EXTRACTED VERSION

OPERATION TEAPOT

Report of the Test Manager
Joint Test Organization

Nevada Test Site
Spring 1955

NOTICE

This is an extract of Report of the Test Manager, Operation TEAPOT, which remains classified SECRET/RESTRICTED DATA as of this date.

Extract version prepared for:

Director
DEFENSE NUCLEAR AGENCY
Washington, D.C. 20305

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Operation TEAPOT

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

It is the primary purpose of this report to record test operation data and experience for Operation TEAPOT which will be of greatest use to those responsible for the future planning and executing of test operations and the utilization and development of the Nevada Test Site. This report has been compiled as a general summary with a view toward its reference value to the Atomic Energy Commission.

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FOREWORD

This report has had classified material removed in order to make the information available on an unclassified, open publication basis, to any interested parties. This effort to declassify this report has been accomplished specifically to support the Department of Defense Nuclear Test Personnel Review (NTPR) Program. The objective is to facilitate studies of the low levels of radiation received by some individuals during the atmospheric nuclear test program by making as much information as possible available to all interested parties.

The material which has been deleted is all currently classified as Restricted Data or Formerly Restricted Data under the provision of the Atomic Energy Act of 1954, (as amended) or is National Security Information.

This report has been reproduced directly from available copies of the original material. The locations from which material has been deleted is generally obvious by the spacings and "holes" in the text. Thus the context of the material deleted is identified to assist the reader in the determination of whether the deleted information is germane to his study.

It is the belief of the individuals who have participated in preparing this report by deleting the classified material and of the Defense Nuclear Agency that the report accurately portrays the contents of the original and that the deleted material is of little or no significance to studies into the amounts or types of radiation received by any individuals during the atmospheric nuclear test program.

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INTRODUCTION

It is the primary purpose of this report to record test operation data and experience for Operation Teapot which will be of greatest use to those responsible for the future planning and executing of test operations and the utilization and development of the Nevada Test Site. This report has been compiled as a general summary with a view toward its reference value to the Atomic Energy Commission.

The entire report is comprised of seven principal parts. Part I presents a general activities account of the operation; Part II is the scientific version of the operation's objectives and accomplishments as presented by the Test Director of the Joint Test Organization; Part III presents the aspects of the Public Relations and Information Programs; Part IV presents the Federal Civil Defense operations; Part V presents the Department of Defense operations; Part VI presents the Nevada Test Site support account including engineering, construction and logistical functions performed mainly at the Nevada Test Site; Part VII presents the Operation Teapot costs.

Since this report has been compiled within a very short time after the termination of Operation Teapot, no conclusions or recommendations have been included but will be developed in the future contingent upon the completion of various studies of the segments of the operation.

PART I - GENERAL ACTIVITIES ACCOUNT

CHAPTER 1 - SUMMARY

1.1 OPERATION SITE

Nevada Test Site (formerly called the Nevada Proving Ground) is a facility of the Atomic Energy Commission for the full-scale testing of nuclear devices and weapons. It was established in early 1951 as a "backyard laboratory" for the Los Alamos Scientific Laboratory's weapons development program as an alternate to the more remote Pacific Proving Ground. The Nevada Test Site is a location where relatively small yield devices and weapons can be detonated in less time and with considerably less effort and expense than is required overseas. The site is located in Nye County, Nevada, 70 miles northwest of Las Vegas, Nevada, on land acquired from U. S. Air Force's Las Vegas Bombing and Gunnery Range, with the exception of a small tract at the south end which was withdrawn from public domain as the location for Mercury. the base camp facility. The test site is a rectangular tract approximately 16 miles east and west by 40 miles north and south, totaling approximately 650 square miles. The tract appended to the south end for Mercury contains three square miles. The geographical location in its relationship to the Bombing and Gunnery Range and surrounding communities is shown in Figure 1. Operationally, the Nevada Test Site is comprised of two areas, the forward area where the tests and experiments are conducted and the base camp (Mercury) area. The forward area includes firing sites in both Frenchman and Yucca Flats and the Control Point facilities which are located between those flats. A map of the forward area is shown on Figure 2. Mercury (formerly called "Camp 3") provides facilities for feeding and housing test personnel, main administrative area, motor pool and electrical power plant. Figure 3 shows an aerial view of Mercury. A map of Mercury is shown on Figure 4.

Practically all structures and facilities at the Nevada Test Site are owned and operated under the direction of the Atomic Energy Commission. However, the Department of Defense has established a motor pool for servicing its vehicles and two warehouses for the handling of its materials and supplies. These facilities are operated by the Department of Defense.

Responsibility for the normal operation and maintenance of the test site rests with the Manager, Santa Fe Operations. This responsibility is delegated by the Manager, SFO, to the Manager, Las Vegas Field Office. The Field Office accomplishes the functions of engineering, design, construction, camp operation and maintenance through its various contractors.

1.2 OPERATION PLANNING

In March 1953 the program assumption for Fiscal Year 1955 pertaining to test operations at the Nevada Test Site established plans for full-scale test operations at NTS as follows:

(a) Operation Teapot - Fall of 1954

(b) Operation (unnamed) - Fall of 1955

In a subsequent meeting participated in by personnel from the Scientific Laboratories and Santa Fe Operations Office, it was determined that the execution of a full-scale test on an annual basis at each NTS and PPG did not appear practical. Accordingly, a revised schedule was developed which planned for a Ranger-type operation at NTS in the fall of 1953 and a development, military effects and civil effects operation of general magnitude equivalent to Upshot-Knothole in either late fall 1954 or early spring 1955. Planning was modified again on the basis as follows:

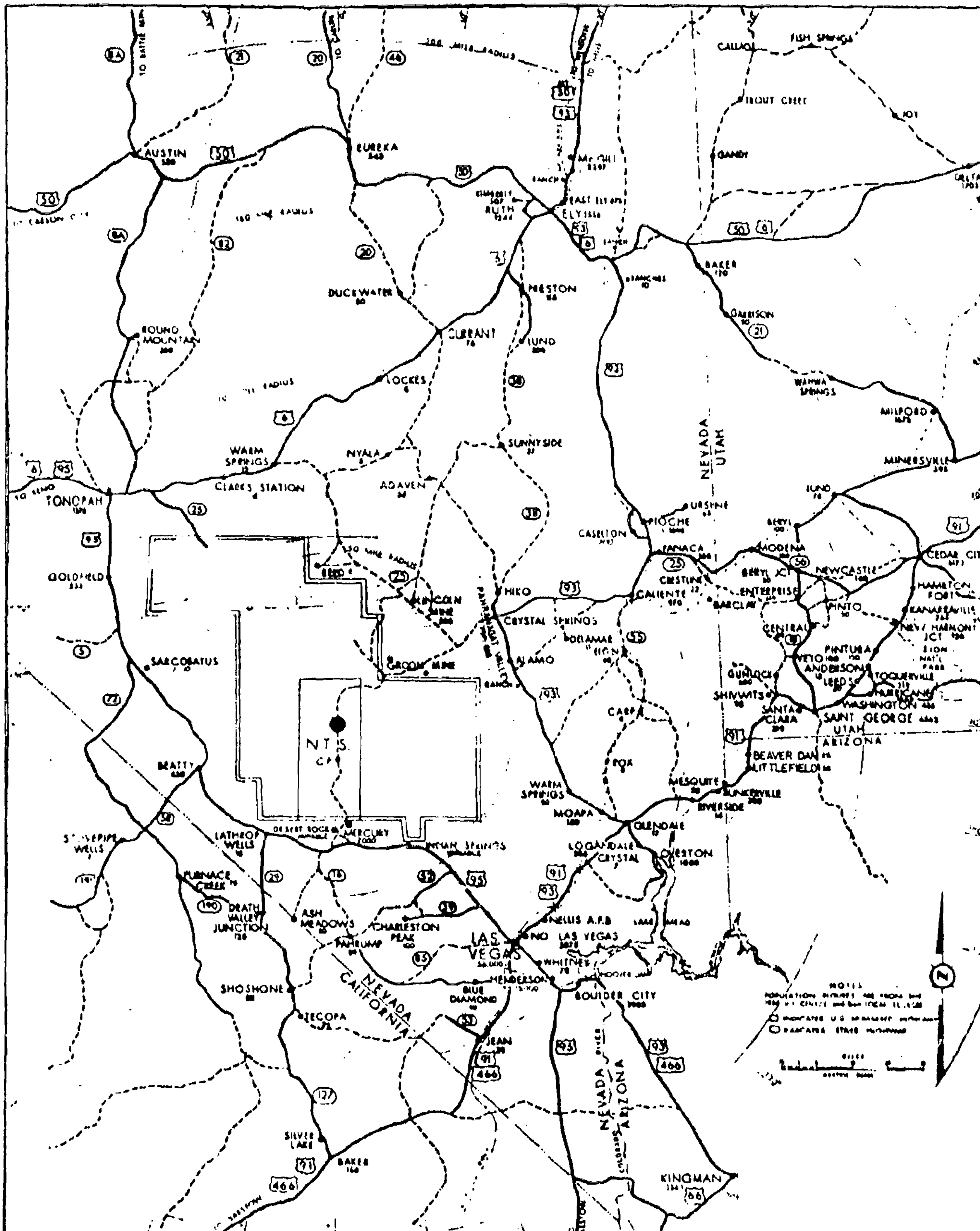


Figure 1 - Nevada Test Site and Vicinity

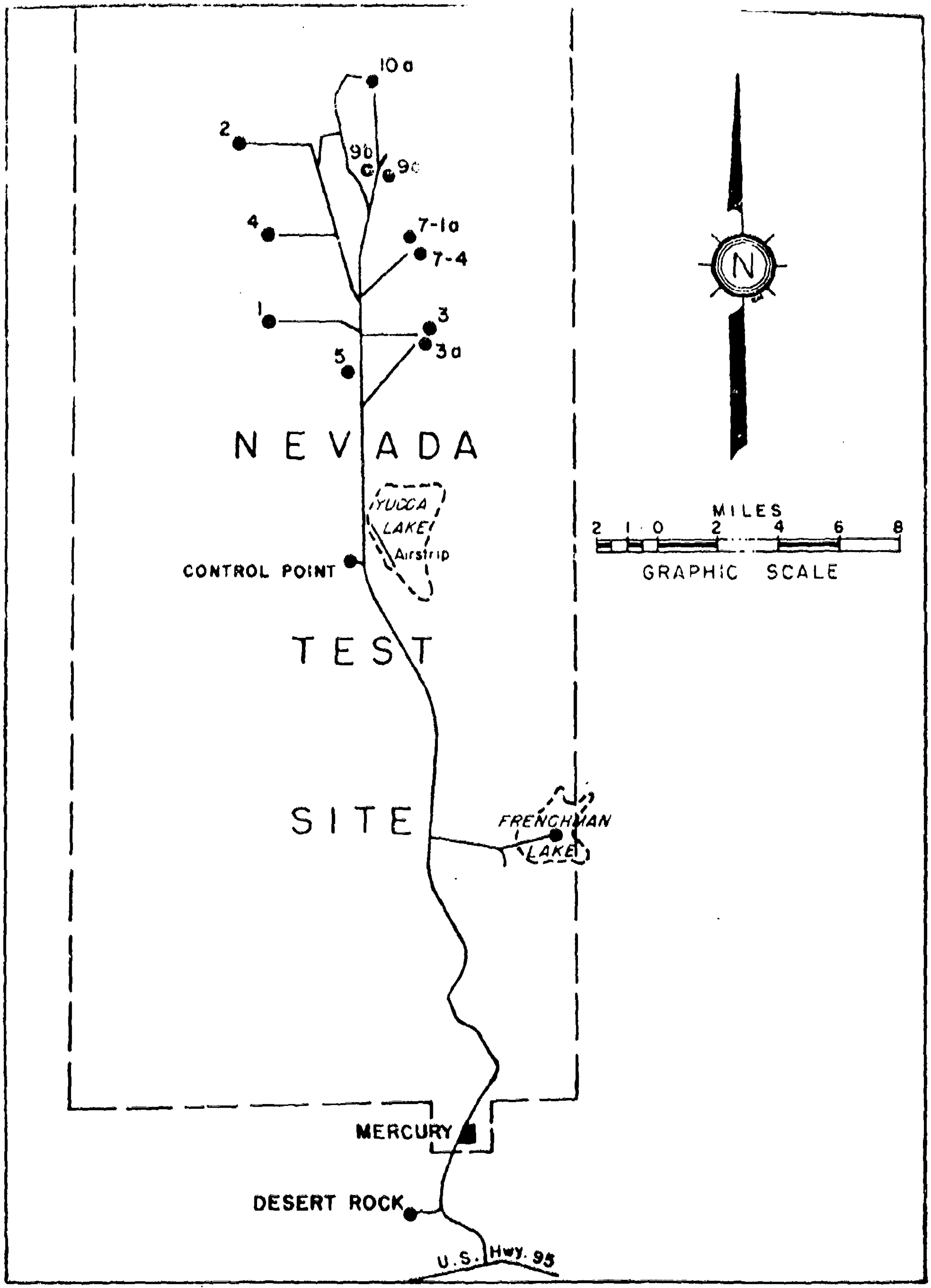
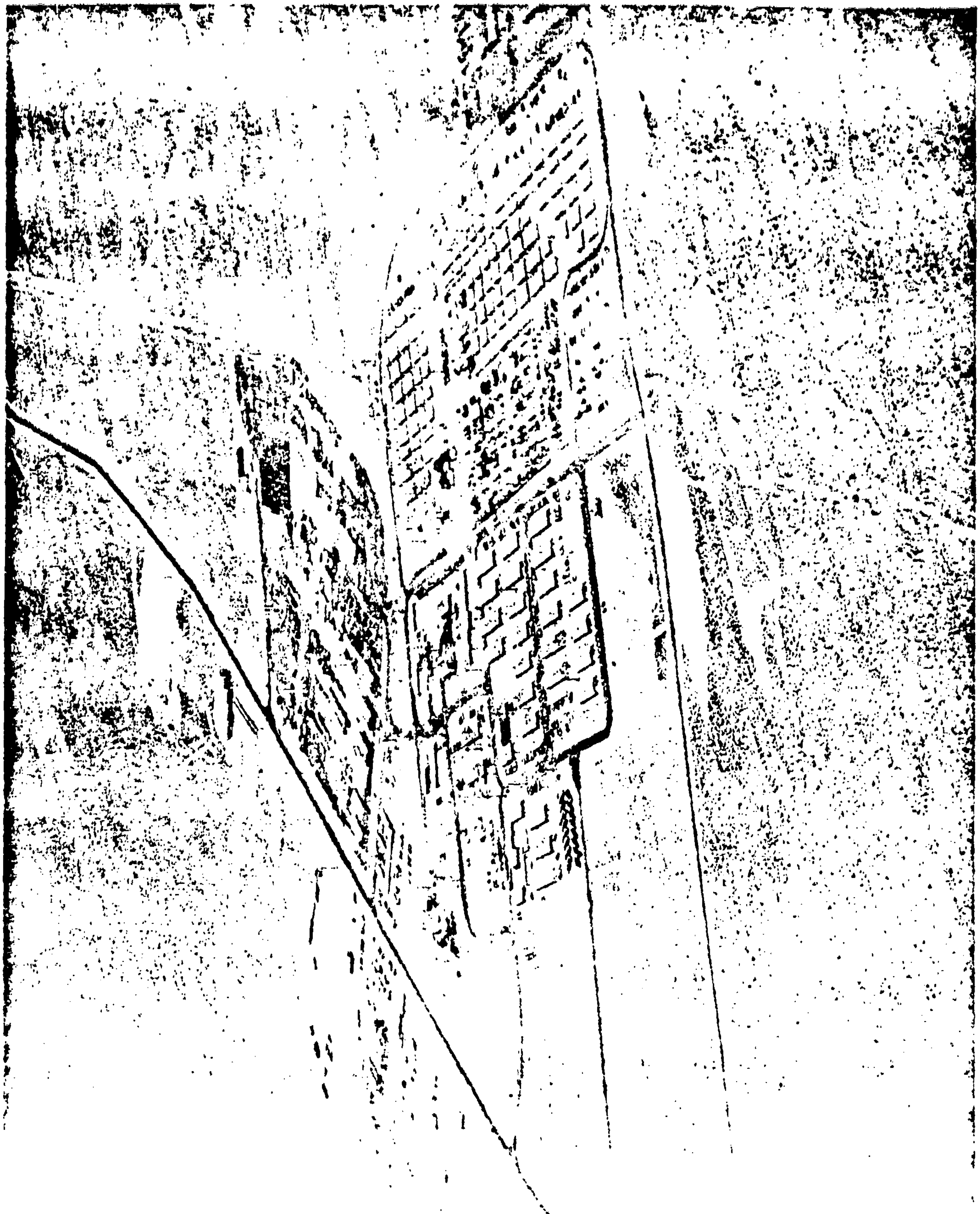


Figure 2 - NTS Forward Area



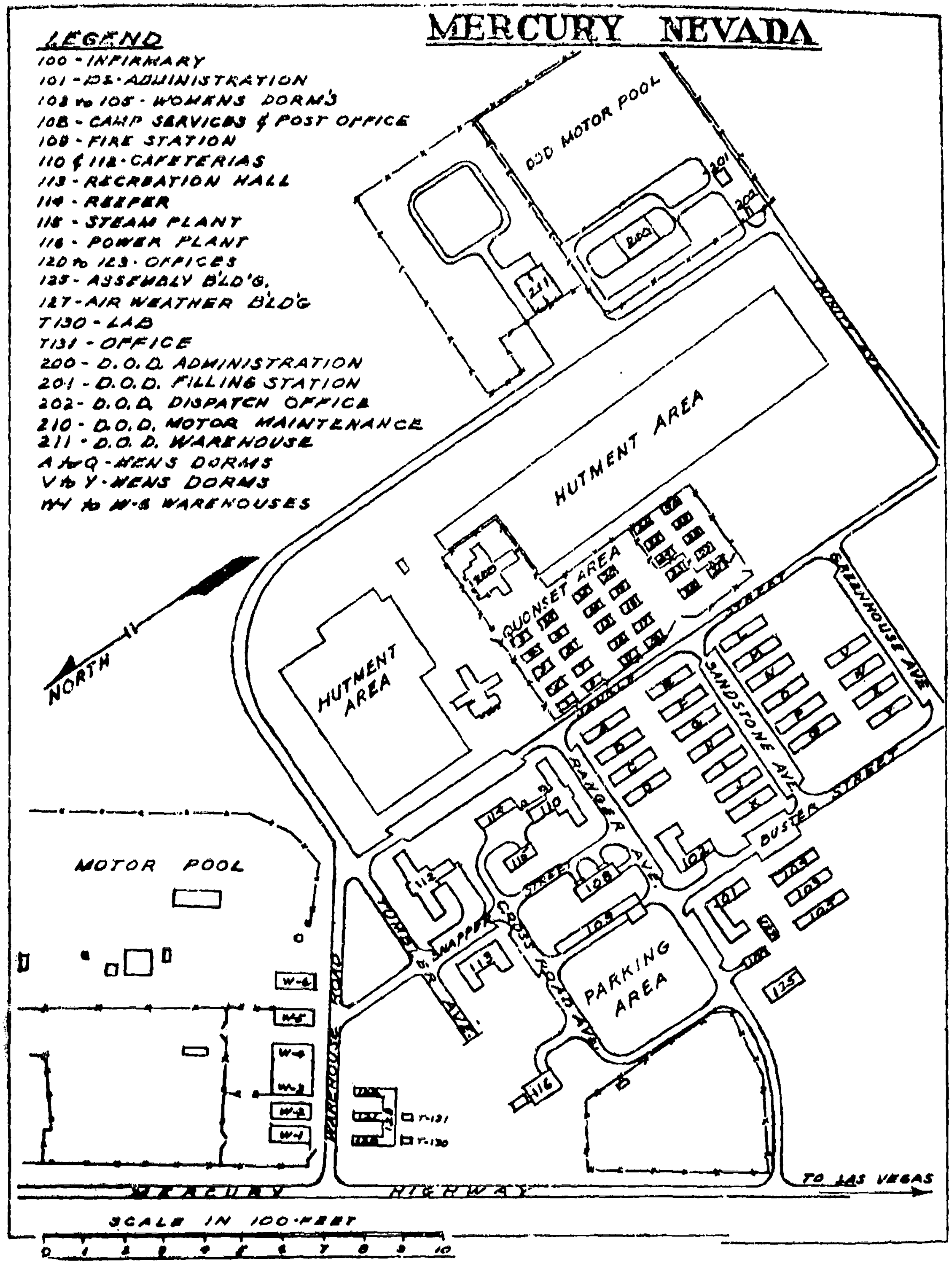


Figure 4 - Map of Mercury, Nevada

(a) Operation Domino - Ranger-Type - Fall 1953

(b) Operation Teapot - Development and Military Effects - Fall 1954

(c) Operation Julep - Development and Military Effects and Weapons Effects - Fall 1955

By July 1953 the revised Fiscal Year 1955 Full-Scale Weapons Test Budget Assumption applicable to NTS was developed to plan for the following operations:

(a) Operation Domino - Fall 1953

(b) Operation Teapot - Fall 1954

(c) Operation Julep - Spring 1956

In March 1954, planning was further revised to include the following operations:

(a) Operation Teapot I - Fall 1954

(b) Operation Teapot II - Spring 1955

(c) Operation Dixie - Fall 1955

(d) Operation Julep - Fall 1956

Subsequent to the preparation of estimates on the above basis, alternate estimates were prepared encompassing the following assumptions:

(a) Operation Teapot - Spring 1955

(b) Operation Dixie - Fall 1955

(c) Operation Julep - Fall 1956

In the preparation of the Mid-Year Review 1955 estimates were prepared in the fall of 1954 on the following basis:

(a) Operation Teapot - Operational Period from 2-1-55 to 4-30-55 inclusive

(b) This assumption planned for twelve detonations consisting of two air drops, a sub-surface shot, five 300-foot tower shots, and four 500-foot tower shots. This planning required the reactivation of Area 9 involving the construction of a new "300" station, several lesser instrument stations and associated signal and power cable.

At Meeting 1020 on August 18, 1954, the Commission, by Staff Paper AEC 707/5, dated September 9, 1954, made their decision on AEC 707/3, "Nevada Proving Ground Test Activities for Calendar Year 1955." This approved the conducting of a series of atomic tests at the Nevada Proving Ground during the Calendar Year 1955, commencing about mid-February, and generally of the scope outlined in paragraph 5 of AEC 707/3.

1.3 OPERATING CRITERIA FOR OPERATION TEAPOT

In AEC Staff Paper 141/22 dated February 5, 1954, subject: "Use of Nevada Proving Ground," the Commission determined the policy with respect to future use of the Nevada Proving Ground. Reconsideration was given to this in AEC Staff Paper 141/25 dated June 24, 1954, in evaluating the continued use of the Nevada Proving Ground for atomic testing activities in the light of comments from the General Advisory Committee and the Advisory Committee on Biology and Medicine. Paragraph 6 of Appendix "A" of AEC Staff Paper 141/25 set forth the operating criteria for Operation Teapot.

"a. The number of nuclear shots at the Nevada Proving Grounds in one year should be determined by laboratory requirements as reviewed by the Division of Military Application in the light of other pertinent considerations and approved by the Commission.

"b. Each nuclear shot programmed whether AEC, military or civil defense should be justified individually and the number involved should be held to the minimum consistent with technical requirements.

"c. Each potentially hazardous shot should be separately identified and justification for such a shot should include plans for controlling or reducing fall-out from it.

"d. Shots should be scheduled with more elasticity, so that non-critical shots may be fired when conditions are not right for more critical or marginal shots. Such elasticity will benefit from addition of new firing areas."

"e. Marginal shots should be fired only under satisfactory weather conditions that have a high degree of predictable stability. The possibility of continuing postponements and of resulting extension of series duration should be accepted. Participating organizations and units should be advised that they must accept the possibility of postponements on such shots.

"f. Any air drop of more than 1 KT projected yield should be scheduled only after thorough evaluation of the reliability of its fusing system.

"g. Shots should be limited as follows with regard to yield and burst altitude, with maximum yield to incorporate a reasonable allowance for error:

Surface and sub-surface, 1 KT

300-foot tower, 25 KT

500-foot tower, 50 KT

Air drop, 80 KT (fireball not to touch ground)

"Prior to detonating a 50 KT weapon from a 500-foot tower the safety factor calculated for such a shot should be confirmed by detonating a shot of lesser magnitude from a 500-foot tower."

In memorandum to Brig. General K. E. Fields from James E. Reeves and Alvin C. Graves dated December 7, 1954, subject: "Operation Teapot," a specific program for the conductance of Operation Teapot was submitted for Commission approval.

Operation Teapot was conducted throughout its duration in conformance with the operating criteria set forth above and in accordance with the plan referred to in the above-mentioned December 7 memorandum.

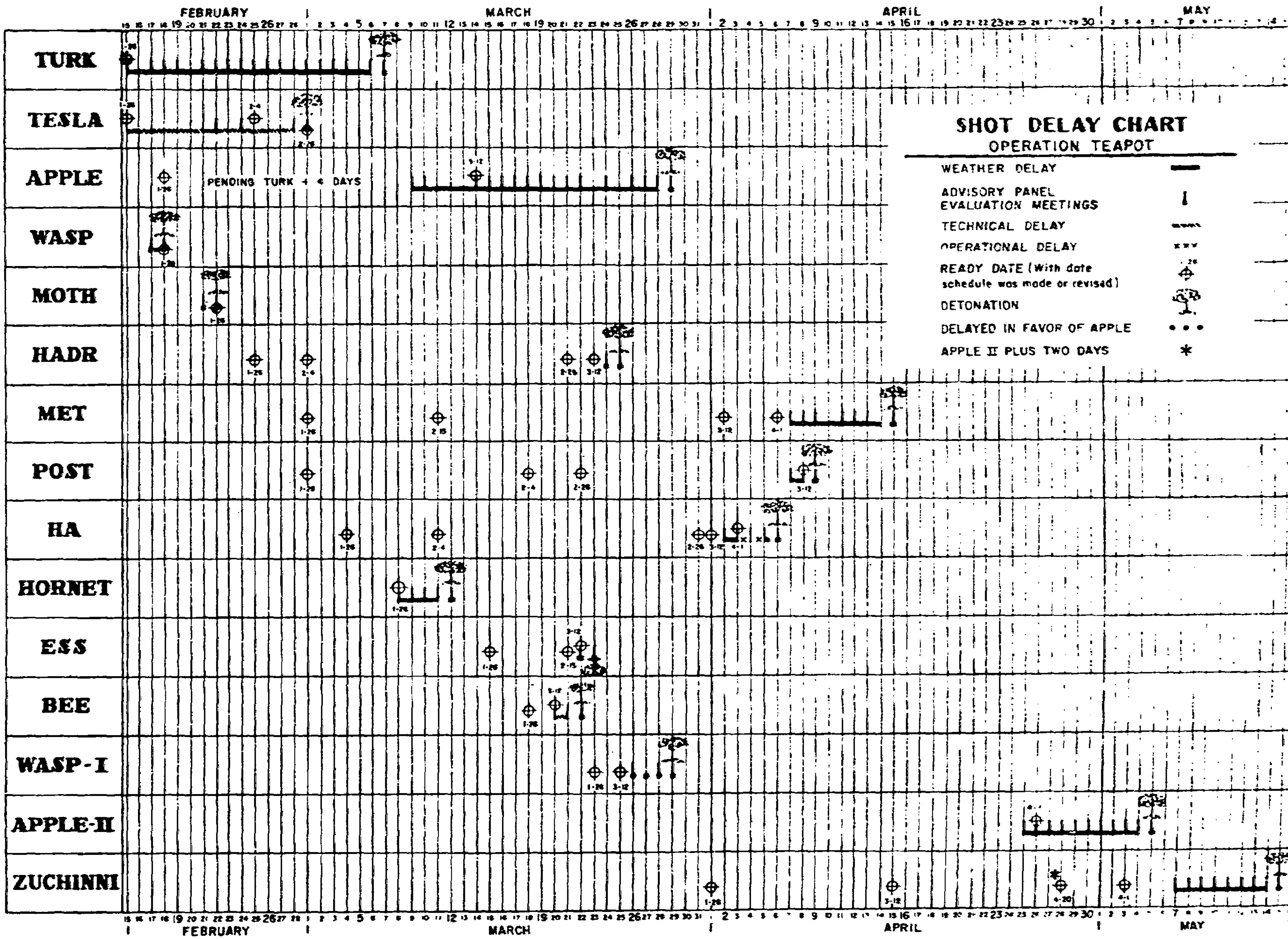


Figure 5 - Shot Delay Chart

1.4 OPERATION SCOPE AND SCHEDULE

1.4.1 GENERAL

Operation Teapot was a full-scale operation developed by the Atomic Energy Commission (AEC) for testing nuclear devices and experimental weapons evolved in the Los Alamos Scientific Laboratory (LASL) and the University of California Radiation Laboratory (UCRL). In addition to extensive diagnostic experimental programs conducted by these laboratories, there was also included a program of Weapons Effects Tests sponsored by the Department of Defense (DOD) and a Civil Effects Test program sponsored by the Federal Civil Defense Administration (FCDA) and the Atomic Energy Commission's Division of Biology and Medicine as a joint effort. The final approved readiness schedule is shown in Table 5, Part II. The sequence of shots as they actually occurred is shown in Table 6, Part II. The scientific objectives, operational concepts and technical conclusions are discussed in Part II, Scientific Account.

1.4.2 SCHEDULE

The first readiness date was February 15, 1955, for the TURK device. The first Advisory Panel meeting to consider the firing of this shot was held on February 14, 1955. Figure 5 is a Shot Delay Chart showing the extent and general reasons for shot postponements. ZUCCHINI was detonated as the last shot of the Teapot series on 150500 PDT May.

The following is a listing giving the summary of results of the Advisory Panel evaluation meetings during Operation Teapot.

TEAPOT

SUMMARY OF REPORTS OF ADVISORY PANEL

Meeting February	Objective		Next Meeting Scheduled	Results
142130	TURK	150545	150030	Continue preparations
150030	TURK	150545		Fallout prediction unfavorable Postponed 24 hours
151030				Continue preparations
152130	TURK	160545	161030	Fallout prediction unfavorable Postponed 24 hours
161030	TURK	170545	(162130) 171030	Fallout situation appeared unfavorable, but preparations continued until 161630 when Test Mgr. and Scientific Advisor decided to postpone 24 hrs and set meeting for 171030
171030)	(TURK)	180545	181030	Fallout prediction unfavorable Postponed 24 hours.
)	(			
171030)	(WASP	180730	172030	Continue preparations
172030	WASP	180730	180630	Continue. Situation favorable at 180630, but because of a/c difficulties, WASP was not fired on sched. Next meeting on WASP set for 181030
181030)	(WASP	as soon as possible		WASP fired at 181159
)	(			
181030)	(TURK	190540	182030	Continue preparations
182030	TURK	190540	190200	Continue preparations
190200	TURK	190540	191030	Fallout prediction unfavorable Postponed 24 hours.
191030	TURK	200540	211030	Fallout prediction unfavorable Postponed 48 hours

Meeting	Objective		Next Meeting Scheduled	Results
211030)	(TURK	220530		Fallout prediction unfavorable
)	(			Postponed 24 hours
211030)	(MOTH	220550	212030	Continue preparations
212030	MOTH	220545	220200	Continue preparations
220200	MOTH	220545	221030	MOTH fired at 220545
	(TURK	230535		Weather unfavorable for
221030	(			Feb 23
	(TESLA	230535		Electrical difficulties
				Feb 25 earliest ready date
231030	TURK	240535	241030	Fallout prediction unfavorable
				Delay until Feb 25
241030	(TURK	25035	251030	Fallout prediction unfavorable
	(			Postponed 24 hours
	(TESLA	250535		TESLA not ready before
				March 1
251030	TURK	260535	252130	Continue preparations
252130	TURK	260535	261030	Fallout prediction unfavorable
				Postponed 24 hours
261030	TURK	270530	271030	" " "
271030	TURK	280530	281030	" " "
		(March)		
281030	(TURK	010530		" " "
	(			
	(TESLA	010530	282130	Continue preparations
			(March)	
282130 March	TESLA	010530	010400	Continue preparations
010400	TESLA	010530	011030	TESLA fired 010530 March
011030	TURK	020530	012130	Continue preparations

Meeting	Objective	Next Meeting Scheduled	Results
012130	TURK 020530	020400	TURK
020400	TURK 020530	031030	Fallout prediction unfavorable Postponed 48 hours
031030	TURK 040525	041030	Fallout prediction unfavorable Postponed 24 hours
041030	TURK 040525	061030	Fallout prediction unfavorable Postponed 48 hours
061030	TURK 070520	062130	Continue preparations
062130	TURK 070520	070400	Continue preparations
070400	TURK 070520		TURK fired at 070520
081030	HORNET090520	091030	Fallout prediction unfavorable Postponed 24 hours
091030	(HORNET090520 (((APPLE 090520	101030))) 101030)	(Fallout prediction unfavorable; (Also clouds unfavorable for (sampling. (Operations postponed 24 hours
101030	(HORNET 110520 (	102130	Continue preparations
	(APPLE 110520		Technical difficulties; not ready before March 11
102130	HORNET 110520	111030	Fallout prediction unfavorable Postponed 24 hours
111030	HORNET 120520	112130	Continue preparations
112130	HORNET 120520	120400	Continue preparations
120400	HORNET 120520		HORNET fired 120520 March
141030	APPLE 150515	142130	Continue preparations
142130	APPLE 150515	150400	Continue preparations

Meeting	Objective		Next Meeting Scheduled	Results
March				
150400	APPLE	150515	161030 (Changed to 151330)	Fallout Prediction unfavorable Postponed 48 hours.
151330	APPLE	160515	152030	Continue preparations
152030	APPLE	160515	160330	Continue preparations
160330	APPLE	160515	171030	Fallout prediction unfavorable Postponed 48 hours
171030	APPLE	160515	181030	Fallout prediction unfavorable Postponed 24 hours
181030	APPLE	160515	191030	Fallout prediction unfavorable Postponed 24 hours
191030	APPLE		201030	Fallout prediction unfavorable Postponed 24 hours
211030	(APPLE		211030	Fallout prediction unfavorable Postponed 24 hours
	(BEE		211030	Technical difficulties Postponed 24 hours
211030	(APPLE	220505		Fallout prediction unfavorable Postponed 24 hours
	(BEE	220505	212130	Continue preparations
212130	BEE	220505	220330	Continue preparations
220330	BEE	220505		BEE fired 220505 March
221130	(APPLE	230505		Fallout prediction unacceptable
	(ESS	230900	222130	Continue preparations

Meeting	Objective		Next Meeting Scheduled	Results
March				
222130	ESS	230900	230730	Continue preparations
230730 to 231120	ESS	230900		ESS fired 231230 March
241030	(APPLE	250505	242130	Continue preparations
	(HADR	250900	242130	Continue preparations
242130	(APPLE	250505		Fallout prediction unfavorable Postponed
	(HADR	250900		HADR executed 250900 March
261030	(APPLE	270500	262130	Continue preparations
	(WASP PRIME	27		Continue; at 1500 WASP PRIME was eliminated from consider- ation in favor of APPLE
262130	APPLE	270500	270345	Continue preparations
270345	APPLE	270500	272130	Fallout prediction unfavorable. Postponed 24 hours. 272130 meeting cancelled.
281030	(APPLE	290455	282030	(Continue for APPLE at 290455. (Continue for WASP PRIME at (291000 - 291300
	(WASP PRIME	291000		
282030	(APPLE	290455	290330	(Preparations continued for APPLE (at 290455 & WASP PRIME at (291000.
	(WASP PRIME	291000		
290330	(APPLE	290455		(APPLE detonated at 290455.
	(WASP PRIME	291000	290830	(Continue preparations

Meeting	Objective		Next Meeting Scheduled	Results
March				
290830	WASP PRIME	291000		WASP PRIME was fired 291000 March
April				
021030	HA	030900	022000	Continue preparations
022000	HA	030900	030730	Continue preparations
030730	HA	030900	031045	Could not be fired due to operational failure of aircraft; cancelled at 0815 for April 3.
031045	HA	040900	040800	Weather conditions for aircraft unfavorable; postponed 24 hrs.
040800	HA	050900	050800	Weather conditions for aircraft unfavorable; postponed 24 hrs.
050800	HA	060900	052030	Continuing preparations
052030	HA	060900	060730	Continue preparations
060730	HA (An informal meeting at CP)			HA was fired 061000
070830	(MET (POST	080900 080430	072130	Continue for MET and retain capability for POST
072130	(MET (POST	080900 080430	080730	Continue for MET only.
080730	MET	080900	082130	Fallout prediction unacceptable for MET to be fired April 8. Continue preparations for MET 4/9/55

Meeting	Objective		Next Meeting Scheduled	Results
April				
082130	(MET (POST	090900 090430	090300	Continue for both MET & POST April 9.
090300	POST	090430	090530	POST detonated at 090430 APRIL
090530 090730	MET	090900	 111030	MET postponed at the 090730 meeting. Not to be fired earlier than Tuesday, April 12
111030	MET	120900	120830	Fallout prediction unfavorable to fire MET April 12
120830	MET	130900	130830	Fallout prediction & clouds unfavorable for MET April 13
130830	MET	140900	140830	Fallout prediction unfavorable to fire MET April 14.
140830	MET	150900	142130	Continue preparations
142130	MET	150900	150530	Continue preparations
150530	MET	150900	150730	Continue, but unfavorable fall-out pattern to fire at 0900
150730	MET		150930	Continue, fallout pattern shifting
150930	MET	151115	151045	Continue preparations
151045	MET	151115	251030	MET fired at 151115
251030	APPLE II	260520	261030	Fallout prediction unacceptable; Cloud cover unfavorable & experiments not ready. Postponed 48 hrs.
261030	APPLE II	270515	262130	Continue preparations

Meeting	Objective		Next Meeting Scheduled	Results
April				
262130	APPLE II	270515	270345	Continue preparations
270345	APPLE II	270515	271030	Fallout pattern unfavorable. Postponed 24 hours.
271030	APPLE II	280515	272130	Continue preparations
272130	APPLE II	280515	280345	Continue preparations
280345) 280445)	APPLE II	280515	281030	Fallout pattern unfavorable. Postponed 24 hours.
281030	APPLE II	290515	291030	Weather & fallout pattern unfavorable. Postponed 48 hrs.
291030	APPLE II	300510	301030	Fallout pattern unacceptable Postponed 48 hours.
301030	APPLE II	010510 May	302130	Continue preparations
302130	APPLE II	010510 May	010345	Continue preparations
May				
010345	APPLE II	010510	011030	Cloud sampling uncertain due to overcast in test area. Postponed
011030	APPLE II	020510	012130	Continue preparations
012130	APPLE II	020510	021030	Unfavorable fallout pattern. Postponed 24 hours.
021030	APPLE II	030510	031030	Unacceptable fallout prediction Postponed

Meeting	Objective		Next Meeting Scheduled	Results
May				
031030	APPLE II	040510	032130	Continue preparations
032130	APPLE II	040510	041030	Unacceptable fallout prediction Postponed
041030	APPLE II	050510	042130	Continue preparations
042130	APPLE II	050510	050345	Continue preparations
050345) 050445)	APPLE II	050510	061030	APPLE II detonated 050510 061030 Panel meeting canceled
071230	ZUCCHINI		081030	Unfavorable weather. Postponed
081030	ZUCCHINI	090505	091030	Unacceptable fallout pattern Postponed
091030	ZUCCHINI	100505	101030	Unfavorable fallout pattern Postponed
101030	ZUCCHINI	110505	102130	Continue preparations
102130	ZUCCHINI	110505	110330	Continue preparations
110330	ZUCCHINI	110505	111030	Fallout pattern unacceptable Postponed
111030	ZUCCHINI	120500	112130	Continue preparations
112130	ZUCCHINI	120500	120330	Continue preparations
120330	ZUCCHINI	120500	131030	Fallout pattern unacceptable Postponed 48 hours
131030	ZUCCHINI	140500	Inform 131530	Unfavorable weather picture. 131530 - conditions still unacceptable. Informal meeting scheduled for 141500

Meeting	Objective	Next Meeting Scheduled	Results
141500(inform)	ZUCCHINI 150500	142030	Continue preparations
142030	ZUCCHINI 150500	150330	Continue preparations
150330	ZUCCHINI 150500	-----	ZUCCHINI detonated. Teapot series completed

A total of 122 formal evaluation meetings were held. There were fifty-four postponements due to predicted adverse meteorological conditions. These unfavorable weather conditions created not only an unfavorable fallout prediction, but in some cases due to excessive cloud cover also made it unfavorable for cloud sampling. There were three postponements due to the scientific technical difficulties and four postponements because of aircraft operational difficulties. Several of the postponements were due to a combination of the above factors. It is considered that not one good firing day was missed, and at the most, possibly two marginal firing days were missed.

1.4.3 DUAL CAPABILITY

In a Commission Staff Paper, AEC 141/25 (See Section 1.3), criteria were set forth for tests in Nevada which included the following: "Shots should be scheduled with more elasticity, so that non-critical shots may be fired when conditions are not right for more critical or marginal shots."

Accordingly, the Test Manager and his Scientific Advisor wrote a memorandum to the Division of Military Application dated 7 December 1954 in which the proposed Teapot shots were divided into two groups according to expected difficulty from the off-site fallout point of view, and elaborated on a plan for firing either difficult shots or easy shots, designated as Group A and Group B shots, respectively, depending on the suitability of weather for difficult shots.

It seems useful, therefore, to consider the results of this dual capability approach and to determine whether a similar plan should be adopted for future operations. Those instances in Operation Teapot in which two shots were considered are summarized in the following paragraphs.

On 17 February at 1030, the first weather meeting to consider two shots was held. TURK, a 500-foot tower shot with a maximum yield of 50 KT, and WASP, a 2 KT 800-foot airburst, were both ready. TURK was considered a difficult shot and WASP easy. Because the fallout pattern was forecast to the south over the Control Point, Camp Mercury, and Desert Rock, TURK was postponed; WASP was continued since some change in wind direction prior to shot time was possible. After consideration in several other meetings on 17 February and the morning of 18 February, and after delays due to aircraft difficulties and cloud cover, WASP was fired at 11:59 a.m. on 18 February 1955. The pattern would have been unacceptable for TURK.

A meeting was held on 211030 February to consider the possibility of firing TURK at 220530 or MOTH at 220545. The predicted fallout pattern was slightly east of south and was unacceptable for TURK. MOTH, however, was continued. Essentially the same fallout pattern was predicted at the 212030 February meeting, and MOTH was continued. At a meeting at 220200 February the main fallout pattern was forecast to be slightly east of Frenchman's Flat with the 4r line extending out 10 miles and with 0.2r at 30 miles. After a confirmatory meeting at 0415, MOTH was detonated at 220545 February. The pattern would have been unacceptable for TURK.

A Meeting was held at 281030 February to consider TESLA and TURK. For TURK, the predicted pattern had a bearing of 90° and indicated that the 4r line would be over St. George. This was unacceptable. For TESLA, the 4r line extended only 45 miles. This was acceptable. At the 282130 meeting, the developing situation showed no shear in the winds, and the 4r line extended 80 miles on a bearing of 92°. It was not considered acceptable to put so much activity in the Bunkerville-St. George area on an easy shot. However, since the situation was changeable, TESLA was continued. At the 010400 meeting, more shear was anticipated and a pattern was predicted in which the bearing was 98° and in which the 4r line extended only 50 miles. This was acceptable, and TESLA was fired at 010530. The pattern was essentially as predicted and would have been unacceptable for TURK. TURK was detonated on 070520 March without a dual capability.

In the period between 14 February and 7 March the only acceptable day for the TURK detonation was the day it was fired. The planned flexibility of the schedule permitted the Test Organization to test three alternate devices during that period. This shortened the operation by insuring that the acceptable day for TURK was not missed, as well as by utilizing the poor TURK weather for less critical shots.

At the 091030 March meeting of 1955, consideration was given to firing HORNET or APPLE. The forecast pattern was to the north with very little shear, and expected cloud cover was unacceptable for sampling. Showers were forecast downstream, and a very heavy fallout activity was predicted in the vicinity of Lincoln Mine. In view of so many unfavorable factors, both shots were postponed. A second meeting to consider these shots was held at 101030 March. The predicted pattern indicated an infinite dose of 6r near Alamo. Since the technical people wanted time to clean and re-align mirrors, it was agreed not to continue APPLE under such marginal conditions. However, HORNET was continued on the chance that the pattern might shift farther from Alamo. At the 102130 meeting no improvement was evident and, in view of a prediction of 8r a few miles from Alamo, the test was discontinued. HORNET was fired at 120520, with APPLE not ready because of technical difficulties.

On the morning of 17 March a meeting was held to consider APPLE. The forecast fallout pattern was to the south with the 4r line extending 120 miles. 200r was predicted at the distance of the Control Point, and 75r in the vicinity of Mercury and Desert Rock. Hence, APPLE was postponed. Although this wind pattern did not verify, the actual winds for the next morning had almost no shear from the surface to 35,000 feet, and, even though these winds were light, the 4r line would have extended 120 miles to the southwest. This pattern would have been rejected.

A meeting was held at 211030 March to determine whether APPLE or BEE could be detonated on the 22nd of March. Since it was predicted that APPLE would deposit 13r near Las Vegas, and since it was reasonably certain with the existing synoptic situation that fallout would occur in the Nellis-Las Vegas region, APPLE was postponed. Because the 1r line for BEE was predicted to extend only 60 miles, BEE was continued. After several confirmatory meetings, BEE was detonated at 220505 March, as predicted fallout from APPLE would have been unacceptable in the Nellis-Las Vegas region.

A meeting was held on 221130 March to consider conditions for APPLE and ESS. Since 15-20r was predicted on the road from Las Vegas to Glendale for APPLE, and since the experimental people preferred additional time to give them more assurance of successful experiments, APPLE was postponed; however, ESS was continued. Although the weather was acceptable for ESS from an off-site public safety point of view, experimental equipment to record fallout had been positioned in the east-southeast sector, and it was considered desirable from a technical point of view to obtain data from this equipment. Since a favorable shift was possible, an almost continuous meeting was held from 0730 until 1200 hours. At that time, it was predicted that the pattern would be in the acceptable sector and ESS was detonated at 231230 March.

A meeting held at 241030 March determined that weather conditions favorable for both APPLE and HADR were possible, and preparations were continued to fire both shots. At the 2130 meeting it was agreed that APPLE could deposit an extremely heavy dose of radiation in the Las Vegas-Nellis area and that it was too risky to consider the firing of APPLE under these conditions. HADR was continued and the test completed on 250900 March.

At a meeting held on 261030 March it was decided to continue both APPLE and WASP-PRIME; however, at a subsequent informal meeting held at 1500 hours, WASP-PRIME was eliminated from consideration. APPLE was discontinued at the 0345 meeting since the pattern that developed would have put an infinite dose of 200r at the Control Point and 40r at Mercury. A second meeting to consider APPLE and WASP-PRIME was held at 281030 March, and after a number of confirmatory meetings APPLE was detonated at 290455 March. At 290830 March a decision was made to fire WASP-PRIME as well. WASP-PRIME was detonated at 291000 March.

At a meeting held on 070830 April to consider MET and POST the predicted fallout pattern was on a bearing of 107^{o} with 25r near Crystal Springs. Although the predicted winds were extremely light, a heavy concentration of fallout was predicted quite far out due to the almost complete absence of horizontal shear in the winds. Because of the possibility that some shear might develop, preparations were continued for both MET and POST. At the 2130 meeting POST was discontinued in favor of MET, but at a meeting held at 080700 the predicted shift in the winds had not occurred and very heavy fallout was possible on Mercury or Indian Springs. Hence, MET was postponed.

At a meeting held at 082130 April very short fallout patterns were predicted with the 4r line extending out only 50 miles for MET; consequently, both POST and MET were continued and POST was detonated at 090430 April. MET, however, was discontinued at the 090530 meeting. MET was finally detonated on 151115 April.

Operation Teapot was concluded with the firing of APPLE II and ZUCCHINI with no dual capability.

In evaluating the dual capability system used for the first time on Operation Teapot, it seems clear that the following results were obtained:

a. The average interval between shots on Operation Teapot was less than that on Operation Upshot-Knothole and, hence, the overall length of the operation was materially decreased even though more stringent criteria for off-site fallout and for acceptable weather were adhered to.

b. Many shots were tested at an appreciably earlier date than would have been the case if the Upshot-Knothole concept of operations had been followed. For example, under the Upshot-Knothole concept of operations with Teapot fallout criteria, if TURK had been scheduled for 15 February, it would have been fired on the 7th of March. Hence, WASP, MOTH, and TESLA would have been fired some three weeks to a month later than the date on which they were actually fired. Since the data for WASP were needed for a decision to design, produce, and test WASP-PRIME as well as HA and HADR, all of these shots would have been postponed until at least mid-April. It is also probable that there would have been insufficient time to modify BEE and HORNET.

c. Both APPLE and WASP-PRIME were fired on 29 March. This is the first example in any test series of two nuclear tests being conducted on the same day. Such a procedure would have been impossible without the dual capability concept, and its effect on shortening the operation is evident.

It is concluded that the dual capability concept of operations is advantageous and should be adopted where pertinent in future operations.

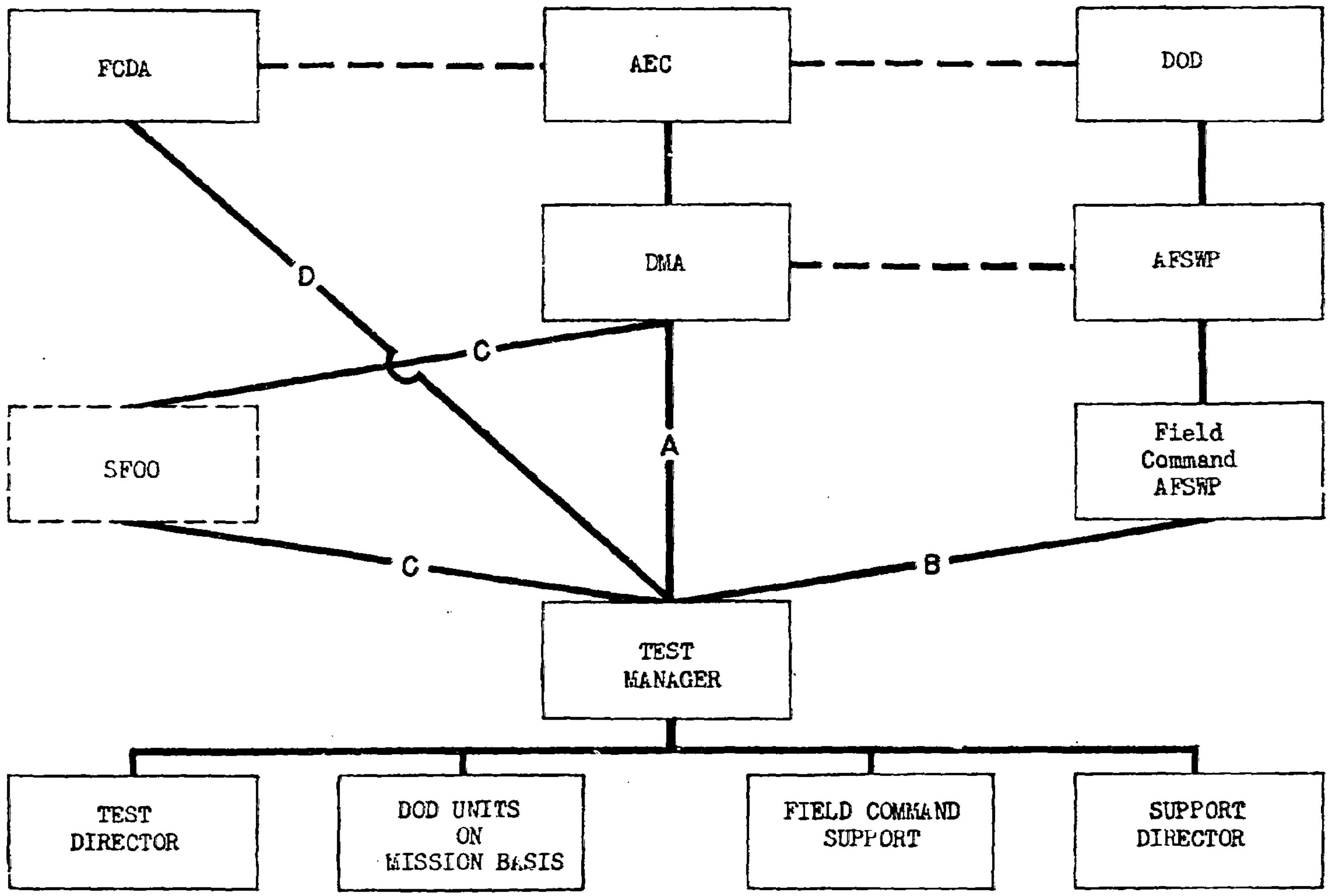
1.5 ORGANIZATION

By Directive issued December 13, 1954, subject: "Directive for Operation Teapot," the Director of the Division of Military Application directed that to implement the commitments being made to the Department of Defense and to provide for the orderly planning and conduct of Operation Teapot, the Manager, Santa Fe Operations, designate a Test Manager for Operation Teapot. Mr. James E. Reeves was designated as Test Manager for Operation Teapot at the Nevada Test Site. During the planning stages the Test Manager was responsible to the Manager of Santa Fe Operations. By a Directive issued January 21, 1955, to the Test Manager, the Manager of Santa Fe Operations set forth instructions for Operation Teapot. The Test Manager was charged with the responsibility for the over-all direction of the test operation and the operational planning therefor (exclusive of scientific experiments). Specifically, along with other instructions, he was directed to execute Operation Teapot in accordance with the plan approved by the Commission and conduct the operation in accordance with the criteria approved by the Commission in AEC 141/22 dated February 5, 1954, and revised in AEC 141/25 dated June 24, 1954.

By Announcement No. 3, Office of the Manager, Santa Fe Operations, dated January 27, 1955, February 1, 1955, was designated as the beginning of the operational period for Operation Teapot at which time the Test Organization would assume operational status with headquarters at Mercury (Nevada Test Site), Nevada. By Announcement No. 8, Office of the Manager, SFO, dated April 29, 1955, the operational period was terminated at midnight on the fourteenth day following the execution of the final detonation (D + 14). Hence this date was established as May 29, 1955. During the operational period the Test Manager reported directly to the Director of Division of Military Application, U. S. Atomic Energy Commission, Washington, D. C., on the general conduct of the test and to the Department of Defense and the Federal Civil Defense Administration on matters concerning their participation. The Joint Test Organization Chart (Operational Period), Operation Teapot (dated 12-15-54) and the Joint Test Organization Chart, Spring 1955 Continental Test (dated 1-15-55) are shown as Figures 6 and 7. Figure 8 depicts the Test Director's Organization Chart, and Figure 9 shows the Support Director's Organization Chart. Personnel to staff the Joint Test Organization were drawn from the resources within the Atomic Energy Commission's Santa Fe Operations organization, AEC contractors and from various services within the Department of Defense, the Federal Civil Defense Administration and other Federal agencies. Staff assistance was furnished to the Joint Test Organization by Divisions of Santa Fe Operations Office throughout the operation. The U. S. Public Health Service, the U. S. Weather Bureau and Civil Aeronautics Administration furnished personnel to assist within the Test Organization.

JOINT TEST ORGANIZATION
(Operational Period)

Operation Teapot



A. General conduct and execution of the atomic tests.
B. Execution of DOD Programs.
C. AEC administrative and contractual channel
D. Execution of FCDA Programs

12/15/54

Figure 6 - Joint Test Organization Chart
(Operational Period)

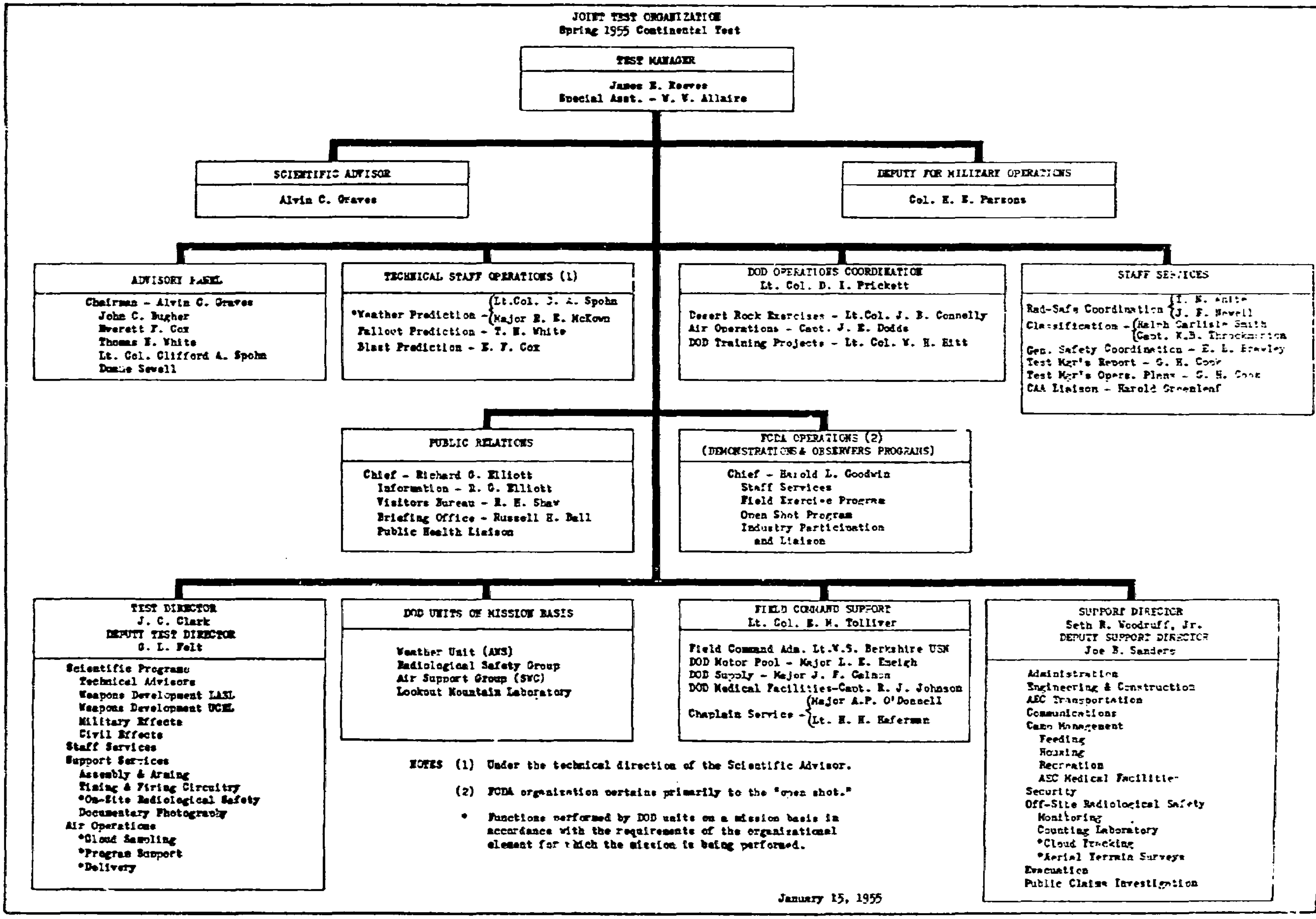


Figure 7 - Joint Test Organization Chart
Spring 1955 Continental Test

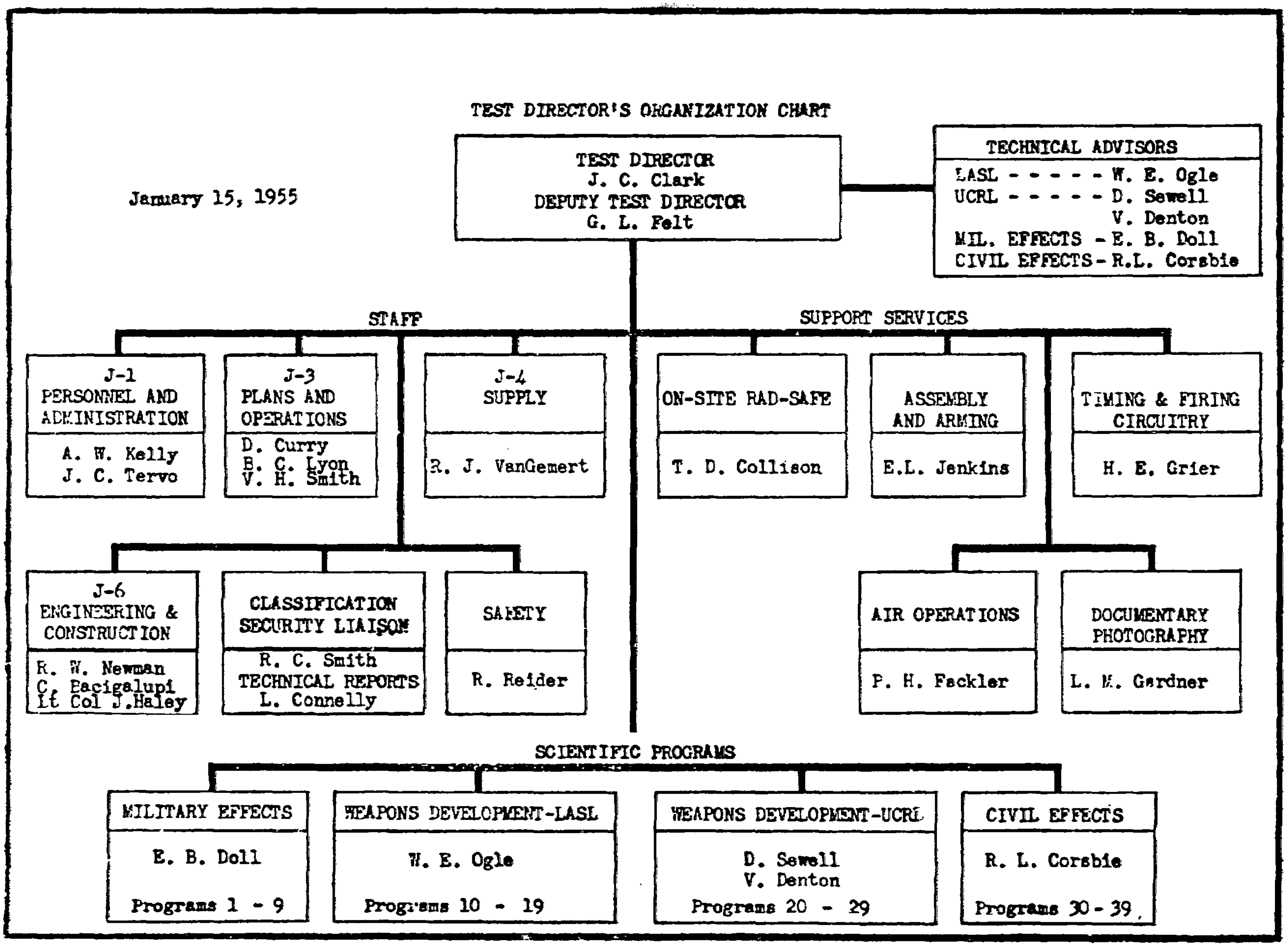


Figure 8 - Test Director's Organization Chart

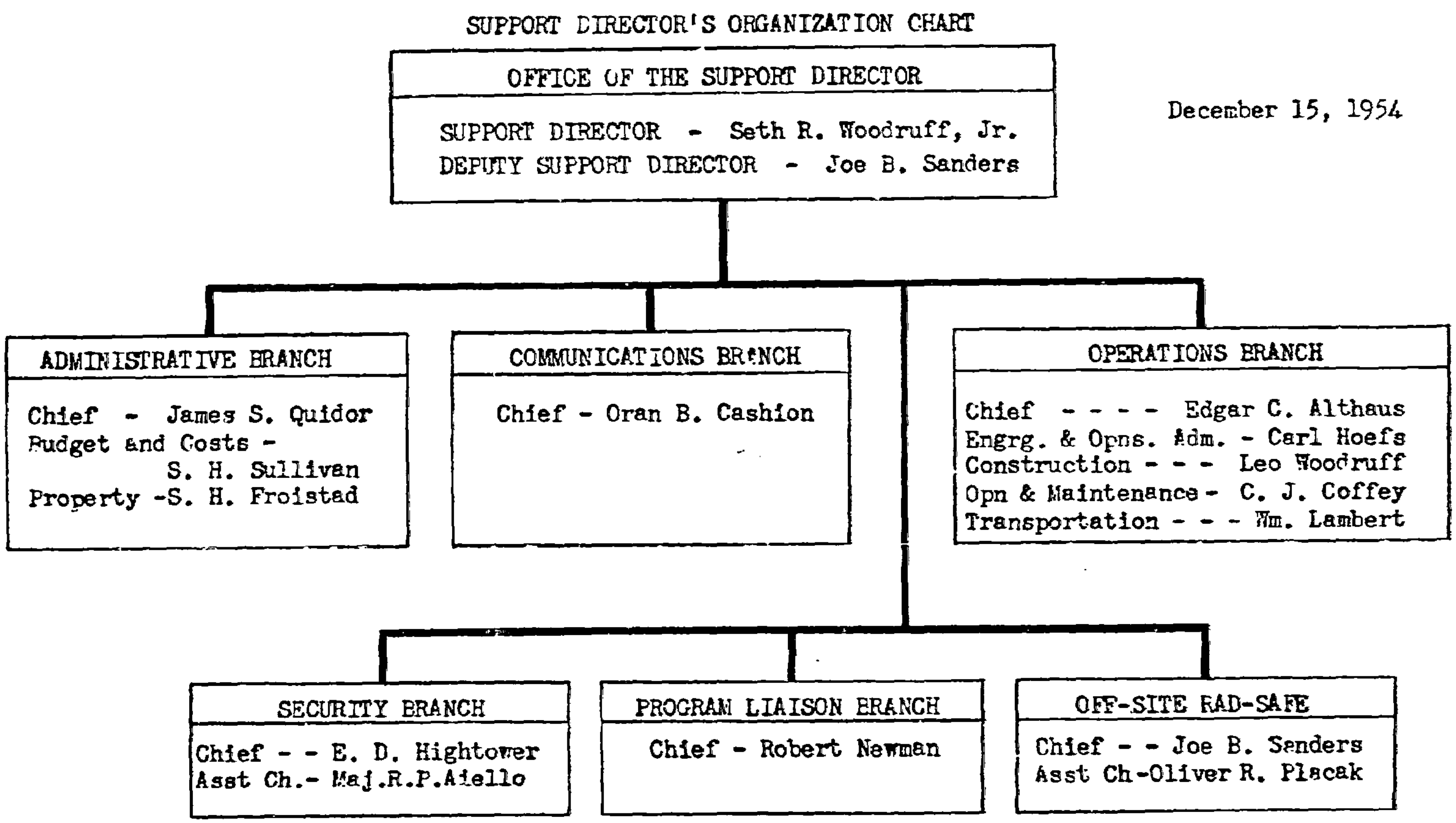


Figure 9 - Support Director's Organization Chart

Dr. Alvin C. Graves was designated Scientific Advisor, providing staff assistance to the Test Manager on matters involving the scientific conduct of the test program. He was Chairman of the Advisory Panel. This panel was comprised of persons qualified in biomedical aspects of radiation and in blast, fallout and meteorological prediction, whose function was to advise the Test Manager on matters within their fields of interest. This panel advised the Test Manager concerning the executing or delaying of a scheduled detonation.

Functions and procedures of other elements of the Test Organization, as shown in the Joint Test Organization Chart (Figure 7), are set forth in the appropriate subsequent chapters.

1.6 GENERAL ACTIVITIES OF THE TEST DIVISION

The Test Division, Santa Fe Operations Office, is responsible to the Manager, SFO, through the Assistant Manager for Engineering, Construction and Test Operations, for matters relating to both continental and off-continental test programs at AEC proving grounds for nuclear devices, weapons and weapon components and their effects. In particular, the Test Division coordinates the planning, development and execution of full-scale testing programs at the AEC proving grounds, including the use of such grounds for effects tests or uses by other agencies, and coordinates and arranges for necessary AEC and contractor support to the agency involved. In this respect much planning and coordination is constantly required with other Divisions of Santa Fe Operations Office, Field Managers, the scientific laboratories, DOD, and other Government agencies and the Federal Civil Defense Administration.

In conformance with the general functions outlined above, the Test Division, SFOO, began the definite planning for Operation Teapot during the latter part of 1953. This was initiated from the tentative participation requirements and scope of scientific tests as submitted by the scientific laboratories and DOD. In about May and June of 1954, tower construction requirements were coordinated with Engineering and Construction Division, SFOO. In June 1954, the Test Division began to formulate the Joint Test Organization Chart, coordinating the various organizational elements with appropriate test participants. With final approval of the chart, action was taken to staff the Joint Test Organization positions with personnel from AEC, SFOO and AEC contractors, other Government agencies, the DOD, and the scientific laboratories. Action was initiated to consummate agreements with DOD and FCDA. Logistical requirements such as housing, office space, warehouse space, motor vehicles, and communications, both telephone and radio, were received from various test participants, reviewed and passed on to the Support Director for fulfillment. The Test Manager's Operations Order was formulated and distributed. The Test Division functions as the central agency in formulating, coordinating, effecting and placing into operation all requirements (exclusive of scientific experiments) which are necessary and required for the conducting of a full-scale test at the Nevada Test Site.

1.7 TEAPOT PARTICIPATING AGENCIES

The following participating agencies were allocated scientific stations for this series of tests:

1. AFCRC - Air Force Cambridge Research Center
2. NOL - Naval Ordnance Laboratory
3. NEL - Naval Electronics Laboratory
4. ERDL - Engineering Research and Development Laboratories
5. SRI - Stanford Research Institute
6. ONR - Office of Naval Research
7. CRL - Chemical & Radiological Laboratory
8. BRL - Ballistics Research Laboratory
9. ESL - Evans Signal Laboratory
10. NRL - Naval Research Laboratory
11. NRDL - Naval Radiological Defense Laboratory
12. NMRI - Naval Medical Research Institute
13. WADC - Wright Air Development Center
14. BU DOCKS - Bureau of Yards & Docks
15. BU AER (NASWF) - Naval Air Special Weapons Facility
16. LASL - Los Alamos Scientific Laboratory
17. EG&G - Edgerton, Germeshausen & Grier
18. SC - Sandia Corporation
19. UCRL - University of California, Livermore

20. DBM - Division of Biology and Medicine

21. HHFA - Home & Housing Finance Agency

22. FCDA - Federal Civil Defense Administration

23. PBS - Public Buildings Services

24. FDA - Food and Drug Administration

25. Lovelace Foundation

26. UCLA - University of California, Los Angeles

27. AF Air Force

28. Lookout Mountain Laboratory

29. CETG - Civil Effects Test Group

30. Department of Agriculture

31. ARDC - Air Research & Development Center

32. DOD - Department of Defense

33. OCE - Office, Chief of Engineers

34. AMS - Army Map Service

The agencies listed below were participants or contributed toward the joint effort of this operation:

1. AFSWC - Air Force Special Weapons Center

2. BU AER - Bureau of Aeronautics

3. DWET - Director Weapons Effects Test

4. NYOO - New York Operations Office

5. HASL - Health & Safety Laboratory

6. ACF - American Car & Foundry

7. PHS - Public Health Service

8. SAC - Strategic Air Command

9. TAC - Tactical Air Command

10. AFSWP - Armed Forces Special Weapons Project

11. AFRDC - Air Force Research & Development Center

12. CAA - Civil Aeronautics Authority

13. USWB - United States Weather Bureau

14. AACS - Aircraft & Airways Communications Service

CHAPTER 2. RADIOLOGICAL SAFETY

2.1 GENERAL

The radiological safety activities for Operation Teapot were divided into two parts, on-site and off-site. The on-site activities were the responsibility of the Test Director and were performed by a radiological safety group furnished through the Field Command, Armed Forces Special Weapons Project. The off-site activities were the responsibility of the Support Director. This function had been the responsibility of the Test Director during previous operations, but prior to the Teapot series it was transferred to the Support Director in the interest of relieving the Test Director of a non-scientific function not directly related to the diagnostic experimental program. Likewise, this transfer provided a continuity of the off-site radiological safety function through non-test periods.

Coordination of these activities was provided by the Radiological Safety Coordinator on the staff of the Test Manager. In addition the Radiological Safety Coordinator provided staff services in review and development of the Test Manager's Operation Order and of the on-site and off-site radiological safety criteria, coordination with the CAA in air space closures, investigation of on-site personnel overexposure incidents and of off-site fallout incidents, review of the Desert Rock and FCDA Exercises' operation plans for conformance to the AEC safety criteria for nuclear testing, and also provided advice to the Test Manager on radiological safety matters during the tests.

2.2 ON-SITE RAD-SAFE CRITERIA

The criteria for the on-site rad-safe operations during Teapot were substantially the same as for past continental operations. Although these criteria are set forth in the Test Manager's Operation Order, Part III, they can be summarized as follows:

a. The total cumulative radiation exposure authorized by the Test Manager for the test personnel was 3.9 roentgens for the operation. Provision was made for the Test Manager to authorize in advance more than 3.9 roentgens upon recommendation of the Test Director as to operational necessity.

b. All parties entering contaminated areas were required to be accompanied by trained rad-safe monitors. No personnel could enter contaminated areas without proper authority from the Test Director. In most cases this authority was delegated to the On-Site Rad-Safe Officer.

c. Contaminated areas were defined as having radiation intensities greater than 10 mr per hour. Personnel entering into areas of more than 10 mr per hour were required to wear film badges and dosimeters to record the radiation accumulated.

d. Protective clothing was furnished to personnel entering contaminated areas.

e. Vehicles leaving contaminated areas were monitored and decontaminated by washing if radiation levels were greater than 7 mr per hour, gamma only, on the outside, or 7 mr per hour, gamma plus beta on the inside.

f. Personnel leaving contaminated areas were monitored. Personnel tolerance levels were 1 mr per hour on surface of skin, 2 mr per hour on underclothing and internal surfaces of skin, 2 mr per hour on underclothing and internal surfaces of respirators, and 7 mr per hour for outer clothing, all gamma plus beta.

2.3 OFF-SITE RAD-SAFE CRITERIA

Prior to Teapot the Director, Test Division, SFOO, requested the Division of Biology and Medicine, AEC Washington, to develop criteria for off-site radiological safety operations. The need for such a criterion became apparent during Upshot-Knothole when the off-site fallout problems were accentuated because of the number of "tower" shots of relatively high yield. Before Upshot-Knothole the off-site fallout problems were not as acute due to the fact that there were more air drops with fewer tower shots.

The criteria developed by Division of Biology and Medicine were approved by the Commission for the Teapot Operation. It provided a guide for the Test Manager in evaluating off-site rad-safe situations and in determining any necessary actions that should be taken with respect to evacuation, when personnel should be instructed to remain indoors, decontamination of personnel, monitoring and decontamination of motor vehicles, contamination of water, air and foodstuffs, and routine radiation exposures. The complete criteria with discussion on interpretation is included as a part of the Off-Site Operations Plan of the Test Manager's Operation Order. Highlights of the criteria are as follows:

Evacuation

Evacuation of populated areas is not indicated if the effective biological radiation dosage calculated to be delivered in a one-year period is less than 30 roentgens.

If the effective biological dosage (EBD) is in the range 30 to 50 roentgens, evacuation of the populated area would be considered if the dosage could be reduced by 15 roentgens.

Evacuation is indicated if the EBD is 50 roentgens or higher.

Personnel Remaining Indoors

Personnel should be requested to remain indoors with windows and doors closed when the gamma dose reading as measured by a survey meter held three feet above the ground reached the values given in the following table at the indicated time.

Time of Fallout	Gamma Dose Rate at Time of Fallout (mr/hr)
1 hour	2000
2 "	1000
3 "	667
4 "	500
5 "	400
6 "	333
7 "	250
8 "	250
10 "	200
12 "	167
24 "	83

Decontamination of Personnel

Decontamination of personnel is indicated and recommended when the gamma dose rate at the time of contamination equals or exceeds the reading in the following table. (Based on situation of contamination existing over relatively large areas, one-half square foot or more, of the body.)

Time after Detonation Contamination Occurred	Gamma Dose Rate at Time of Contamination (mr/hr)
1 hour	200
2 "	100
3 "	67
4 "	50
5 "	40
6 "	33
8 "	25
10 "	20
24 "	8

Monitoring and Decontamination of Motor Vehicles

When predicted fallout across a main highway will be equivalent to a 10 roentgen infinite gamma dose or higher, vehicles should be held out of the path of fallout until after the actual fallout has essentially ceased. When less than 10 roentgens, but still significant amounts of fallout are predicted across highways, vehicles should be warned to proceed with windows and vents closed and should be monitored after passing through the contaminated area.

When the dose rate reading taken inside a vehicle or over any readily accessible exterior area equals or exceeds the values in the following table, the vehicle should be decontaminated.

Time after Detonation of Monitoring Vehicle	Gamma Dose Rate at Time of Monitoring Vehicle (mr/hr)
1 hour	1000
2 "	500
3 "	333
5 "	200
10 "	100

Time after Detonation of Monitoring Vehicle	Gamma Dose Rate at Time of Monitoring Vehicle (mr/hr)
24 hours	42

Contamination of Water, Air and Foodstuffs

In any area where the theoretical gamma infinite dose exceeds 10 roentgens, adequate sampling of the water, air and foodstuffs should be made to ascertain the conditions of possible contamination. (It is not implied that any level above this does constitute a serious contamination to water, air or foodstuffs.) The criteria recommend that no action be taken in regard to limiting intake except to advise the washing off of such exposed foods as leafy vegetables when that action seems desirable.

Routine Radiation Exposure

The whole-body gamma effective biological dose for off-site populations should not exceed 3.9 roentgens over a period of one year. This total dose may result from a single exposure or a series of exposures.

2.4 ORGANIZATION AND OPERATION OF ON-SITE RADIOLOGICAL SAFETY

The On-Site Rad-Safe organization held the following responsibilities during the operation:

a. To provide radiac equipment together with maintenance and repair services for both on-site and off-site organizations.

b. To maintain dosimetry and records service for both organizations.

c. To conduct training courses and to provide guidance in on-site radiological procedures.

d. To give advice and coordinate use of radiation sources.

e. To provide monitors for other organizations when required.

f. To provide radiological surveys and mapping services.

g. To provide services for personnel and vehicle decontamination.

The organization as furnished by the Field Command, AFSWP, consisted of eight sections of monitoring, plotting and briefing, logistics, dosimetry and records, supply, instrument repair, transportation and decontamination. There was an average of approximately 30 officers and 120 enlisted men assigned for duty during the operation.

At the start of Operation Teapot the Rad-Safe group offered two courses of instruction, one with a five-day duration, and the other a one-day course. The two courses were participated in by personnel of various test organizations with a total of 332 persons attending.

After H-hour Rad-Safe survey teams entered the contaminated area working toward Ground Zero on various predetermined routes. These teams reported their findings to a central control station where the points were plotted and isointensity lines were drawn. In the field these teams established the 10 mr per hour, the 100 mr per hour, 1 r per hour and 10 r per hour lines, and these points were marked. After this, R-hour (recovery) was declared by the Test Director on the advice of the On-Site Rad-Safe Officer. Authorized personnel were then permitted to enter the areas. At the same time the survey teams started their entry into contaminated areas an aerial survey was started by means of helicopters. By these two methods areas were rapidly cleared and thereby permitted workers early entry into the areas.

Vehicles and personnel returning from a contaminated area were monitored by Rad-Safe men located at check points along the access highway. Contaminated vehicles were sent to the vehicle decontamination building for washing. Personnel showing evidence of radioactivity were required to proceed to the Rad-Safe building to change clothing and to wash off contamination.

Personnel authorized to enter a contaminated area were issued dosimeters and film badges. On completion of the mission into the contaminated area these exposure detection devices were returned to the dosimetry and records section where the results were entered on the individual's exposure record card. From these records a cumulative exposure record was maintained on each person taking part in a project.

2.5 ON-SITE PERSONNEL OVEREXPOSURE

Following the TESLA shot a security guard received an exposure of 39 roentgens while performing an assigned duty in the test area between H-hour and R-hour. The circumstances leading to the overexposure were investigated and disclosed that a serious flaw existed in the procedure for controlling entry into a shot area during this period. Action was immediately taken to revise the controls for entry into the contaminated area.

Prior to the MET shot, the Test Manager approved a request from the Deputy of Military Operations for four officers of the U. S. Air

Force to receive up to 15 roentgens whole-body radiation while engaged in Project 2.8 of the Military Effects Test Program. This approval was granted after consideration of the importance of this project to the Military Effects Test program and after approval had been granted by the Surgeon General, USAF, for the exposure.

The distribution of individuals receiving overexposures during the operation was as follows:

Over 20 roentgens	3 persons
From 10 to 20 roentgens	6 persons
From 5 to 10 roentgens	8 persons
From 1 to 5 roentgens	13 persons
From 100 mr to 1 roentgen	26 persons
Less than 100 mr	10 persons

All personnel who received overexposures were prohibited from entering contaminated areas for the duration of the operation. The Test Director advised the Test Manager of all personnel who received overexposures and of the action taken in each case.

2.6 ORGANIZATION AND OPERATION OF OFF-SITE RADIOLOGICAL SAFETY

The Off-Site Radiological Safety organization had the following responsibilities during the operation:

a. To determine the off-site radiological situation to insure against public health hazards.

b. To obtain a complete record of radioactivity caused by nuclear tests.

c. To establish and maintain public confidence that all reasonable public health safeguards were employed.

d. To investigate reports of incidents attributed to radioactivity from the operation.

2.6.1 ORGANIZATION

The organization of the Off-Site Rad-Safe group was composed of personnel from five organizations including AEC, U.S. Public Health Service, AFSWP, and two AEC contractors. The Support Director was responsible for performing the functions of the Off-Site Radiological Safety group with the direct responsibility being delegated to the Deputy Support Director. The U.S. Public Health Service furnished the majority of the personnel for the off-site organization, provided an operating staff of 33 Sanitary Engineers together with other scientific personnel. The AEC contractors provided 21 men for radio communications services and mapping services. The AFSWP personnel provided aerial low level terrain monitoring services and cloud tracking services on a mission basis.

2.6.2 PUBLIC RELATIONS

A school for training in public relations, use of instruments, and general indoctrination was held at NTS in December 1954. This was attended by all of the Sanitary Engineers, other scientific personnel and interested people connected with the rad-safe program. Particular emphasis was placed on the public relations part of the work since this was considered to be of primary importance.

Twelve Zone Commanders were appointed and stationed in areas covering the entire vicinity surrounding the NTS. They maintained headquarters in the following cities: Mercury, Indian Springs, Las Vegas, Nellis AFB, Glendale, St. George, Alamo, Caliente, Pioche, Tonopah, Mercury-Lincoln Mine, Ely, Cedar City and Beaver. As residents of these various communities they were invited to give talks on radioactive fallout, health problems in connection with radiation, and steps being taken to protect the public, etc. before many different groups. They also gave showings of one or more of the nine films pertaining to this problem. By these several approaches nearly all the people in the NTS area received some authoritative information. All complaints regarding any radiation effects were investigated.

2.6.3 SAMPLING PROCEDURES

Twenty-four air sampling stations were established over the area. In addition, water samples were taken from important public supplies over the area at periodic intervals during the tests, including both surface and sub-surface supplies. Milk samples were collected from representative dairy herds and processing plants in each of the 12 zones. Analysis of air, water, and milk samples were made at the laboratory at Mercury.

2.6.4 MONITORING PROCEDURES

A mobile surface monitoring group consisting of four to six teams of two persons per team made surveys of the fallout area after each shot. Each team was provided with a vehicle equipped with radio. Monitoring results were reported to the central control station at Mercury. The ground monitoring groups were also prepared to set up road blocks (through local sheriff offices) if fallout was sufficiently intense along public highways, however, no such road blocks were found to be necessary.

Personnel monitoring was accomplished by means of film badges and dosimeters supplied to all off-site rad-safe people. These film badges were changed at seven to twelve day intervals. Also, film badges were supplied to a number of people in each zone in order to get a better coverage and more information regarding conditions over the entire area.

2.6.5 LOW LEVEL AERIAL TERRAIN SURVEY

A low level aerial terrain monitoring survey was carried out by AFSWP personnel and planes after each shot. Radiation levels were logged, and by means of conversion factors established during previous test, converted to units comparable to those recorded at ground level. The results of these aerial surveys were then plotted on maps of the area similar to ground surveys.

Cloud tracking was also performed by AFSWP personnel after each shot. Two B-50s and one B-25 were ordinarily used to track the leading edge of the nuclear cloud at 12,000 feet MSL, 18,000 feet, and 25,000 feet. Their positions were reported every 15 minutes in order to plot the results on maps of the area, and the cloud tracking was continued until the outline of the cloud was no longer visible.

2.6.6 CUMULATIVE FALLOUT

From data obtained from the off-site fallout surveys for each detonation, a cumulative fallout map for the Teapot detonations is shown in Figure 10.

2.7 OFF-SITE FALLOUT INCIDENTS

Following the WASP shot on February 18, 1955, the Arizona State Civil Defense Director advised the Test Manager that the people in Parker, Arizona, were in a state of "panic" because of fallout which had been detected by the Parker Chief of Police. Residents of Yuma, Arizona, and Blythe, California, also reported fallout from this shot. These reports were investigated on February 19 and February 20 by representatives of the Joint Test Organization, making trips to these particular areas. The significance of readings in these areas were explained to individuals, and several hundred copies of the booklet "Atomic Test Effects in the Nevada Test Site Region" were distributed. The Rad-Safe Coordinator also contacted the State Health Officers in Arizona and California, including the State Civil Defense Director of Arizona and the Chief, Radiological Safety Services Division of the California State Civil Defense Office.

On April 1 following the APPLE I shot, representatives of the Joint Test Organization investigated complaints on fallout in the Alamo, Nevada, area. It had been reported that four citizens of Alamo had experienced "uneasiness, burning and stinging sensations" during the fallout. This

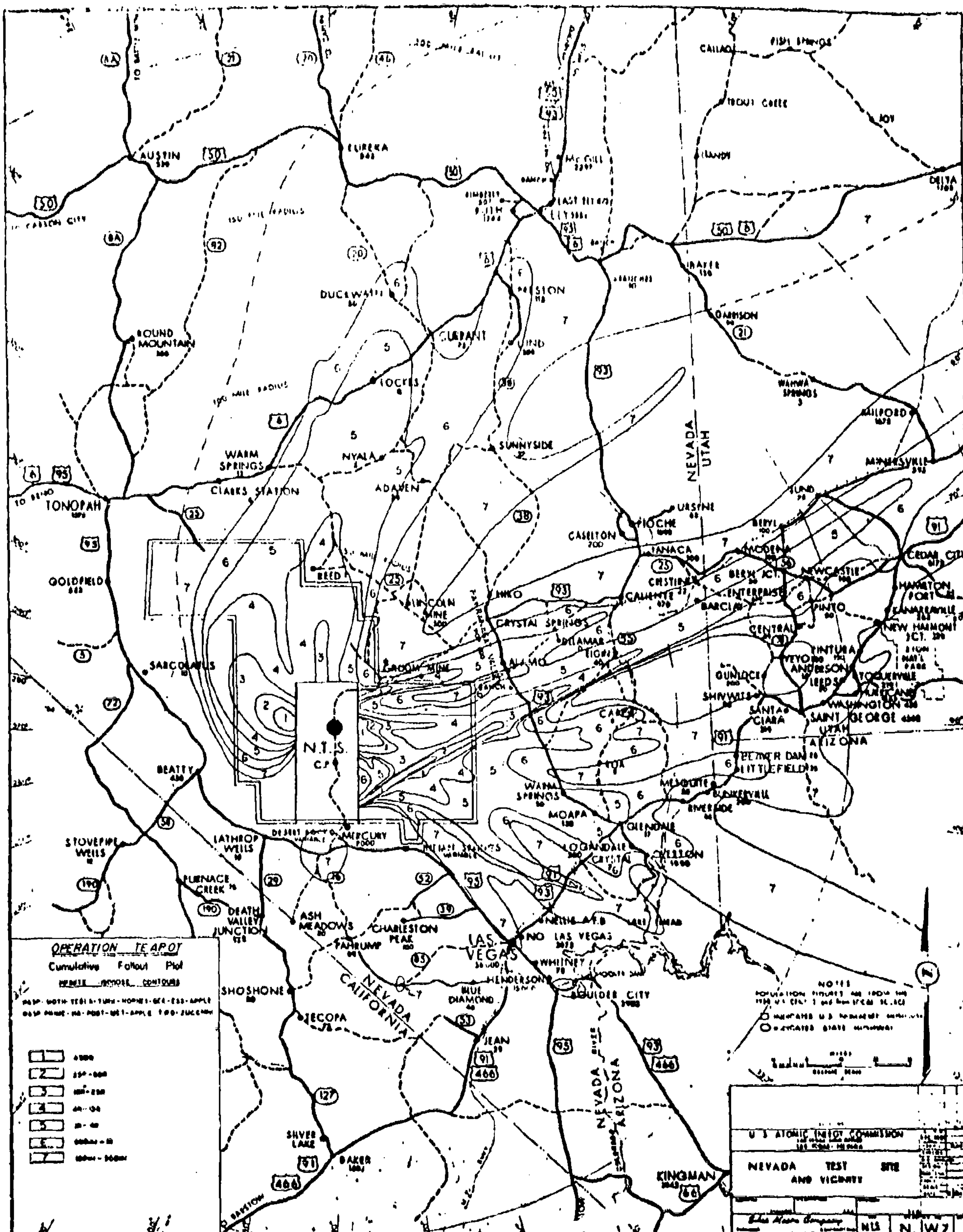


Figure 10 - Cumulative Fallout Chart

situation was discussed with various individuals in Alamo.

The incidents enumerated above were the only two reported which appeared at the time to be of significance insofar as off-site personnel radiological effects were concerned within the NTS region. Some other minor off-site incidents were reported, and in each case representatives of the Joint Test Organization made appropriate investigation to determine the actual conditions.

2.8 RADIOLOGICAL SAFETY COORDINATION WITH DESERT ROCK AND FCDA EXERCISES

2.8.1 DESERT ROCK EXERCISES

Liaison was maintained between the Deputy for Military Operations and the Military Coordinator for Desert Rock Exercises in reviewing the operations plans for the Desert Rock troops and observers participation program. The plans were reviewed for positioning of the troops and observers with respect to protection of their health and safety. The criteria for the health and safety of the troops and observers were contained in the Directive for Exercise Desert Rock VI dated 8 December 1954. This document provided for the Exercise Director to be responsible for enforcing the safety criteria established by each participating service for its own personnel. The Directive contained the criteria for positioning of Department of Army (DA) troops and troop observers at continental atomic tests. These criteria were applied to all Desert Rock participants.

"1. The following criteria is established as the maximum limit to which the DA personnel will be exposed when participating in peacetime training of troop tests conducted in conjunction with atomic weapons tests.

"a. Overpressure - 5 pounds per square inch.

"b. Nuclear radiation - 6 roentgens at any one test, of which no more than 3 roentgens is prompt, whole-body radiation; provided further that no individual will receive more than 6 roentgens in any six-months period.

"c. Thermal radiation - 1 calorie per square centimeter.

"d. Ground particle velocity - 0.2 feet per second."

A special volunteer program authorized by Office, Chief of Army Field Forces for Exercise Desert Rock VI provided for special volunteers not to exceed 12, to occupy close-in positions in accordance with the following criteria:

"Criteria for Positioning of DA Personnel Participating in Volunteer Program

"1. In order that this series of tests provide maximum experience for selected individuals, the Exercise Director is hereby given discretionary authority on tests subsequent to the first one of the DESERT ROCK VI series to position selected individuals at points closer to ground zero than is prescribed for the main body of troop participation, but in no case closer than 1500 yards. The use of such discretionary authority will be based upon observed results of the first test.

"2. The individuals selected to participate in such an operation, not to exceed twelve (12) in number for any one test, must have sufficient indoctrination in weapons effects to be fully aware of all of the risks involved in exposure of this nature, including possible latent effects, and must volunteer for such duty. Furthermore, they should be familiar in detail with the nature of the experimental explosion involved and be capable of making personal assessment of the probability of significant variations in yield.

"3. It is not intended that these exposures result in any injury to the selected individuals, but rather that their reactions to the experiments be gained for use as a basis for development of later troop exposure programs and for confirming safety doctrine for tactical use of atomic weapons.

"4. In the exposure of selected individuals as authorized above, it is desired that the following limits of exposure not be exceeded, in each case assuming that the individual is crouched in the bottom of a fox hole at least six feet deep.

"a. Overpressure - eight (8) pounds per square inch at ground level.

"b. Nuclear radiation - ten (10) roentgens in any one test, of which no more than five (5) roentgens is prompt, whole body radiation and with the further limitation that no volunteer shall take more than a total of twenty-five (25) roentgens in this series of tests.

"c. Thermal radiation - one (1) calorie per square centimeter.

"5. This discretionary authority applies to tower shots only."

The Desert Rock Exercises provided their own dosimetry and records service for determining the actual radiation exposures accumulated by their own personnel.

2.8.2 FCDA EXERCISES

Liaison was maintained with the Chief of the FCDA Operations, Demonstrations and Observer Program to review and assist in the planning of the FCDA participation in the Open Shot. The agreement between the FCDA and the AEC provided for the Demonstration Program to be subject to review and approval by the AEC.

The FCDA selected two positions for the Observer Program. Position Able was approximately eight miles from Ground Zero and presented no hazard other than possible flash blindness should the observer not wear high density goggles or not face away from the tower at Zero time. Position Baker was an entrenched position located at 10,500 feet from Ground Zero. Approximately seventeen volunteers were selected, including men and women, to occupy the entrenched position.

In developing the Observer Program, the AEC criteria on safety during the nuclear tests were furnished to and discussed with the Chief of the FCDA Operations, Demonstrations and Observer Program as follows:

1. Personnel should not be exposed to an overpressure exceeding two pounds per square inch.

2. Thermal radiation should not exceed one calorie per square centimeter.

3. No person should receive more than 3.9 roentgens of nuclear radiation during the Teapot Operation.

The FCDA Exercise Program was furnished dosimetry and service records by the Test Director's On-Site Radiological Safety organization. No personnel in this program received exposures exceeding the AEC Criteria.

2.9 COORDINATION WITH CAA IN AIR SPACE CLOSURES

Before Teapot, arrangements were made with the Civil Aeronautics Administration for Liaison between the AEC and the CAA. A senior controller was assigned by the Salt Lake City CAA Center to work with the Test Manager's Staff at the NTS on the air space closures and to keep the CAA advised regarding the atomic cloud trajectories for each shot. The purpose of this arrangement was to assure protection of the health and safety of commercial and military aircraft passengers and crews.

2.9.1 CLOSURE PROCEDURE

The CAA Liaison Controller at NTS and the Rad-Safe Coordinator established closures of the air space based upon the yield of the device, the atomic cloud height, and the wind trajectories and speeds. The closures were calculated immediately after the 2130 hour weather meetings on D-1. As soon as the closures were calculated and plotted on a large scale CAA map, the CAA Liaison Controller advised the Salt Lake City Center of the closure pattern.

The Salt Lake City Center plotted the closure on a duplicate map and immediately initiated their program of air traffic diversion. On D-day the CAA Liaison Controller and the Rad-Safe Coordinator watched the atomic cloud tracking progress and, if necessary, modified the air space closures accordingly. The Salt Lake City CAA Center was kept advised of the atomic cloud location, with particular respect to the airways as indicated by the cloud tracking aircraft, until it no longer presented any hazard.

2.9.2 CRITERIA FOR ESTABLISHING CLOSURE

The Division of Biology and Medicine developed a guide for use in calculating the length of time after detonation the air spaces should be closed and the altitudes of closure. The guide proved quite satisfactory and provided a consistent basis for calculating the closures.

In general terms the guide provided for closure of only those altitudes containing the nuclear cloud during the time of cloud passage, allowing, of course, for a reasonable error of estimation. Twenty degrees (20°) were added to the closure bearings to allow for directional variation to wind trajectories. If cloud height reached the tropopause, as was the usual case, the closure altitudes were increased 2,000 feet above top of cloud and 3,000 feet below the bottom of the cloud. The length of time of closure after detonation was a function of yield and decay. Based upon these factors a table was developed as follows:

Yield (KT)	Air Space Closed During Cloud Passage If Time of Cloud Arrival is Less Than:
Less than 5	H + 2 hours
5 - 15	H + 4 hours
15 - 30	H + 6 hours
30 - 50	H + 8 hours

For conditions of no shear, 1 hour was added to the closure time up to 15 KT of yield and 2 hours for a yield of more than 15 KT.

2.9.3 CAA TRAINING

During Teapot the Salt Lake City CAA Center sent three senior controllers to the NTS for training purposes to observe the air space closure problems and procedures for one shot. A representative of the CAA Regional Office at Los Angeles and the Chief, Salt Lake City Center, also visited NTS for purposes of familiarization and coordination. This proved to be quite helpful to both the AEC and the CAA in that the CAA controllers at the Salt Lake City Center were able to better appreciate and anticipate the problems confronting the Rad-Safe Coordinator and the CAA Liaison Controller in establishing the air space closures for any particular situation.

2.9.4 PUBLIC RELATIONS

Although the air space closures caused some interruption and inconveniences to both commercial and military air traffic in general area of the NTS on shot days, cooperation in observing the closures was excellent. There were only a few incidents reported during the operation where aircraft (other than test aircraft) believed they had received radiation. Appropriate investigations were always made in each case, but none of these reported incidents proved to be of more than minor significance. There were no reported cases of either commercial or military aircraft that did not observe the closure system. The nickname "Sawmill" was used by all test operational aircraft to signify to the CAA and the NTS Air Operations Office that they were on a mission pertaining to the test and were cleared into the danger area.

CHAPTER 3 WEATHER PREDICTIONS

3.1 GENERAL

The Mercury Weather Station, including the satellite sites, began full-scale operations by February 8, 1955. The weather station, which was organized to function as a weather central with primary emphasis on analysis and forecast for the Nevada Test Site, was located at Mercury. Local surface observations were included as part of the weather station activity. In addition, the Mercury Weather Station was the control center for the receipt of weather data in support of Operation Teapot not normally transmitted over scheduled teletype circuits. These data, which were evaluated and checked prior to local dissemination, consisted primarily of upper air observations from the subsidiary off-site stations.

3.2 WEATHER STATIONS

A network of ten upper air observing stations was placed at selected locations surrounding the test site to provide supplementary data not normally available. These additional weather observations proved very useful in weather analysis and forecasting as well as for monitoring winds aloft prior to shot time. The data were also valuable in post analysis for accurate plotting of fallout and determining cloud trajectories. The location and type of operations of these stations were:

Location	Type
Yucca Lake (NTS)	Rawinsonde
Tonopah, Nevada	Rawinsonde
Stead AFB, Reno, Nevada	Rawinsonde
Fresno, California	Rawinsonde
Beatty, Nevada	Pibal
Caliente, Nevada	Pibal
Round Mountain, Nevada	Pibal
Furnace Creek, California	Pibal
Needles, California	Pibal
St. George, Utah	Pibal

Additional support was provided by (1) The 55th Weather Reconnaissance Squadron, McClellan AFB, California, which flew a daily special reconnaissance flight over the eastern Pacific Ocean, and (2) Selected Weather Bureau and military weather stations which provided special upper air observations on a scheduled basis.

On-site observations consisted of the following:

Type	Location	Schedule
Surface Observations	Mercury	Hourly (24 per day)
Rawinsonde Observations	Yucca Lake	3 per day plus specials from H - 12 to H / 12
Surface Observations	Yucca Lake	Half-hourly from H - 3 to H / 3
Pibal Observations	Station #353 Yucca Flat	Specials prior to ESS shot
Pibal Observations	Frenchman Flat	Specials prior to MET shot

3.3 ORGANIZATION AND FUNCTIONS

Personnel were drawn from various Air Weather Service groups. The maximum number assigned to the operation at any one time was 74, as follows: 13 Officers - Forecasters; 61 Airmen - Observers (14), Technicians and Operators (46) (including 34 off-site), Administrative and Supply Clerk (1). Key personnel consisted of a Weather Briefing Officer and member of the Advisory Panel who normally presented the weather briefings for the Test Manager and the Air Crews at Indian Springs Air Force Base and advised the Scientific Advisor on weather problems; a Chief Forecaster who prepared or supervised all analyses and forecasts and was responsible for the operation of the weather station; a Weather Project Officer and Assistant Briefing Officer who planned and directed weather operations as required by the AEC and DOD organizations and coordinated between these agencies on weather problems, collected and disseminated meteorological data and provided weather support as required, assisted in the briefing duties and prepared required reports; and an Officer-in-Charge to supervise and monitor the operations of the upper air stations.

The principal function of the Weather Unit was to furnish the Test Manager with forecasts and observations for the Nevada Test Site and surrounding areas. Detailed forecasts were required with emphasis on winds aloft which were the primary basis for the forecast fallout path of radioactive particles. The decision to proceed with a scheduled shot was largely determined by the fallout pattern. Of secondary importance were cloud cover, areas of precipitation and trajectory patterns.

3.4 BRIEFINGS

Formal briefings were held in the Conference Room, Building 101 at Mercury, on D-1 at 1030 and 2130 hours, at which time detailed weather forecasts for H-hour were presented to the Test Manager and his staff. If, during the morning briefing, the wind and weather forecasts were acceptable, an evening briefing was scheduled. During these briefings, a general 48-hour outlook was usually presented for planning purposes. At approximately H-3 a formal briefing was held at the Control Point to determine the advisability of firing. Informal briefings were held as required from H-3 to approximately H-30 minutes to ascertain that the weather predictions for H-hour were continuing favorable for the detonation.

Weather charts used in the formal briefings to indicate the weather conditions and forecasts consisted of the following: (1) Latest synoptic chart showing the flow pattern at the 500 millibar level with superimposed surface fronts; (2) Prognostic chart for H-hour with the same details as the above; (3) Winds aloft chart with forecast winds in tabulated form and a graphic presentation of the forecast winds in relation to the latest winds; (4) Large scale cloud and precipitation chart; and (5) A 24-hour trajectory chart for the 10, 000', 20, 000', 30, 000', and 40, 000' levels. Figure 11 shows the charts (1) to (5) noted above.

3.5 SPECIAL FORECASTS

The Weather Unit also prepared and distributed a daily general forecast for the NTS area; provided Air Operations with weather information on a routine basis and with specialized computations during the air drops; furnished certain projects, e.g., Technical and Civil Effects, with particular weather observations not normally disseminated; and published and distributed the meteorological data for H-hour.

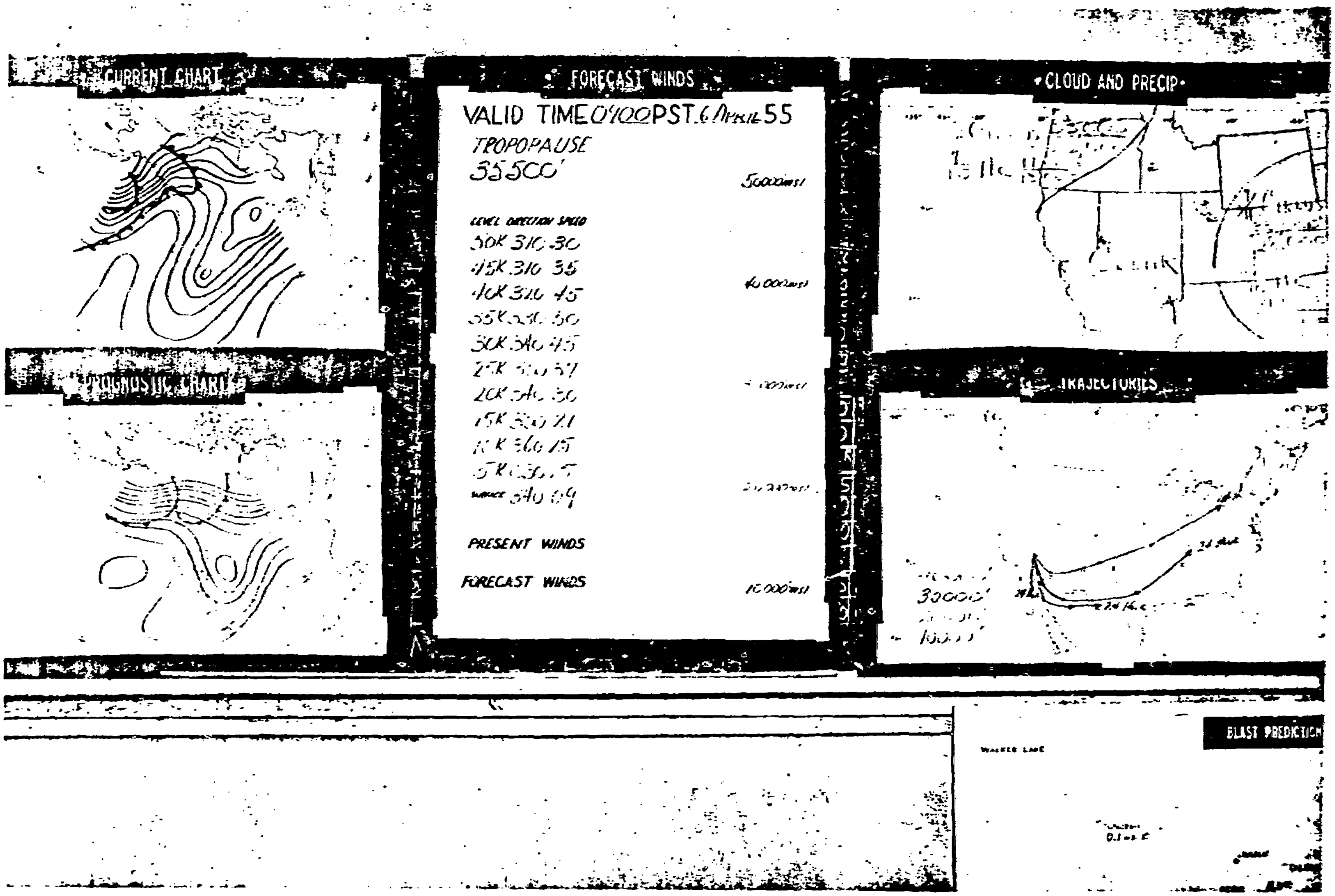


Figure 11 - Weather Charts

CHAPTER 4 FALLOUT PREDICTIONS

The Fallout Prediction Unit was composed of personnel from LASL, UCRL and the U. S. Weather Bureau. Normal strength during the operation was six persons.

4.1 PREDICTION FACTORS

Under the direction of the Scientific Advisor, the Fallout Prediction Unit provided, at each weather briefing, a forecast cloud height and a forecast fallout pattern. Important variables that were entered into the forecasting formulae were:

a. An estimate of the maximum yield of the device, provided by the Scientific Advisor,

b. A meteorological forecast (including height of tropopause, lapse rate, and winds aloft) provided by the Weather Unit of the Test Organization.

The method of forecasting cloud height was the same as used during Operation Upshot-Knothole and will be described in a technical report by this unit. This forecast, needed for the fallout forecast, was also used by the Radiological Safety Coordinator in recommending an airways closure pattern. The method of forecasting fallout is outlined below. One of the objectives of Operation Teapot was to provide information concerning the joint effect of yield and tower height on radioactive fallout within a distance of about 200 miles. Previous tests had shown the importance of contact between the fireball and the ground but had provided little data for conditions of marginal contact. Teapot was designed to provide such conditions for several important shots. Hence, another important but rather uncertain item of input data was:

c. The "scaling factor" (the fraction of the yield that should be assigned to the fallout pattern).

At the outset of the operation use was made of the scaling theory of Graves and Felt, "Report of the Committee to Study Nevada Proving Grounds", 1 February, 1954. During Teapot, changes were made in the scaling formula in an effort to profit from current fallout observations. The time and the main features of the principal changes are noted in this account. The cooperation of the Off-Site Rad-Safe Unit and of Program 37 "Fallout Studies" was especially helpful in providing the data needed for these changes.

4.2 PREDICTION METHODS

The formulae used for predicting fallout were based almost entirely on past experience with moderate to heavy fallout, and Teapot predictions were not made for situations in which light fallout was assured. Further, none of the methods was designed for predicting on-site fallout; in general, Teapot predictions were for distances greater than 20 miles. At pre-shot briefings, a conservative compromise between the predictions of several methods was presented. Most reliance was placed on the following methods:

a. "Weather Bureau Method"

This was an operational version of a method developed by the Special Projects Section, Scientific Services Division, U.S. Weather Bureau, while working on a contract with SFOO for the study of NTS fallout. A description of the basic work is contained in Secret Report AFSWP 895 "Fallout Symposium, January 1955", page 355, but the details were modified by the time of Teapot. A description of the operational version will be included in a technical report by the Fallout Prediction Unit.

b. "Machine Method"

This method uses IBM-type 701 Electronic Data Processing Machines at Los Alamos and/or Livermore and telephone communication. The theory of the method is described in the above AFSWP Report, page 317. Wind data, cloud height, a coded shot identification, scaling factor, and instructions concerning the desired area of calculation were telephoned to a Fallout Prediction Unit representative at Livermore or Los Alamos. He punched the input data on cards, started the machine, and obtained from it a printed listing of radiation doses at the desired distances and directions, which he telephoned back to NTS.

From these data a plot of the desired isodose contour was prepared. Early in the test series, the radioactivity versus particle size results of the Weather Bureau study were incorporated into the machine calculation. By the middle of the series there had been developed a simplified hand calculation version of the machine calculation. This gave the main features of a fallout pattern in less time than it took to get results from the machine. This method came to be relied upon for final forecasts during early morning hours when the machine was not readily available. The method will be described in a technical report by the Fallout Prediction Unit.

The assumed properties of the initial cloud are illustrated approximately in an eight-layer model in Table 1 (more layers were used except in the last type of calculation mentioned above). The main difference between the Weather Bureau model and the Machine model appears in the distribution of fallout radioactivity with height. This did not make much difference in the results since, for off-site fallout, most of the activity came from the mushroom (top 3/8 of cloud). In this part of the cloud the relative percentages are about the same, and the difference in absolute values was compensated in some degree by differences in scaling. In the Machine Method it is assumed that in each layer the radioactivity has a gaussian distribution with respect to the logarithm of the rate of fall. The tabulated gaussian characteristics represent both models with respect to fallout in the principal range of interest. This form of representation is chosen for conciseness. The models differ in the horizontal distribution of activity in the initial cloud. The Weather Bureau method assumes uniform distribution over a 5 mile diameter; the Machine Method assumes a gaussian distribution with a gaussian diameter in the mushroom of about 2 miles for low yields and 4 miles for high yields, and the stem diameter is assumed to be about one third that of the mushroom. This difference had little effect on results except in cases of little directional wind shear. In principle, both methods of calculation are the same. After scaling the forecast yield to determine the total fallout radioactivity in the cloud, the activity of each of several particle size (or rate of fall) groups in each cloud layer (up to the forecast cloud top) is carried down through the forecast wind field and deposited on the ground at the proper place. The sum of these deposits, which overlap more or less according to the wind pattern, is computed, and from the sum at any point one obtains the radiation dose. Then from the radiation dose at many points the desired isodose contours are drawn. Even in the Machine Method some short cuts were needed to obtain results within the time limits that were available. Calculations prior to Teapot had shown that inherent errors (due to short cuts) in both methods should be unimportant compared to other sources of error in the forecasting system.

TABLE 1

CLOUD MODELS

Layer Number Counting from Top	Percent Activity In Layer: W.B.	Percent Activity In Layer: Machine	Fall Rate f (knots): Median f	Fall Rate f (knots): Av'g $\log_e f$	Standard Deviation of $\log_e f$
1	7	13	0.52	−0.65	1.75
2	16	32	1.0	0.00	1.58
3	12	32	1.9	0.65	1.42
4	9	9	3.2	1.15	1.28
5	12	3	5.2	1.65	1.18
6	14	1	7.8	2.05	1.05

Layer Number Counting from Top	Percent Activity in Layer		Fall Rate f (knots)		Standard Deviation of log $_e$f
	W.B.	Machine	Median f	Av'g log $_e$f	
7	15	0.5	12	2.50	0.95
8	15	0	17	2.85	0.85

4.3 FORECAST AND OBSERVED FALLOUT

In this report a comparison is made between the pre-shot prediction described above and the observed fallout pattern. The difference between this prediction and the observations includes therefore the error in wind forecasting, in yield, and in scaling, as well as the errors inherent in the several methods of computing fallout. It is felt that for the purpose of over-all evaluation of the operational system, this comparison is the most pertinent one to examine. Insofar as was possible at the time of reporting, relative importance of the component errors was estimated. A more complete analysis will be reported separately. In most instances the comparison is given by means of a diagram showing the location of the forecast and observed one roentgen and four roentgen infinity dose contours. (The infinity dose (sometimes called infinite dose) is an estimate of the gamma radiation dose delivered from time of fall to infinity, assuming no protection and the $t^{-1.2}$ fission product decay formula). For brevity, other data pertinent to the comparison between forecast and observation are consolidated in Table 2.

TABLE 2

TEAPOT SHOTS WITH SIGNIFICANT FALLOUT

SHOT NAME	1955 DATE	LOCAL[1] TIME	AREA	TOWER H'T(ft)	YIELD (KT) F'C'ST	YIELD (KT) OBS'D	CLOUD H'T[2] F'C'ST	CLOUD H'T[2] OBS'D[3]
MOTH	2/22	0545	3	300	5.5	2.5	24	23.9
TESLA	3/1	0530	9-B	300	5	7	26	30-27[4]
TURK	3/7	0520	2	500	45	43	43	42.5
HORNET	3/12	0520	3	300	10	3.6	38	38
BEE	3/22	0505	7-1A	500	13	8.4	35-40	39
ESS	3/23	1230	10	-67[5]	1.2	1.2	8-10	12
APPLE	3/29	0455	2	500	50	15.5	39	31
POST	4/9	0430	9C	300	3	1.5	24	15
MET	4/15	1130	FF[6]	400	35	24	39	42
APPLE II	5/5	0510	1	500	50	30	42	40.5
ZUCCHINI	5/15	0500	7	500	50	28	38	37.3

(1) Pacific Standard thru MET; Pacific Daylight APPLE II to end.

(2) In thousands of feet above mean sea level.

(3) From aircraft observations.

(4) 30 reported at H $\neq$ 10 min.; stabilized at 27 at about H $\neq$ 19 min.

(5) No tower; underground shot.

(6) Frenchman Dry Lake.

The report on each shot was written shortly after the shot, as soon as the main features of the results had become apparent, It was felt that this procedure offered two advantages. First, it would give a better picture of the development of the art of fallout forecasting during the series. Second, it would avoid delays of uncertain length that might be made in an effort to find a complete explanation for the discrepancies between prediction and observation.

4.3.1 WASP

The first shot, WASP, fired at 1200 on February 18, 1955, was an air burst with negligible fallout. Since before the shot there was an appreciable risk of fuse failure, the fallout forecast was based on a surface burst of 500-tons yield. Although the methods of calculation were not designed to cope with such a situation, the results did not appear to be seriously at variance with the Jangle surface shot data. They were:

Cloud Height (K feet)	14
Maximum Distance of 4 r dose contour (sea mi)	20
Maximum Distance of 1 r dose contour (sea mi)	35

Since fuse failure did not occur, comparison with observed fallout is not pertinent.

4.3.2 MOTH

The second shot, MOTH, was critical with respect to intersection of the fireball with the ground. Of two different estimates of fireball radius, one gave no intersection, while the other gave intersection and a five-fold greater estimate of fallout dose. At all briefings, the former estimate was used for the primary forecast, and attention was called to the five-fold factor of uncertainty. A comparison between forecast (0200 briefing) and observation is shown in Figure 12.

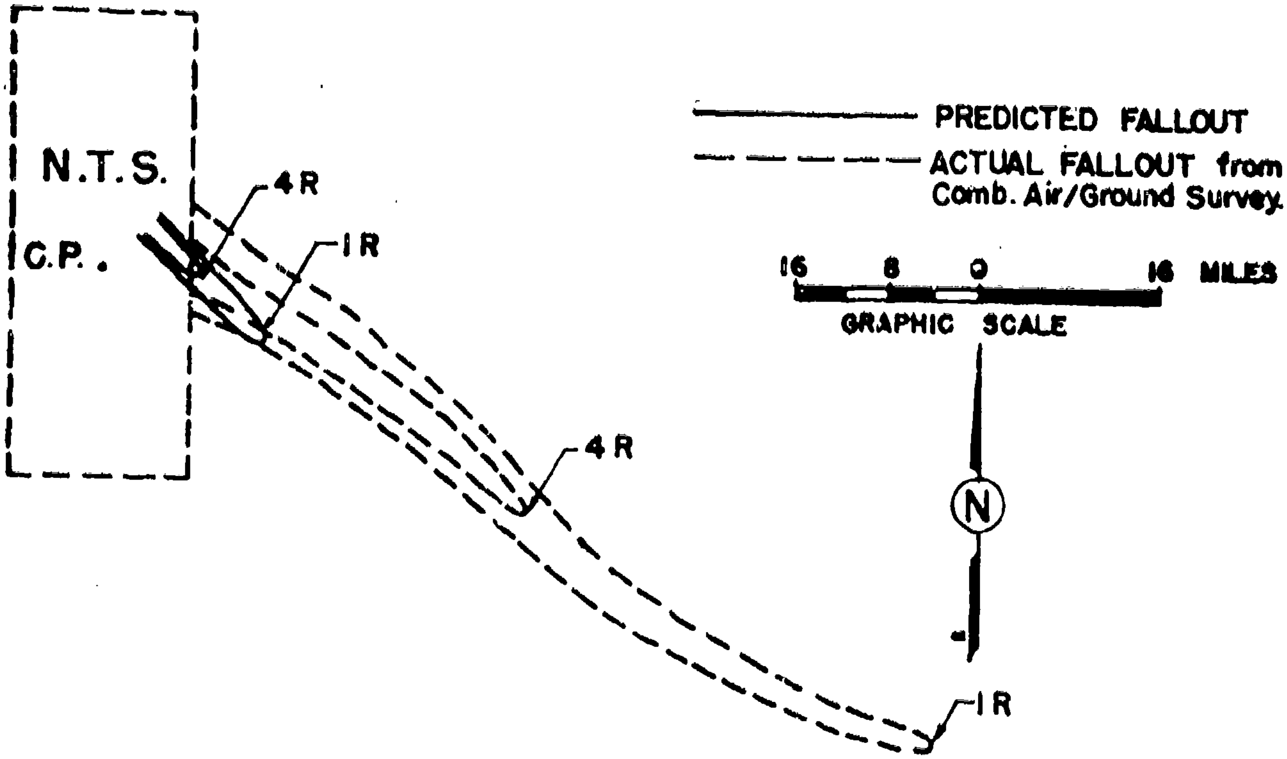


FIGURE 12 MOTH FALLOUT

Following MOTH an attempt was made to account for the marked discrepancy between the forecast and observed fallout patterns. Only a small part of this large discrepancy can be blamed on any thing except an error in scaling. At first it was suspected that the fireball must have touched the ground, but photographs showed that it did not. It was then recalled that when higher towers were first considered, the possibility of an adverse effect from added tower material had been recognized. However, this was not the only possible explanation. In the theory of Graves and Felt, the fallout is attributed to two factors. One factor depends upon the area of contact of the fireball with the ground, and, when good contact is made, this factor is of overwhelming importance. Another factor, the so-called "thermal factor", is introduced to account for the much lesser fallout that occurs when the fireball does not touch the ground. Relative to the intersection factor, the thermal factor is assigned a weight of one percent in order to obtain agreement with past experience. However, for past shots where the thermal factor should predominate, the data were rather sketchy. One could probably increase the thermal factor to improve the MOTH forecast without encountering any very violent disagreement with past results. When Program 37 found that a large fraction of the fallout activity could be removed from an earth sample by means of a magnet, the former explanation was chosen. It was assumed that, when the fireball does not touch the ground, the total fallout is proportional to the mass of metal consumed, and the MOTH results were used for a first estimate of the proportionality factor.

4.3.3 TESLA

For the third shot, TESLA, the forecast yield gave a fireball radius indicating no intersection. However, following the experience with MOTH, the quite massive TESLA tower (90 tons) was included in the computations. The forecast presented at the 0300 briefing on March 1 is compared with the observed pattern in Figure 13. The agreement indicated that inclusion of consumed tower in the scaling formula should be continued.

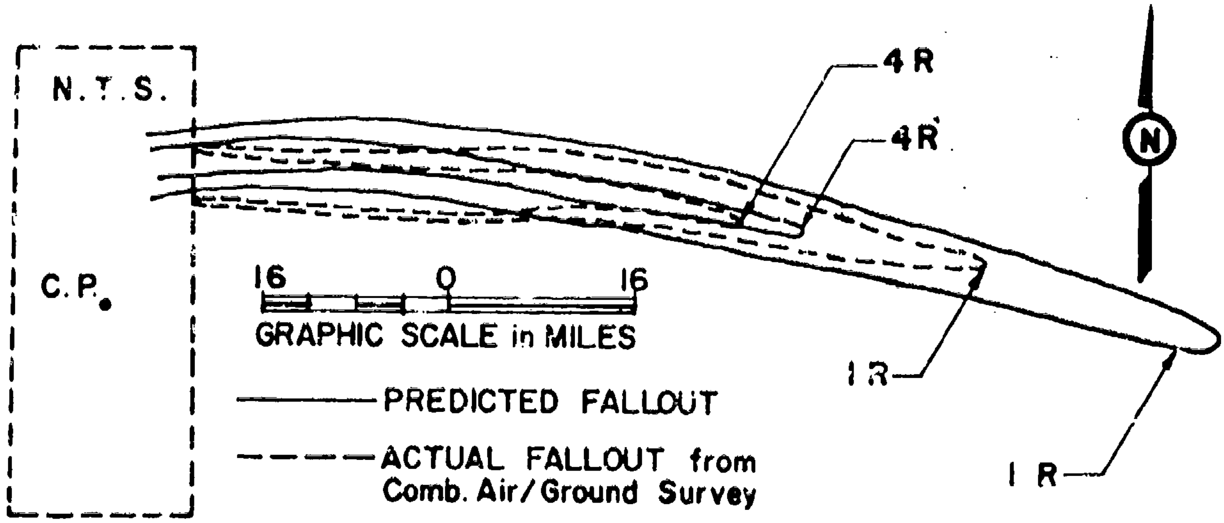


FIGURE 13 TESLA FALLOUT

4.3.4 TURK

For the fourth shot, TURK, the expected fireball radius was sufficiently large that the tower effect was negligible. The forecast presented at the 0400 briefing on March 7 is compared with observation in Figure 14. The marked discrepancy between the forecast and observed fallout pattern locations can be accounted for by rapid changes in the wind pattern from the period H-5 hours to H + 7 hours. Throughout the operation fallout predictions were based on point winds with no time or space variability taken into account. The time variability of the wind during the period of fallout following TURK was far greater than that ever previously experienced during a shot period. The main fallout was in an inaccessible region, so that the observed values were less reliable than usual.

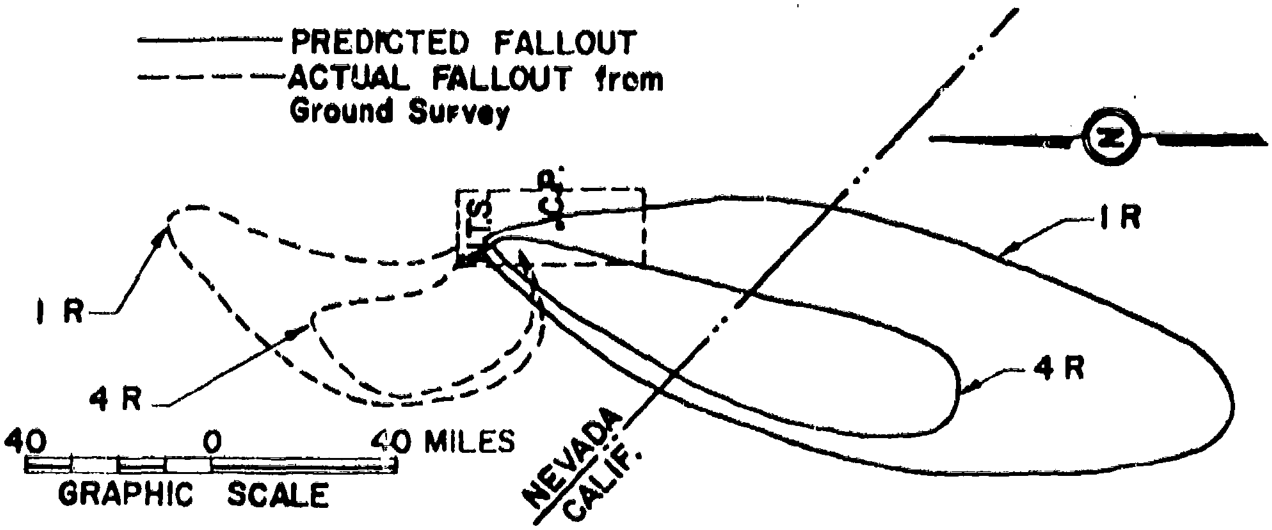


FIGURE 14 TURK FALLOUT

4.3.5 HORNET

For the fifth shot, HORNET, the fallout patterns presented at the briefings were based on an upper limit of 10 KT. Comments on the pattern with a yield of 3.5 KT were made at the briefings, although no actual patterns were presented. The forecast presented at the 0400 hour briefing on March 12 is compared with observation in Figure 15. Much of the discrepancy between forecast and observation for HORNET is attributable to the excess in forecast yield.

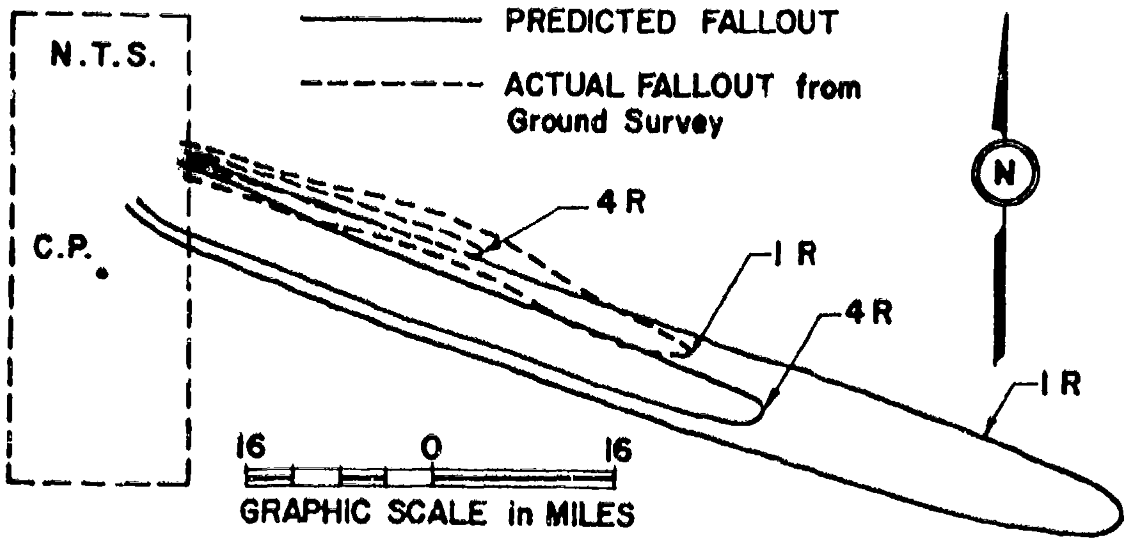


FIGURE 15 HORNET FALLOUT

4.3.6 BEE

For the sixth shot, BEE, the forecast presented at the 0400 hour briefing on March 22 is compared with observation in Figure 16. Only a relatively small part of the discrepancy is attributable in excess forecast yield. The cause of most of the discrepancy is unknown at present.

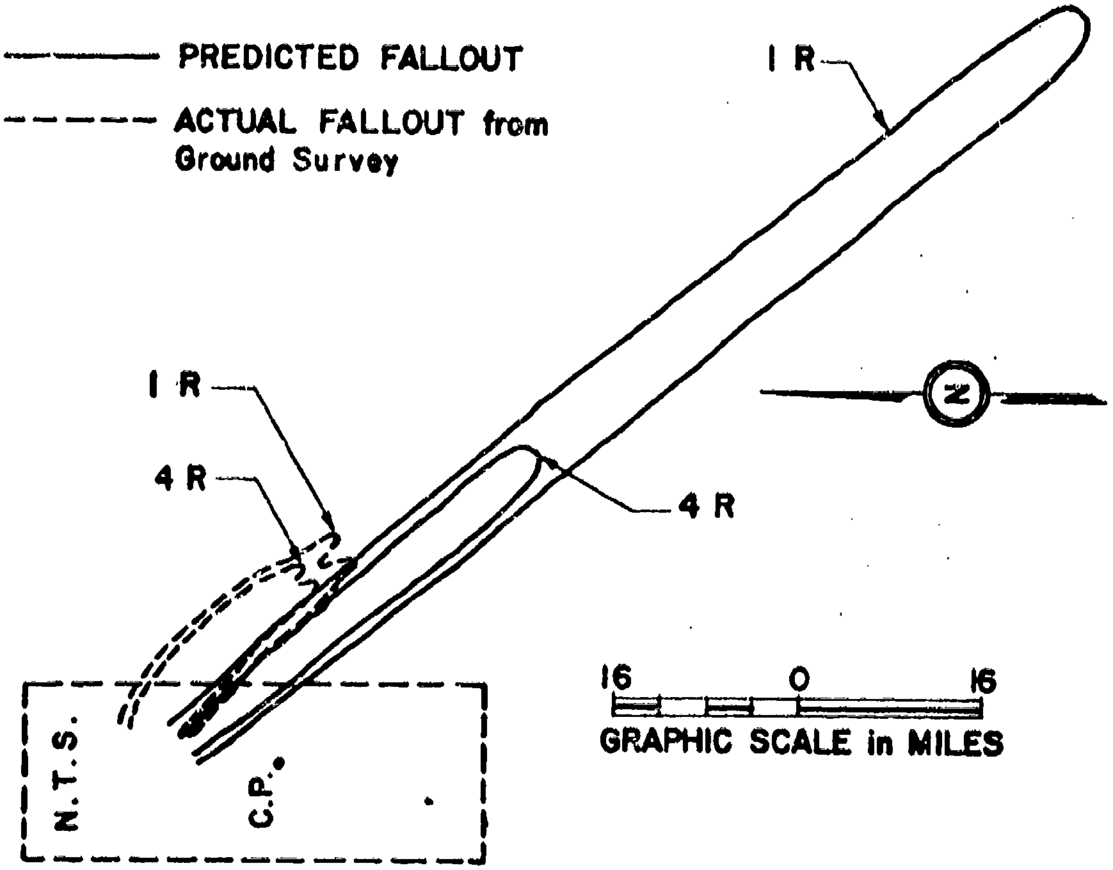


FIGURE 16 BEE FALLOUT

4.3.7 ESS

For the seventh shot, ESS, the cloud height was estimated primarily from the data obtained on the Jangle surface and underground shots, insufficient data being available to incorporate atmospheric conditions into a height computation. Similarly, the fallout pattern was estimated from patterns obtained from the two Jangle shots with an attempt to include the effects of forecast wind speeds and erratic flow patterns caused by the rugged terrain. A comparison between forecast and observation is given in Figure 17. The agreement is fairly good, considering the unusual uncertainty in the forecast.

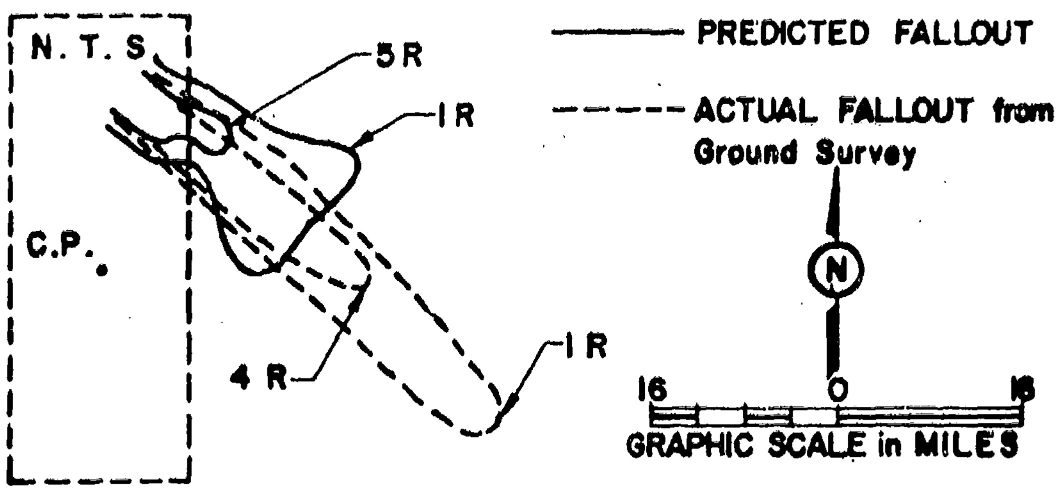


FIGURE 17 ESS FALLOUT

4.3.8 APPLE

For the eighth shot, APPLE*, the forecast presented at the 0345 hour briefing is compared with observation in Figure 18. Since WASP-PRIME was detonated on the same data as APPLE, the actual fallout pattern shown in Figure 18 represents fallout from both detonations. The discrepancies between forecast and observation of height and extent and width of the 4 r contour are directly related to, but not entirely explained by, the low observed yield. Early post-shot analysis gave at Alamo, for example, 50% of the observed peak dose and a pattern of twice the observed width.

*HADR, a high altitude HE shot is not considered a shot in this section since no radioactive material was involved.

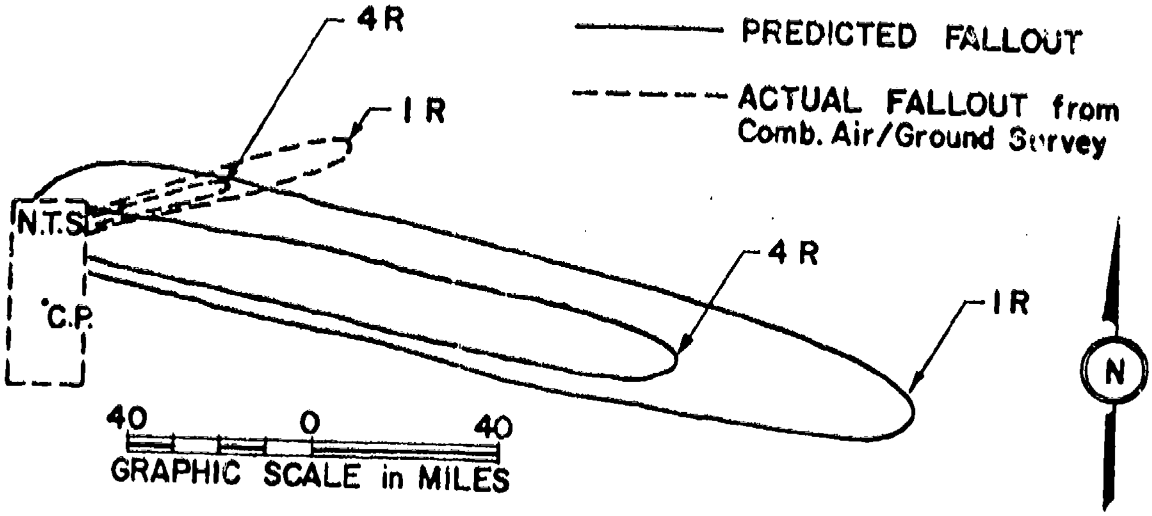


FIGURE 18 APPLE and WASP-PRIME FALLOUT

At this stage another change was made in the method of estimating the fraction of the yield that goes into the fallout pattern, as computed by the Machine Method. It had been assumed that the effect of contact of the fireball with the ground should be estimated in terms of area of contact. It was now assumed that a fictitious "volume of contact" should be used. This appeared to give somewhat better agreement between the machine calculations and past experience.

4.3.9 WASP-PRIME

The ninth shot, WASP-PRIME, was an air drop detonated at a height of 800 feet absolute in Area 7 at 1000 hours on March 29, 1955. The forecast cloud height of 25,000 feet was based on an air burst with a yield of 2 KT. No formal fallout pattern was presented at the briefings for these conditions, since the fallout would present no hazard. At the 0830 hour briefing it was stated that a conservative estimate of 200 mr lifetime dose might be found at the distance of Alamo. A fallout pattern based on assumed fuse failure and subsequent surface burst with a yield of 0.5 KT was presented at the briefings. Since fuse failure did not occur, no comparison can be made.

4.3.10 HA

The tenth shot, HA, was an air drop detonated at a height of 36,000 feet MSL over Station 5 at 1000 hours on April 5, 1955. Since the firing circuits included pressure switches as well as timing devices, it was estimated that there was only a remote probability that detonation could occur low enough to create a fallout problem. At briefings only a simple statement of direction of fallout and extent of the 4 r contour was given.

4.3.11 POST

For the eleventh shot, POST, predictions presented at the 0300 hour briefing on April 9 are compared with observation in Figure 19. The cloud rise was damped considerably because of the lower yield, a strong surface inversion, and a quite stable layer between 12,000 to 15,000 feet. As a result, the average wind was much less than anticipated. This accounts for much of the discrepancy.

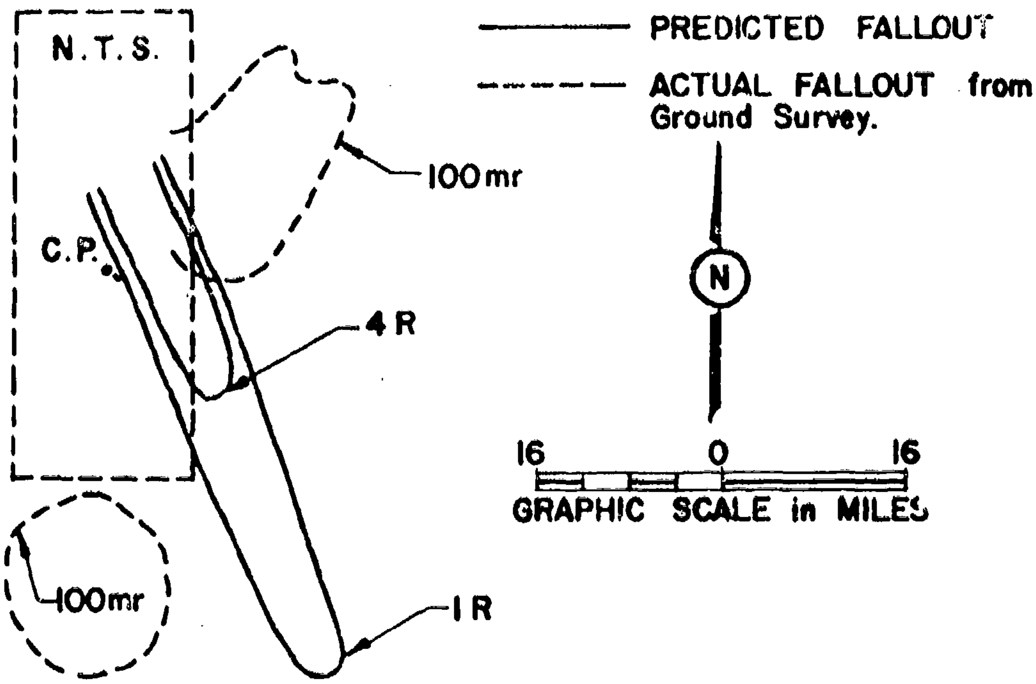


FIGURE 19 POST FALLOUT

4.3.12 MET

For the twelfth shot, MET, the forecast presented at the 1045 hour briefing on April 15 is compared with observation in Figure 20. Much of the discrepancy is due to excess forecast yield.

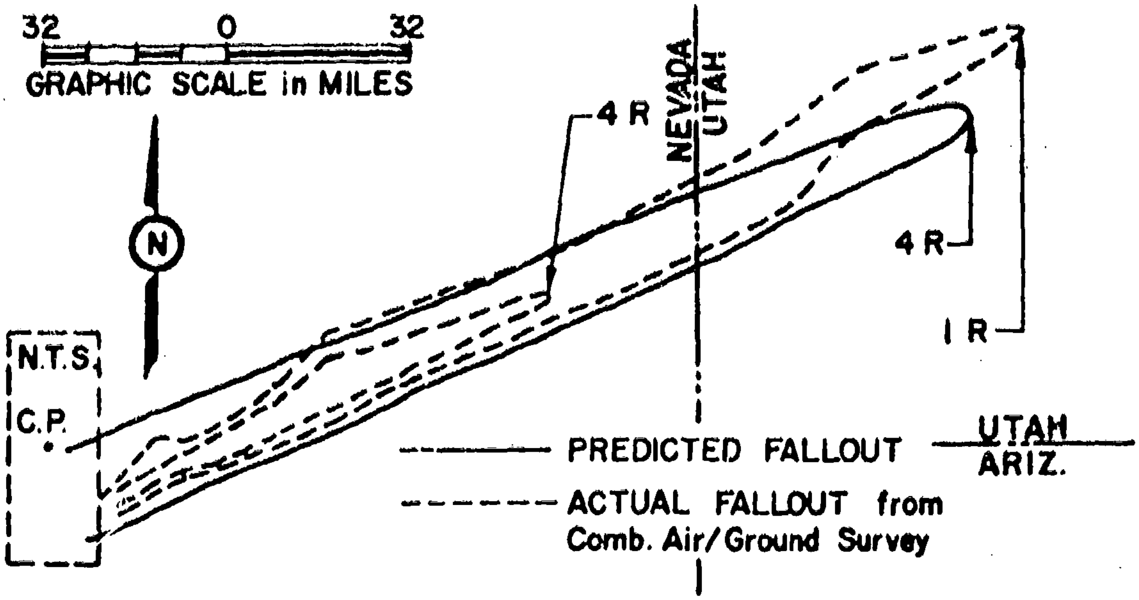


FIGURE 20 MET FALLOUT

4.3.13 APPLE II

For the thirteenth shot, APPLE II, the forecast presented at the 0345 hour briefing is compared with observation in Figure 21. At the time of writing, the outline of the 4 r contour was not well defined by the ground monitoring results. Aerial terrain survey indicated that the dimensions were about twice as great. It was clear, however, that much of the dis crepancy that might appear in the final analysis could be attributed to the difference between forecast and actual yield.

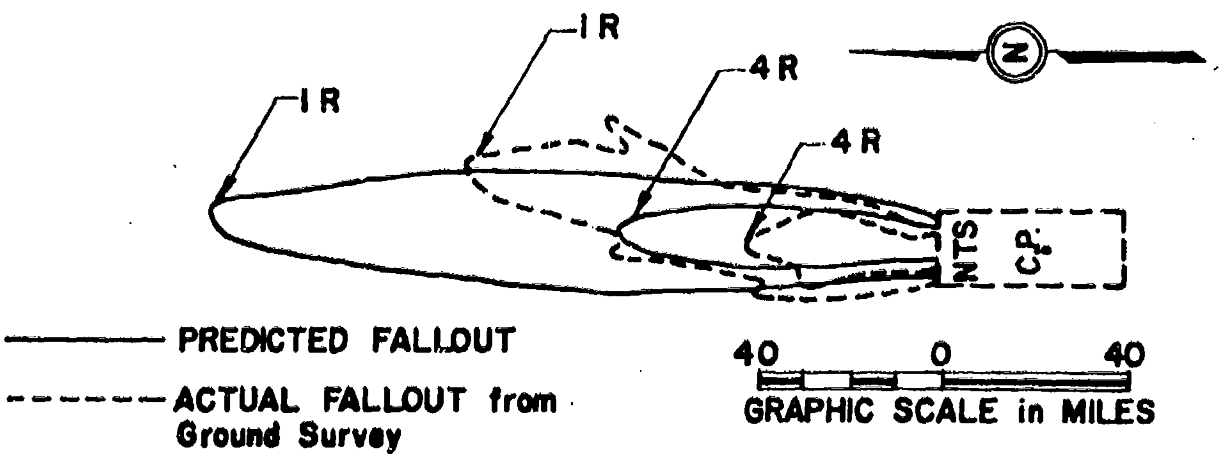


FIGURE 21 APPLE II FALLOUT

Following APPLE II, an effort was made to find something more satisfactory than the fictitious "volume of intersection" of the fireball with the ground. It was assumed that the volume of the fireball would be conserved; that this sphere would be "squashed" into the shape of the part of a larger sphere that is cut off by a plane. It was supposed that the "area of intersection" should be reckoned as the area of this plane section. This concept permitted somewhat better agreement with past experience, especially in the UK series. This method of scaling was dubbed the "squashed fireball theory". The tower term was retained, with an adjusted coefficient, in the revised scaling formula.

4.3.14 ZUCCHINI

For the fourteenth shot, ZUCCHINI, the forecast pattern presented at the 0430 hour briefing is shown in Figure 22 together with the observed pattern. Again, the excess forecast yield accounts for much of the discrepancy.

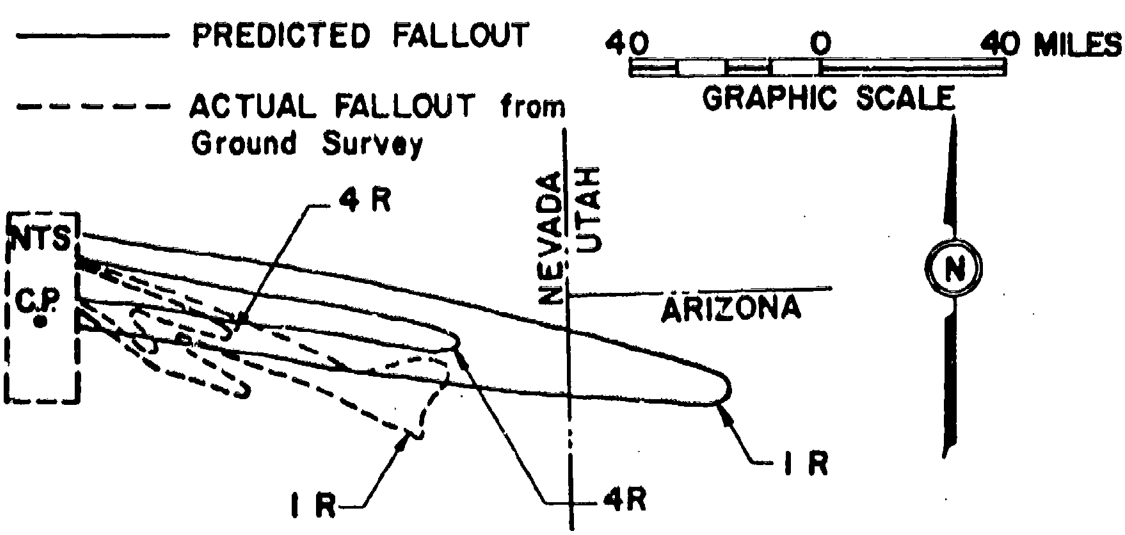


FIGURE 22. ZUCCHINI FALLOUT

CHAPTER 5 BLAST PREDICTIONS

The Blast Prediction Unit was composed of personnel from Sandia Corporation. The normal strength of this unit of seven persons was augmented from time to time by about seven additional individuals from other AEC or contractor organizations and assisted in the establishment of the off-site microbarographic stations.

5.1 RAYPAC COMPUTER

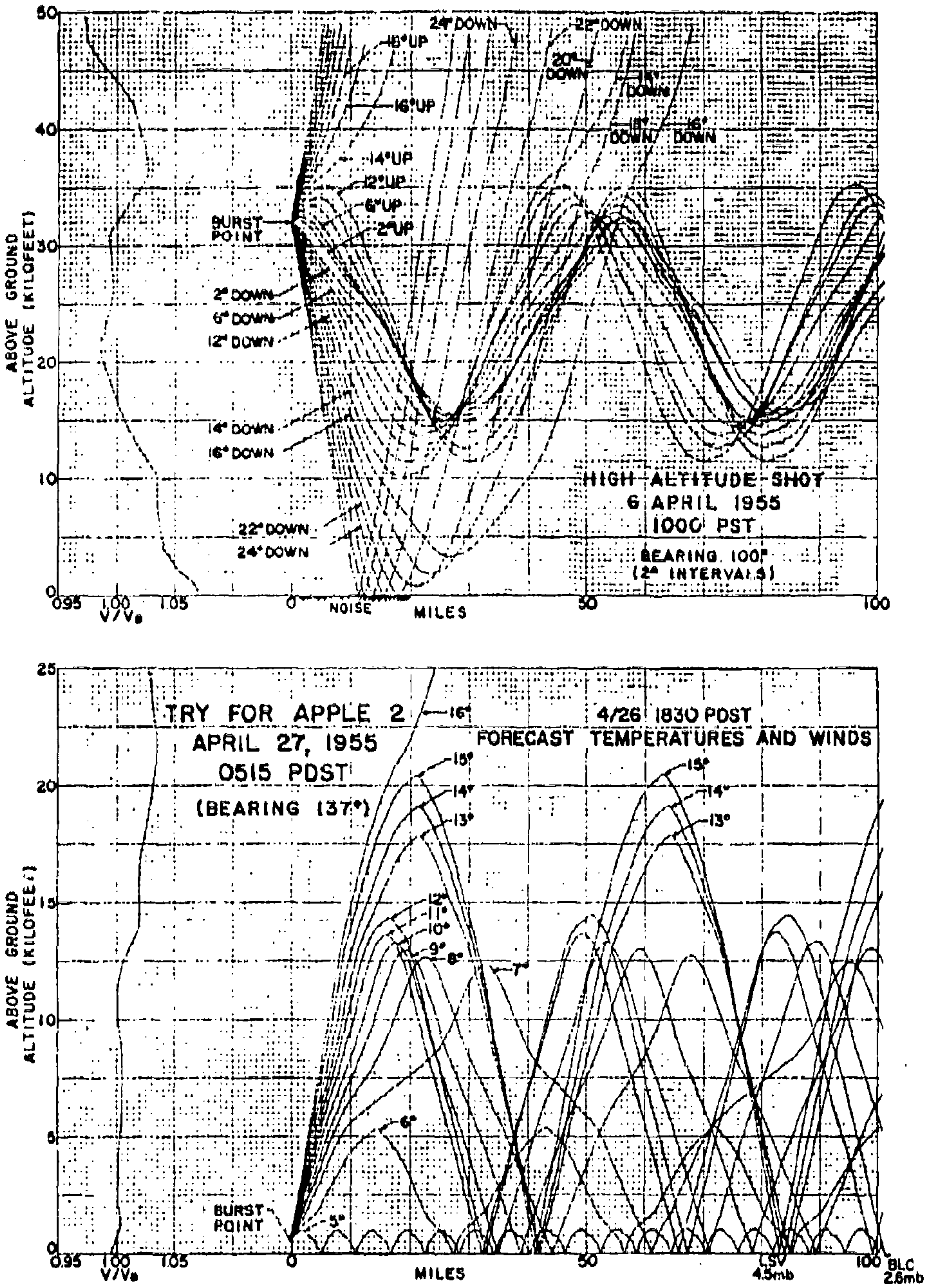
During Teapot the Blast Prediction Unit put into operation a new analog computer, designed and built by Sandia Corporation, to permit rapid use of the most recent weather information in computing the striking locations and intensities of blast from nuclear detonations.

Radical simplification had to be made in weather data during Buster-Jangle, Tumbler-Snapper, and Upshot-Knothole, so the complex equations of blast propagation could be applied speedily enough in long-hand calculations to provide a prediction before the shot was detonated. The new computer, named the RAYPAC (Ray Path Analog Computer), accepts uncompromised data signifying sound velocity toward any selected azimuth, such as that toward Las Vegas or Tonopah, at twenty significant altitudes from ground level to 50, 000 feet above mean sea level. The machine then plots lines representing paths of blast rays toward that azimuth as they are bent through the atmosphere. (See Figure 23). Rays starting out from the shot at equal angular spacings above or below horizontal (e.g., 6°, 8°, 10°, 12°, etc.) are depicted and their striking locations indicated. Concentrations of rays mean focuses where damage might occur.

With empirical formulae obtained from past operations, and the predicted yield of the nuclear device, peak blast pressure may be speedily predicted for any location. Predictions may be based on weather forecasts or on actual weather data, or a combination of data and forecast.

5.2 PROCEDURES

A blast pattern forecast was prepared from the weather forecast available about 7: P.M. on the evening prior to each planned shot day. Predicted pressures were presented to the Test Manager's Advisory Panel at the pre-shot evening meeting. In general, whenever the weather prediction resulted in a forecast of no off-site blast focus, pressure values prognosticated at the evening meeting turned out to be true within a factor of 1.5, which includes the lack of predictability of bomb yield. But whenever the 7:00 P.M. weather forecast resulted in the prediction of an off-site focus on one or more localities, pressures predicted from the forecast were often wildly off, showing for these cases that forecasting blast from forecasted weather data is almost useless work. Blast patterns are



TWO EXAMPLES OF RAYPAC WORK

The left curved line depicts input data: ratios of sound velocities V toward a selected azimuth (bearing), at altitudes, to burst-height sound velocity V_B. Shot-time air temperatures, and winds resolved toward the east (ie, bearing 100°), for the High Altitude Shot, introduced on the RAYPAC, produced the upper representation of sound rays. No blast struck earth more than 20 miles east from the shot, but all rays emitted in the vertical angle between plus and minus 12° from the horizontal were channeled between 11,000 and 36,000 feet above terrain. The lower example utilized forecast temperatures and winds resolved toward the southeast for an attempted shooting of APPLE-2. Strong blast focuses are predicted at 32, 64 and 96 miles, and also at 41 and 83 miles. Had this weather forecast been verified, and had the shot been fired at predicted yield, both Las Vegas and Boulder City would have received glass-breaking shock overpressures, 4.5 and 2.6 millibars respectively.

Figure 23

exceedingly sensitive to weather; small mistakes in the weather forecast create big errors in the blast forecast.

Between six and four hours prior to planned shot time, wind data were usually obtained which were then coupled with the forecasted temperatures and introduced on the RAYPAC. These computation runs generally gave sufficiently accurate predictions (within a factor of about 4) to allow proper range settings of off-site pressure-recording instruments (microbarographs)for the high-explosive shots or shot fired in advance of the nuclear.

A weather ballon released at minus two hours supplied the last preshot temperature and wind data introduced to the RAYPAC. Because of wind persistence, and the customary excellence of temperature-versus-altitude forecasts, these data frequently differed but little from the minus six-to minus four-hour combination, so the blast forecast also differed but little. Reasonably reliable blast predictions in critical directions were thus available to the Advisory Panel and the Test Manager by minus one hour.

To aid in predicting blast on future operations, meteorological data obtained by a balloon released immediately after each shot have been set up on the RAYPAC, and the hindsight "predictions" compared with measured values. Results will be discussed in a Weapons Test Report.

As in the past operations since Ranger, blast recording instruments were strategically located both off-site and on-site for three purposes: (1) To aid in blast predictions, (2) To deter or counter ridiculous off-site blast-damage claims, and (3) To acquire scientific knowledge of the stratosphere and ionosphere. For all shots instruments were operated at the Control Point, Mercury; Indian Springs; Las Vegas; Boulder City; Caliente; Lund; and Tonopah, Nevada; St. George, Utah; and Bishop and Inyokern, California. A portable station which could be placed on call was sent to Cedar City (Utah), Lincoln Mine, Glendale, Overton, Beatty, Death Valley Junction, etc., and to various on-site locations for certain shots, depending on the criticality of the situation and location as predicted on the preshot evening.

5.3 BLAST OVERPRESSURES

A summary of maximum blast overpressures observed during Teapot is shown in Table 3. Pressures measured at Indian Springs and Lincoln Mine would have caused damage if they had hit a larger town. The Lincoln Mine pressure recorded from Apple II was observed on the flats west of the mining town. The town itself probably experienced considerably lower pressures since it is protected by a mountain to the south; no damage was reported. St. George experienced the next largest off-site pressure, but it was just below the amplitude necessary to pull out very large store windows.

TABLE 3

Maximum Observed Overpressure

Station	Shot	Date	Overpressure (millibars*)	Remarks
CP	Apple II**	5-5-55	15.6	
Camp Mercury	Bee	3-22-55	3.8	
Indian Springs	Bee	3-22-55	2.9	
Las Vegas	Moth	2-22-55	1.4	
	Bee	3-22-55	1.4	
Boulder City	Bee	3-22-55	0.8	
	Apple	3-29-55	0.8	
Caliente	Bee	3-22-55	0.8	Ozonosphere signal
St. George	Turk	3-7-55	1.8	Ozonosphere signal
Lund	Turk	3-7-55	1.6	Ozonosphere signal
Tonopah	Turk	3-7-55	1.5	
Bishop	Apple II	5-5-55	0.4	Ozonosphere signal
Cedar City +	Moth	2-22-55	0.2	Ozonosphere signal
Beatty +	Turk	3-7-55	0.6	
Lincoln Mine +	Apple II	5-5-55	3.6	Observed west of town
Inyokern	Apple II	5-5-55	0.4	Ozonosphere signal

*One millibar is essentially one-thousandth of one atmosphere pressure, or 2.1 lbs per square foot, or 0.015 pounds per square inch.

**Turk may have given higher pressures, but recorder was knocked out of operation.

\+ A portable station was went to these locations on certain shots.

5.4 "SCALING-UP" MEASUREMENTS

Measuring stations further than 80 miles from the test site were established primarily to make a blast prediction possible, since available weather data up to 15 or 18 miles altitude are not sufficient to allow computation of blast patterns at these distances. The strong blasts striking more than 80 miles from the shot point are nearly always those bent down from a warm air layer 25- to 35- miles above the earth where weather balloons cannot reach. By "scaling up" measured pressures from high-explosive shots at minus one hour and/or minus two hours, and assuming meteorological

130,000 - 185,000 feet

persistence for the intervening time, a blast prediction is possible which usually is confirmed within a factor of about two.

Microbarograph measurements less than 80 miles from the shot points "scale up" very well when the blast pattern is simple, poorly when the pattern contains sharp focuses. Allowed firing points for the advance high-explosive shots are two to five miles from nuclear shot ground zeros. When the source is moved, areas of blast focus move correspondingly. Near a blast focus, peak overpressure changes pronouncedly with distance. Microbarographs in Las Vegas and Indian Springs have no way of sensing how far away from them or in what direction a focus may have struck. Consequently a RAYPAC solution with last-minute weather data supplies much more meaningful information on which to base judgment of continuing toward or turning off a nuclear shot than do the measurements from advance high-explosive shots.

5.5 SUMMARY

Never yet has a shot at the Nevada Test Site been cancelled solely because of predicted blast damage. Both radioactive fallout and ground-striking blast depend on wind speeds and directions, and in most instances any significant levels of fallout or blast pressure would be found in the downwind quadrant. With the present, severe limitations on "acceptable" fallout, tower, surface or underground shots of nuclear devices are much more likely to produce critical fallout conditions than critcal blast. Air bursts at several fireball radii above ground would probably reverse this situation.

CHAPTER 6. TRANSPORTATION OF NUCLEAR DEVICES

6.1 AIR LIFT PLANNING

The air lift of nuclear devices from Los Alamos to Nevada Test Site was discussed in Teapot Test Planning meetings on November 18 and 19, 1954, in the office of the Manager, SFO. Approval for the air lift was given in a memorandum, DMA to Manager, SFO, on November 29, 1954, with the stipulation that:

> "All such flights should be conducted under appropriate conditions and in such a manner that should an emergency occur enroute, landing may be effected at an emergency airstrip in an unpopulated area. Landings enroute from Los Alamos to Yucca Flat are not authorized except those necessitated by an emergency. As discussed in the above-referenced meetings the flight path of such air lifts will be entirely over unpopulated areas and sufficiently clear of any populated areas to insure the safety of such areas in the event of an emergency."

The Manager, SFO, had obtained opinions from the Commanders of AFSWC and AFSWP that it would not be advisable to move these devices by military aircraft from Los Alamos due to the inadequacy of the Los Alamos airstrip for use by military aircraft. The decision was then made to use a Carco Air Service C-47 aircraft for carrying the devices and a Carco Twin Bonanza as an escort craft.

After a number of preliminary meetings with those who would participate, a "Procedure for Transportation of Nuclear Devices From Los Alamos to NTS by Air" was written and approved by the Manager, SFO, and issued January 24, 1955.

6.2 OPERATIONS

The "Procedure for Transportation of Nuclear Devices from Los Alamos to NTS by Air" was followed with only minor changes. Yucca Flat airstrip was to be the destination of some flights but melting snow and later rain flooded the airstrip and aircraft landings were not possible at the beginning of the operation. In addition, the Desert Rock airstrip which was to be an alternate landing field was surveyed by the General Safety Coordinator and the Air Operations Officer, and it was decided that the airstrip was too rough at one end to risk the landing of nuclear devices. The units were landed at Indian Springs Air Force Base until the Yucca Flats airstrip was completely dried out and was approved for use by the Air Operations Officer.

The original schedule called for the delivery of five nuclear devices but after the results of the

. After the operation was complete and most personnel had departed NTS, the device was dismantled, the H. E. burned, and the detonators and nuclear component were returned to Los Alamos separately.

During the movement of these devices there were no adverse incidents or delays. All phases of the transportation were carefully planned and with the cooperation of all concerned were delivered safely and efficiently.

PART II SCIENTIFIC ACCOUNT

CHAPTER 1. GENERAL OBJECTIVES

The scientific account presented in the following chapters has been prepared and submitted by the Test Director of the Joint Test Organization.

1.1 GENERAL OBJECTIVES OF OPERATION TEAPOT

1.1.1

To detonate fourteen nuclear devices in the range from 1 to 45 kilotons.

1.1.2

To obtain information in the following general categories:

a. Feasibility of new ideas applied to weapon design particularly:

b. Investigation of effects, particularly:

(1) Effects of a high-altitude burst

(2) Civil and military effects from near nominal yields

(3) Demolition and radiological effects of a sub-surface burst

1.1.3

Continuation of research and technique developments.

1.2 DISCUSSION OF OBJECTIVES

Weapon development tests were proposed by the two weapon development laboratories, University of California Radiation Laboratory and Los Alamos Scientific Laboratory. Effects tests proposed by civil and military groups were carried out on detonations sponsored by the weapon development groups when feasible, and when not, on devices specifically allotted to the agency proposing the test. The sub-surface and the high-altitude detonations required devices which were not of major weapon development interest.

1.2.1 TEST PROGRAM

The fourteen nuclear devices fired during Operation Teapot are listed in the following table. Also included for the record is the high-altitude dress rehearsal (HADR) shot.

TABLE 4

Device	Sponsor	Purpose of Test

Device	Sponsor	Purpose of Test

1.2.2 WEAPONEERING TESTS

Detailed discussions of the proposed weapon tests for Operation Teapot are contained in classified letters from the Directors of UCRL and LASL to the Division of Military Application, USAEC, Washington, D. C., dated 7 December 1954 and 1 December 1954, respectively. Brief discussions follow:

1.2.3 EFFECTS TESTS

Various military and civil groups were interested in obtaining data on the effects of nuclear detonations, and every effort was made by the Test Organization to accommodate these tests whenever feasible.

a. High-Altitude Burst:

The Department of Defense had special interest in obtaining information from a nuclear detonation at a high altitude. Heretofore the highest nuclear burst was 10,213 feet MSL, made during Operation Upshot-Knothole. A 40,000 foot MSL burst height was selected for the test during Teapot, since available delivery and and test measurement facilities existed for this altitude. Basic data were desired on blast, thermal, gamma and neutron radiation, and ionization effects in the atmosphere at burst altitude.

b. Civil and Military Effects Tests:

Civil and military groups conducted effects tests on each of the nuclear detonations made during Operation Teapot. Civil effects tests under the direction of the Director, Civil Effects Test Group, in the Test Director's organization covered biological studies; blast measurements; gamma, thermal and neutron measurements; missile damage; civil type structure and utility damage studies; radiation fallout studies, radiation defense training and instrument evaluation; and effects on foodstuffs. Participating civil agencies included the Federal Civil Defense Administration, the Division of Biology and Medicine of the USAEC, the Home and Housing Finance Agency, the Public Building Services, the Lovelace Clinic, the American Gas Association, and the Food and Drug Administration.

Military tests under the direction of the Director, Military Effects Test Group, in the Test Director's organization covered basic blast measurements; basic nuclear radiation measurements and their effects; the effects on military structures and aircraft; evaluation of military instruments; and basic thermal measurements. These tests were conducted by service research laboratories and civilian research groups un der contract to the DOD.

Page 78 Deleted.

c. Sub-Surface Burst:

During Operation Jangle, surface and 16' sub-surface bursts were made using the 1.2 KT Ranger A device. Information was desired on cratering effects and the radiological fallout pattern resulting from a deep underground burst, and for these studies a depth of 67 feet, using a Ranger A device, was proposed. The tests were conducted under the Military Effects Test Program. In addition, the Engineer Corps of the Department of the Army participated in a training exercise in the assembly and emplacement of the weapon for the sub-surface burst.

1.2.4 CONTINUATION OF RESEARCH AND TECHNIQUE DEVELOPMENTS

In Teapot, as in previous operations, a very great amount of effort was put into research and technique development. A glance at the listing of projects will indicate that perhaps half of them were concerned not so much with the testing of the performance of a given device or with the behavior of typical military or civil materials and structures as with the development of new measuring techniques and the general advance of our knowledge in many fields.

The range of experiments in new techniques and instruments extended from the testing of simple burst position locators both civil and military, to the complicated measurement of a ten-million-degree temperature by direct observation. In one case the instruments have an obvious use. In the other the new technique may be applied to the diagnosis of future weapon design and in research.

The range of experiments in research was equally wide and included investigations in nuclear and thermal radiations, bio-medicine, structural design, radiation and shock hydrodynamics, the properties of materials at high temperature, and many other fields.

CHAPTER 2 OPERATIONAL

2.1 SCHEDULING REQUIREMENTS

In planning the test schedule there were technical, operational, and radiological safety requirements to be considered.

2.1.1

The principal technical requirements were of the nature of:

a. Obtaining and analyzing data from one device prior to detonating another.

b. Initial installation or transfer of apparatus from one shot location to another.

c. Fabrication and delivery of devices to the test site.

d. Introduction to the test program of additional devices to be tested.

2.1.2

The principal operational requirements consisted primarily of:

a. Weather, satisfactory from an operational viewpoint as well as from a rad-safe standpoint.

b. Aircraft operation and maintenance.

c. Construction completion or repair of technical facilities.

2.1.3

The radiological safety aspects of the scheduling problem came about by the general limitation imposed upon the Test Organization of the total off-site radiation during the operation. Some of the tests were considered hazardous from an off-site radiation fallout standpoint, the hazardous classification being due in part to the yield and height-of-burst above the terrain. The hazardous tests were considered to be TURK, APPLE I, APPLE II, ZUCCHINI, MET, and possibly BEE.

In order to minimize the duration of the operation, the Test Director established a dual capability for operating. With this plan it was possible from a technical standpoint to detonate a hazardous or a non-hazardous device on any one day with the off-site radiation fallout pattern being the determining factor. This plan contributed to shortening the over-all duration of the operation. In fact, it became possible to have dual capability of two non-hazardous devices, and on one occasion two devices were detonated the same day approximately six hours apart.

2.2 TEST SCHEDULES

The final approved readiness schedule for Operation Teapot as established in the Test Director's Operation Order No. 1-55 dated January 26, 1955, is shown in Table 5. The actual firing schedule of the shots as they occurred is shown in Table 6.

TABLE 5

FINAL APPROVED READINESS SCHEDULE

CODE GROUP "A"	CODE GROUP "B"	SPONSOR	DATE	TIME	AREA	DELIVERY	ESTIMATED KT YIELD	REMARKS
TURK		UCRL	2-15	Pre-Sunrise	2	500' Tower	33.0	- 36.4
	TESLA	UCRL	2-15	Pre-Sunrise	9b	300' Tower	1.0	- 700
APPLE		LASL	2-18	Pre-Sunrise	4	500' Tower	40.0	+ 61
	WASP	LASL	2-18	After Sunrise	7-4	800' Air Burst	2.0	+ 40
	MOTH	LASL	2-22	Pre-Sunrise	3	300' Tower	4.0 ✓	+ 37
	HADR	DOD	2-25	After Sunrise	5	40,000' Air Burst	--	HE only -- Dry Run for HA
MET		DOD/LASL	3-1	0900	F	400' Tower	28.0 ✓	+ 14
	POST	UCRL	3-1	Pre-Sunrise	9c	300' Tower	1.5	- 23
	HA	DOD	3-4	After Sunrise	5	40,000' Air Burst	2.0 ✓	- 60
	HORNET	LASL	3-8	Pre-Sunrise	3a	300' Tower	5.0 ✓	+ 70
	ESS	DOD	3-15	After Sunrise	10a	67' Under Ground	1.2	0
BEE		LASL	3-18	Pre-Sunrise	7-1a	500' Tower	10.0	+ 15
ZUCCHINI		LASL	4-1	Pre-Sunrise	1	500' Tower	40.0 ✓	+ 25

✓ More than 25% error in predicted yield

TABLE 6

ACTUAL SHOT SCHEDULE

CODE	SPONSOR	DATE	TIME	AREA	HOW DETONATED	KILITON YIELD	REMARKS
WASP	LASL	2-18	1200 PST	7-4 Yucca	761' Air Burst	1.2 KT	Dropped from B-36 at 20,000' MSL
MOTH	LASL	2-22	0545 PST	3 Yucca	300' Tower	2.5	
TESLA	UCRL	3-1	0530 PST	9b Yucca	300' Tower	7	
TURK	UCRL	3-7	0520 PST	2 Yucca	500' Tower	45	
HORNET	LASL	3-12	0520 PST	3a Yucca	300' Tower	3.6	
BEE	LASL	3-22	0505 PST	7-1a Yucca	500' Tower	8.5	
ESS	DOD	3-23	1230 PST	10-a	67' Sub-Surface	1.2	
HADR	DOD	3-25	0900 PST	5 Yucca	38,000' MSL Air Burst	No Yield	
APPLE	LASL	3-29	0455 PST	4 Yucca	500' Tower	15.5	

CONTINUATION OF TABLE 6

WASP-PRIME	LASL	3-29	1000 PST	7-4 Yucca	739' Air Burst	3.2	Dropped from B-36 at 20,000' MSL
HA	DOD	4-6	1000 PST	5 Yucca	36,620' MSL Air Burst	3.2	Dropped from B-36 at 46,000' MSL.
POST	UCRL	4-9	0430 PST	9c Yucca	300' Tower	1.85	
MET	DOD/ LASL	4-15	1115 PST	FF	400' Tower	24± 1 KT	
APPLE II	LASL	5-5	0510 PDT	Yucca 1	500'	30	Open Shot
ZUCCHINI	LASL	5-15	0500 PDT	7-1a Yucca	500' Tower	30	

PART III PUBLIC RELATIONS AND INFORMATION

CHAPTER 1 PUBLIC INFORMATION AND EDUCATION

1.1 OPERATION TEAPOT PROGRAMS

Field public information and education activity in support of Teapot was programmed in four general areas of interest, activity, or time: a pre-series public education program; a Test Organization staff program for coordinating sub-programs in public affairs, public information, official visitors, and official briefings; a Teapot public information program; a Civil Defense Observer program in connection with an open shot. The second and the fourth included defined sub-programs for implementing Department of Defense and Armed Services aspects. Activities were guided by the following authorizing papers:

AEC Staff Paper 707/12, December 6, 1954, "Public Information and Public Education Programs for Operation Teapot." Appendix "B" was the "Public Education Program in Advance of Spring 1955 Test Series in Nevada." Appendix "C" was the "Public Information Program for Teapot."

Announcement No. 3 dated January 27, 1955, Office of the Manager, SFOO, established that the staff office of "Chief, Public Relations Group" would report to the Test Manager on matters pertaining to the test operations to coordinate information, visitors, briefing, public health liaison activities, and public affairs generally. Basic to this approach was the February 1, 1954, "Report of the Committee to Study Nevada Proving Ground."

AEC Staff Paper 707/11, December 10, 1954, "FCDA Proposal for an Open Shot During Operation Teapot." This paper defined the field exercise, industry participation, Civil Defense observer, and news media observer phases.

Department of Defense Instruction C-5230.8, January 5, 1955. "Department of Defense Public Information Plan for Operation Teapot" provided policy guidance to the Departments of the Army, Navy, Air Force, and the U. S. Marine Corps.

Teletype, March 11, 1955, from Chief, AFSWP, Washington, D. C., to Field Command, AFSWP, Mercury, Nevada, stated the sub-programs for Army and for USAF information activity during the Civil Defense Open Shot program as agreed to by AEC, FCDA and DOD.

The assigned mission of continental test information activity was:

a. To support national policy, specifically by acting to accomplish the objectives of informing correctly the public in the United States and of helping create a favorable climate of opinion in the world at large.

b. To support the continental test mission by acting: To increase public knowledge and understanding of the purpose and need for continental tests; to help protect life and property by obtaining public cooperation in measures designed to avoid or to reduce hazard; to allay unfounded fear of damage or injury that may arise from public misunderstanding of test operations; to protect classified data while acting adequately to answer public need-to-know about test operations; and to meet the public information requirements of the Test Organization and its components, both civilian and military.

c. To support the program objectives of participating agencies, departments and other organizations.

1.2 PRE-SERIES PUBLIC EDUCATION PROGRAM

The authorized program proposed public education activity to be conducted nationally and in the Nevada region in advance of Operation Teapot in order to achieve public acceptance of the need for continental tests and their accompanying off-site effects. It was based almost entirely on activity recommended by the "Committee to Study Nevada Proving Ground" on February 1, 1954, as modified in view of subsequent developments.

Twenty thousand copies of the booklet, "A-B-Cs of Radiation," compiled by the Brookhaven National Laboratory, were distributed during Autumn 1954 to schools in Nevada and adjacent states.

Available films dealing even remotely with nuclear testing were distributed throughout the Nevada Test Site region. Most effective pre-test use was made of the USAF's "Target Nevada," and of General Electric's "A Is for Atom." When the film, "Atomic Tests in Nevada," became available in mid-April, it was shown repeatedly throughout the remainder of the series in the NTS region and was used extensively for civic club and TV presentation in surrounding states.

Fifty thousand copies of an illustrated booklet, "Atomic Tests Effects in the Nevada Test Site Region," were distributed, approximately 35,000 before the series and 15,000 during the series, basic distribution being through schools in the NTS region.

A comprehensive article on Nevada tests and weather was obtained from the U. S. Weather Bureau. It was circulated widely in Nevada and adjacent states and, it is understood, was distributed nationally to key media, to all U. S. Weather Bureau stations, and to all military weather installations.

Las Vegas Field Office officials, including the senior U. S. Public Health Service representative, contacted doctors, veterinarians, public officials, and civic leaders in all NTS region communities, including personal or other contacts with State Health Officers in Nevada and adjacent states.

Test officials, headed by the Test Manager and the Scientific Advisor, visited NTS communities to meet with civic leaders and to speak at community meetings. The first tour, January 18 to January 22, covered the Nevada and Utah area from Las Vegas to Salt Lake City; the second, February 7 to 10, covered Nevada communities immediately adjacent to NTS.

1.3 VISITORS PROGRAM

The Visitors Bureau was established as an organizational element of the Public Relations Group of the Joint Test Organization. Their assigned mission was to provide a program for observers and visitors at the Nevada Test Site during Operation Teapot. Specifically, this included reception, billeting, arrangement for security clearance and badging and providing orientation briefings and tours for the several categories of visitors. Many additional individual services were performed for the visitors by the Visitors Bureau in an effort to make their stay at NTS as agreeable as possible. These visitors included AEC-AFSWP Official Observers, AEC Employee Observers, and special invitees of the Test Manager. The Visitors Bureau furnished support to special military groups and FCDA observers and closely coordinated their activities with other elements of the Joint Test Organization and the Desert Rock Exercise groups.

The organizational structure of the Visitors Bureau was mutually agreed upon by the AEC and Field Command, AFSWP. It was headed by AEC-SFO personnel. Other key positions were staffed with DOD personnel and augmented by personnel of the NTS operating contractors for handling the administrative work load and security liaison work. Tour guide officers were assigned by Special Weapons Training Group, Field Command to assist with handling of large observer parties. Normal strength consisted of approximately fifteen persons augmented intermittently by about eight additional people.

By agreement reached in January 1955 between DMA-AEC and Headquarters, AFSWP for the conduct of a joint AEC-AFSWP Official Observer program, Special Air Mission Aircraft flights were scheduled between Washington, D. C. and Indian Springs Air Force Base. Four dates which encompassed "ready dates" of particular events of Teapot were established for these flights. Specific spaces were allotted on these trips to the Atomic Energy Commission, Secretary of Defense, Army, Navy and Air Force.

Invitations to members of the Congress to witness a detonation were issued by the Chairman of the Joint Committee of Atomic Energy.

Policies relative to the AEC and SFO and SFO contractors Employee Observer program were established by the Manager, SFO.

Official and Congressional Observer groups were normally housed at Indian Springs Air Force Base while casual official visitors, members of the Joint Committee of Atomic Energy and invitees of the Test Manager were quartered at Mercury.

Observers were met by representatives of the Visitors Bureau. and all required services were provided to them. The Visitors Bureau maintained offices at both Mercury and Las Vegas.

The program for official visitors included briefings, pre-shot forward area tours, witnessing a detonation, post-shot tours when field conditions would permit, and recreational trips when shots were postponed. Employee Observer groups were presented essentially the same program as the Official Observers except that no organized recreational tours were provided in the event of shot delays. The general orientation briefings were held at Mercury and were presented by an official of the AEC with the special subject briefings on Test Programs being presented by the Director of the Civil Effects Test group and the Deputy for Military Operations. On the forward area tour commentaries at the various points of interest were presented by representatives of the DOD, FCDA, Test Director, and Rad-Safe groups. There were eleven briefings and tours at NTS attended by approximately 670 observers. In addition, the

Briefing Officer, by invitation, presented seven programs to groups of Desert Rock participants and observers totaling approximately 2100 persons. Four additional special briefings to non-participants were presented to about 375 persons at UCRL, SFOO and Federal Bureau of Investigation Academy graduates at Phoenix, Arizona.

Table No. 7 summarizes the Observer activities coordinated by AEC-DOD Visitors Bureau.

TABLE 7

OBSERVER ACTIVITIES COORDINATED BY AEC-DOD VISITORS BUREAU

	*Official	*Employee	Special Military Groups	Total
Badges processed for Observers	669	**939	1,530	3,138
Visitors Attending Briefing and Tour	457	214	***660	1,331
Visitors Witnessing Shot	286	207	***1,025	1,518

*Visitors Bureau direct responsibility

**Includes 129 miscellaneous visitors not included in organized groups.

***Briefing and field tours by military.

(Figures compiled from best data available)

The many postponements and revisions in the shot schedule created a much heavier and complex workload for the Visitors Bureau. Nevertheless, a satisfactory program for the Official Observer and Congressional groups was maintained. Likewise, the Employee Observer program was well executed, but successive postponements of particular shots of interest to the organizations represented by the Employee Observers tended to discourage individuals traveling to NTS at their own expense.

The estimated costs for engineering and construction as required by the Visitors program included such items as rehabilitation of observer areas, badge issuing station, signs, etc., and totaled approximately

$13,000. The estimated cost for support items was approximately $16,000 for the military participation and $28,000 for the AEC and AEC contractor participation.

1.4 PUBLIC INFORMATION PROGRAM (OTHER THAN OPEN SHOT)

The Joint Office of Test Information was activated on February 1, 1955, in accord with AEC-DOD agreements, and was deactivated on May 19. The Director, appointed by the AEC, was assisted by a Deputy Director appointed by the Deputy for Military Operations. A civilian was assigned to be DOD Advisor to the Director to assure conformance with DOD policy and to help achieve a balance in service activity.

Approximately 25 individuals served on the JOTI staff during the series, the continuing complement approximating 15. Personnel was drawn from: AEC-SFO and Los Alamos Scientific Laboratory; Field Command, AFSWP : USAF Special Weapons Center and headquarters of various Air Force Commands; the Marine Corps (only during periods of Marine participation); and Sixth Army. Only two individuals, the Director and a secretary, had had representative experience in prior continental tests.

In general, policies and procedures for controlling and for releasing test information to news media and to the public followed those of prior series. All formal issuances were prepared and distributed through the Las Vegas office, JOTI, and all press contact was there. All central records were maintained there, except for the central photo file which was maintained at the Forward Office.

Immediately prior to the readiness date of the first shot, or on February 13, a pre-series briefing conference was held in the Las Vegas City Auditorium with AEC Chairman Strauss in attendance. The extent of public interest was indicated by attendance of 40 newspaper, periodical, press and photo service, newsreel, radio and TV representatives from the West Coast and from mid-west and eastern media. A majority of these media representatives remained in the area throughout the first two weeks, and various representatives from Los Angeles media returned on occasion.

Information personnel met with the press for a briefing on each shot as it became ready for firing. Other meetings were held when there was a media or a Test Organization requirement.

Plans for all weather evaluation meetings and the determinations reached were announced immediately JOTI offices in Mercury and in Las Vegas were staffed at all times during night evaluation meetings and on all shot nights with the results of evaluation meetings being disseminated by the Las Vegas office to all hotels, the county sheriff, radio stations, all news representatives in the area, and Los Angeles media which had requested such service. Dissemination to nearby communities, other than that through radio, was through the radiation monitoring organization.

Between shots, press requests for interviewing members of the Test Organization and for feature information were satisfied to the extent possible. Media visits to Mercury, Desert Rock, or Indian Springs Air Force Base were arranged on several occasions. In addition, members of JOTI and the Test Organization made approximately 35 public addresses, including radio and TV appearances. A majority of these during the series was in or near Las Vegas.

An indication of the scope of activity is given by the fact that 103 numbered press releases were issued by JOTI, exclusive of the Open Shot.

Various official photographs of Test Organization personnel, equipment or installations were issued upon media request. Following each shot one or more photographs of the detonation or resulting cloud and, on occasion, photographs of official visitors were issued. Armed Services photographs of participants, supporting activities, or of shot-time activities were distributed as available. A color photograph was forwarded of each shot to AEC-DIS to satisfy any national media requirement.

1.5 OPEN SHOT PROGRAM

The Civil Defense Open Shot program included technical tests, industry participation and test, a field exercise, an observer activity, and news media correspondents. Further discussion of the FCDA participation is discussed in Part IV. The Open Shot was proposed and approved as a Civil Defense activity with Test Organization and military participation. The approved initial organization included AEC, DOD and FCDA at the policy level but concentrated operating responsibility fully in the FCDA organization. Open Shot participation by an Army Armored Force subsequently was scheduled, and JOTI was informed of Army intention to make its participation a major information effort. Organizationally, planning attempted to concentrate information phases under a joint agency policy and operational structure and separated from FCDA observer phases. Operationally, some phases of the total observer program necessarily came under the "information" organization, such as joint physical arrangements for tours, briefings, etc. The actual organizational structure is indicated in Figure 24, "Joint Office of Test Information - Open Shot."

JOINT OFFICE OF TEST INFORMATION — OPEN SHOT

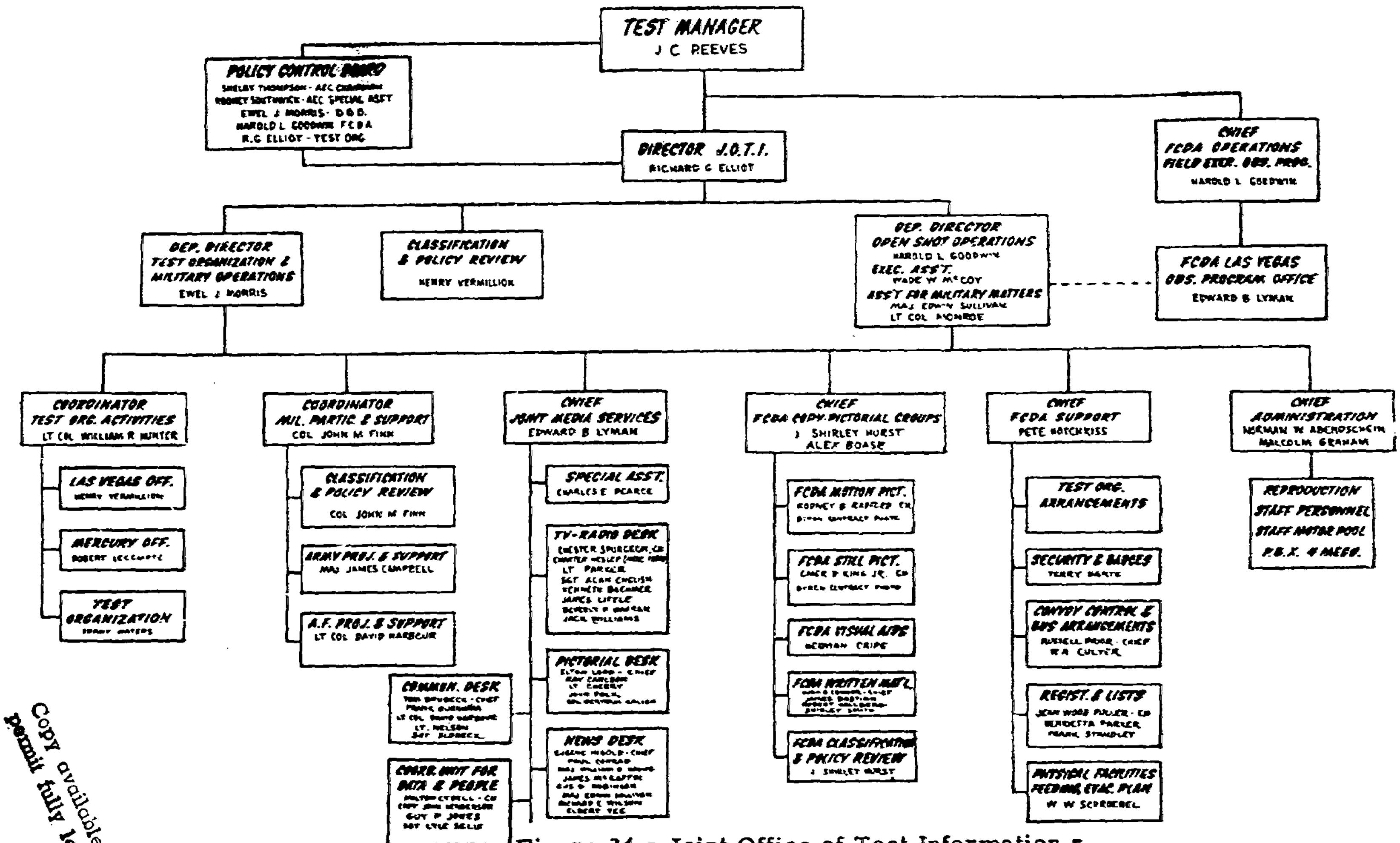


Figure 24 - Joint Office of Test Information - Open Shot Organization Chart

PART IV FEDERAL CIVIL DEFENSE ADMINISTRATION

CHAPTER 1 FCDA PROGRAMS

1.1 GENERAL

The Federal Civil Defense Administration participation in Teapot consisted of three general types of programs: (1) Technical projects to provide data concerning the physical effects of nuclear detonations on structures and material, (2) Field Exercises and demonstrations to permit Civil Defense workers to witness at first-hand the effects of a nuclear detonation and to conduct exercises in the area of damage, and (3) Uncleared observer and publicity program (called the "Open Shot" program).

The responsibilities and conditions of FCDA participation were covered by a Memorandum Agreement (SFOO No. AT(29-2)-263) dated November 3, 1954, between the Atomic Energy Commission and the Federal Civil Defense Administration.

1.2 TECHNICAL PROGRAMS

The FCDA technical programs were integrated into the Civil Effects Test program of the AEC and were under the general direction of the AEC-furnished Director of Civil Effects Test. These FCDA-sponsored projects included participation by Industry. The objectives of Industry participation as stated by FCDA were:

a. To provide through the technical test program information essential for Industry planning in the event of enemy attack.

b. To provide first-hand experience for industry personnel who will be responsible for planning and executing disaster operations.

c. To supplement the Civil Defense staff with qualified technical personnel from several fields.

d. To create greater Industry interest in the Civil Defense program through the participation of major segments of Industry.

1.3 CIVIL DEFENSE FIELD EXERCISE

The Field Exercises were conducted entirely by the FCDA, and the objectives as stated by FCDA were:

a. To make a long delayed start on the essential task of providing first-hand experience under the conditions of a nuclear explosion to key Civil Defense personnel from states and cities.

b. To demonstrate to the public that preparedness for the Civil Defense worker is as important as for the soldier and to increase the prestige of Civil Defense workers in general and of Field Exercise participants in particular.

c. To bring together at the Nevada Test Site key Civil Defense workers from all over the Nation as a first step toward achieving a national esprit de corps among Civil Defense volunteers and to emphasize the national aspects of the Civil Defense program.

1.4 OPEN SHOT PROGRAM

The Open Shot program was conducted by the FCDA in conjunction with the AEC. Their objectives as stated by the FCDA were:

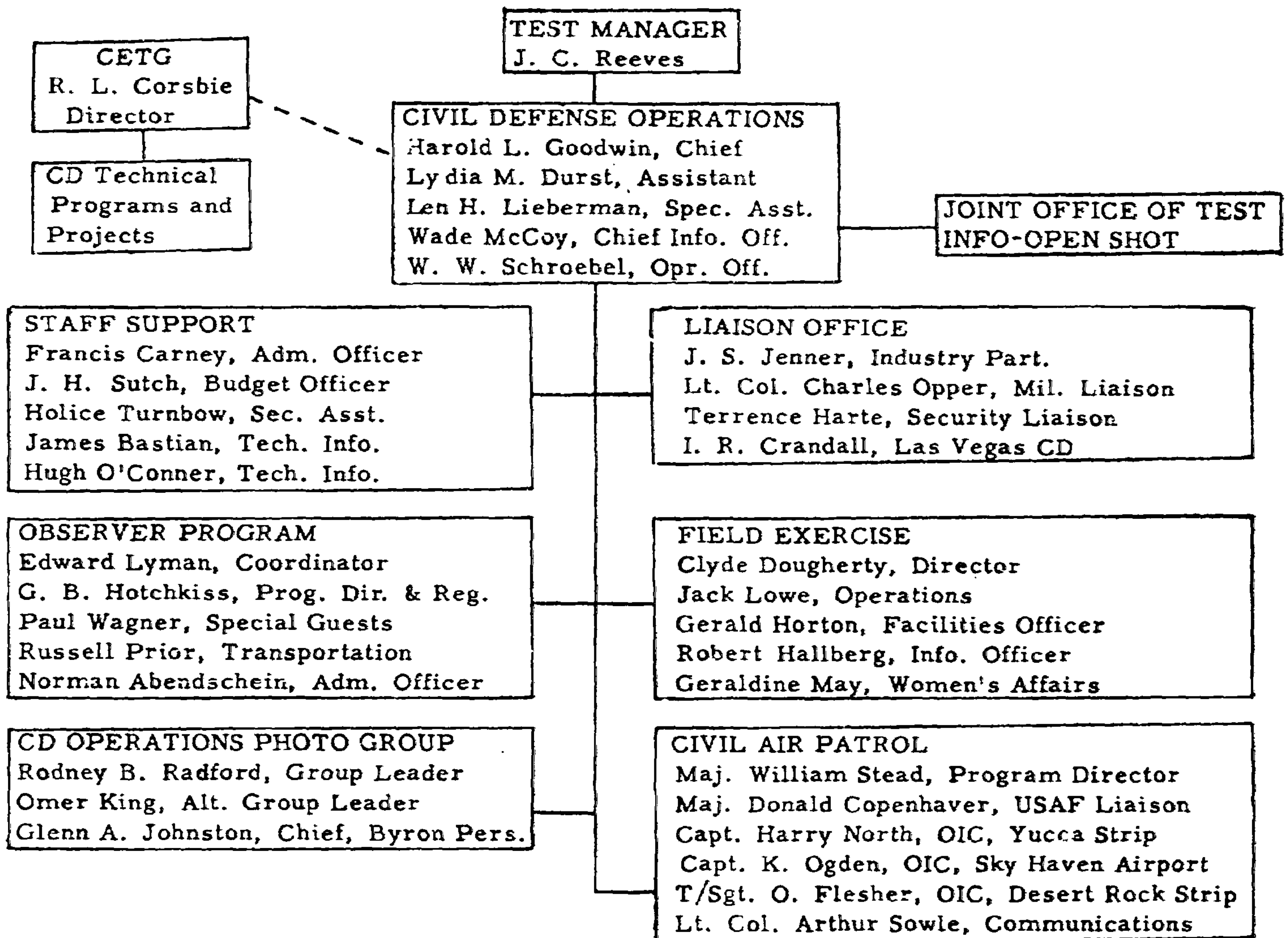
a. To allow selected observers, representatives of the public and public media to witness an atomic explosion and the accompanying Civil Defense technical tests, and thereby increase general levels of accurate knowledge about the various effects of nuclear weapons.

b. To demonstrate through the Field Exercise and technical tests some aspects of the Civil Defense program and thus stimulate greater public interest in Civil Defense.

c. To enable state and city Civil Defense personnel and other officials charged with Civil Defense responsibilities to witness first-hand an atomic explosion for the purpose of indoctrination and a better informal leadership in their home states and communities.

CHAPTER 2 ORGANIZATION

The organization of Civil Defense Operations provided for both Nevada Test Site and Las Vegas staffs. General supervision and coordination was provided through the Office of Chief of Civil Defense Operations. In addition to the assigned mission of conducting Civil Defense operations in Teapot, the Chief of Civil Defense Operations was also the senior representative of the Federal Civil Defense Administration at the Nevada Test Site and maintained cognizance over all Civil



ORGANIZATION CHART
CIVIL DEFENSE OPERATIONS

Figure 25 - Organization Chart Civil Defense Operations

Defense activities, including technical programs and projects which were operationally conducted through the Civil Effects Test group. For Civil Defense Organization Chart, see Figure 25.

Assistance and guidance to Civil Defense sponsored programs and projects were provided through a Staff Support Section which included budget and administrative officers and technical information specialists. Additional support for Civil Defense sponsored Industry programs and projects was provided through an Industry Participation Liaison Office.

Additional staff sections were set up for the conduct of the Open Shot Program, the Field Exercise, Civil Air Patrol activities, and Civil Defense Operations Photo missions.

A Joint Office of Test Information - Open Shot was activated to represent the interests of all agencies and was primarily concerned only with media activities. See Part III, Public Relations and Information, for discussion and Organization Chart JOTI, Figure 24.

By mutual agreement of the Policy Control Board for JOTI-Open Shot, the Director of the Joint Office of Test Information expanded his function to include direction of Open Shot activities. The Chief of Civil Defense Operations became, in addition to his other duties, Deputy Director for Open Shot Operations and, in addition, served as the FCDA member of the Policy Control Board.

CHAPTER 3 THE OPEN SHOT PROGRAM

Originally, Open Shot participation was set for ZUCCHINI with a ready date not earlier than April 1st. However, because of changes in scheduling of devices, the Test Organization determined shortly after April 1st that the Open Shot should be scheduled for APPLE II not earlier than Tuesday, April 26th.

FCDA key staff members reported to Las Vegas and began activities on April 11th. The Joint Office of Test Information-Open Shot opened to the public at the Las Vegas High School Auditorium on April 15th. Upstairs rooms in the auditorium were used for offices. The lobby was used for registration, and the auditorium itself for briefings. The facilities were donated by the Las Vegas school system.

The Open Shot program began on Friday, April 22nd, with the registration of general observers and media participants. Saturday, April 23rd, was devoted to briefings by members of the Joint Test Organization and senior representatives of the participating agencies. The briefings were received enthusiastically by observers and media and were one of the highlights of the program. Sunday, April 24th, was devoted to a pre-shot tour of the FCDA test line in Area 1. On Monday the observers were again briefed at the High School Auditorium. These briefings were generally of a more technical nature than those given on Saturday, the 23rd.

The morning weather briefing on Monday, the 25th, indicated that weather conditions would be unacceptable for firing on Tuesday, the 26th, and the shot was postponed for twenty-four hours. This was the first of an eight-day postponement; three of the postponements took place at the early morning weather briefing just prior to shot time while the observers and media representatives waited at the Observer Area.

Originally, approximately 1300 observers and media representatives registered for the Open Shot. With each postponement the number dwindled as observers were forced to leave and media coverage was reduced generally because of expense.

APPLE II was fired at 0510 hours PDT on the morning of May 5. Approximately 500 observers and media representatives were still on hand for the event. This "hard core" of Civil Defense observers and media representatives were almost unanimous in their opinion that the shot was worth waiting for.

On shot day plus one a tour of the FCDA area was conducted. The genuine interest of observers is evidenced by the fact that many who had been unable to wait for the shot returned for the post-shot tour. Figures 26 and 27 show a pre-shot and post-shot view of a house in the FCDA area.

The Open Shot program ended on Friday, May 6, when the last observer convoy departed the forward area for Las Vegas.

The Memorandum of Understanding, dated November 3, 1954, between FCDA and AEC for FCDA participation in full-scale nuclear tests sets forth that FCDA would participate in the next scheduled full-scale nuclear test at the AEC's Nevada Test Site to the extent that such FCDA participation would not interfere with or impede the AEC's Weapons Development program. AEC Staff Paper 707/11, dated December 10, 1954, summarized that the proposed Open Shot did not require a separate detonation, but could be conducted in conjunction with a developmental shot compatible with such a program.

During Teapot there were approximately 1300 observers and media representatives for the Open Shot program, with approximately 400 additional persons involved in the Field Exercise program. The Open Shot personnel were quartered in Las Vegas, while arrangements in accordance with the Memorandum of Understanding were made to provide

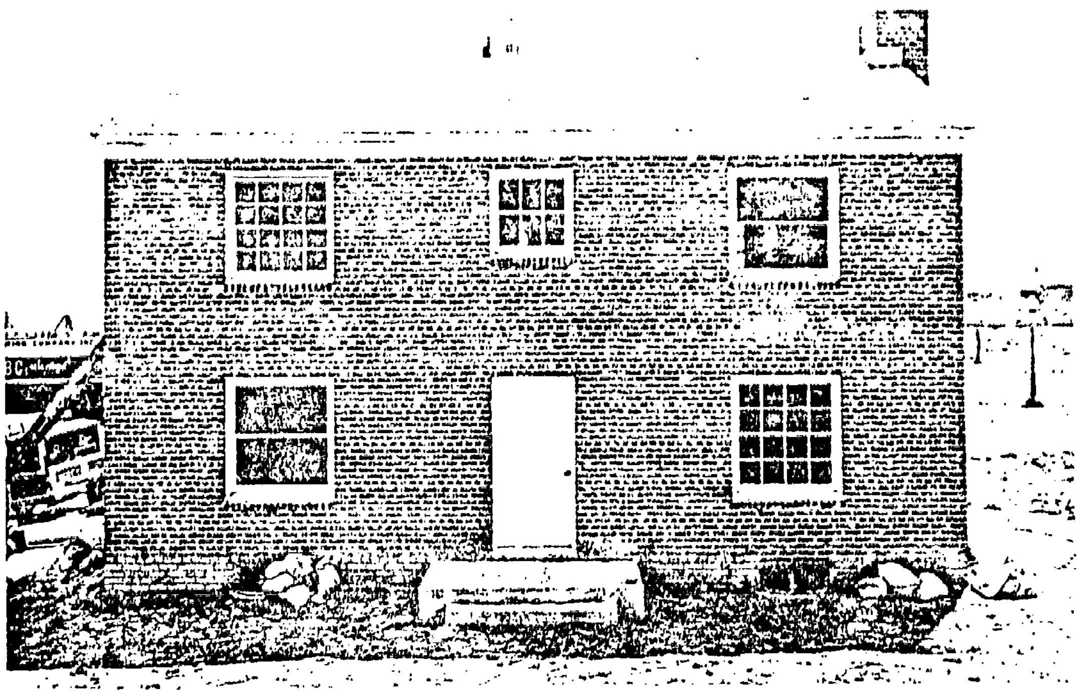


Figure 26 - Pre-Shot View of House

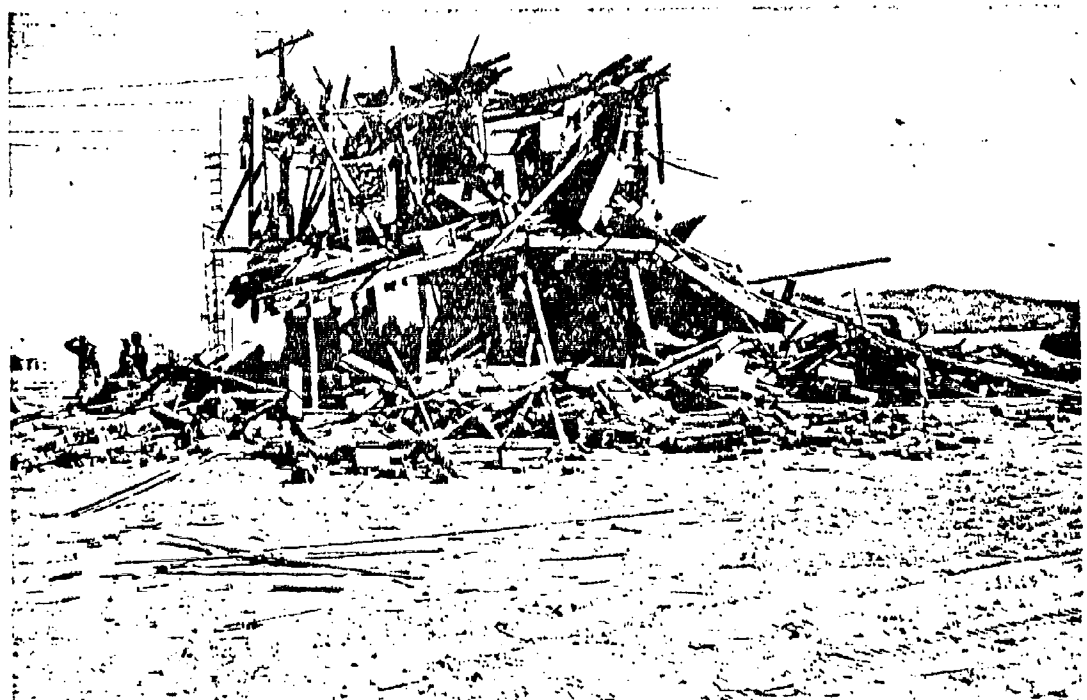


Figure 27 - Post-Shot View of House

housing and messing facilities at Mercury for the Field Exercise workers. It is noted earlier in this report that the Open Shot was scheduled for not earlier than April 26. Programs for Open Shot and Field Exercise personnel began on April 22, and with the ensuing delays of the detonation, many remained through May 6.

For subsequent consideration and study, it should be noted that some interference was created in varying degrees to the Weapons Development program during the FCDA Open Shot program outlined as follows:

a. By the influx of the Field Exercise personnel into Mercury, congestion was created relative to housing, messing and other logistical facilities.

b. Adverse weather conditions creating an eight-day delay for the detonation required the Test Organization officials to give extensive consideration to the availability of housing at Mercury for the Open Shot personnel quartered at Las Vegas in an attempt to house this personnel at Mercury in case they were unable to retain their Las Vegas hotel reservations.

c. In the eight-day delay there were 21 Advisory Panel evaluation meetings in an effort to detonate APPLE II. The Joint Test Organization officials exerted every effort to detonate the shot, and in the eight-day delay "lived through the night" three times, two of which were on consecutive nights. This situation necessitated the scientific personnel and operating contractor people much added effort and fatigue in "buttoning up and unbuttoning" in each of these night sessions.

d. By the combination of the Open Shot and a Weapons Development shot, construction was required within the same test area. Interference and congestion in the test area was observed in attempting to meet construction completion dates.

e. FCDA was allotted a sector upwind from the test area for their various exercises. This placed a limitation upon the Joint Test Organization in determining whether to detonate or postpone a shot due to the possibility of changing wind conditions creating radioactive fallout in this sector.

f. The initially approved Open Shot program did not anticipate military participation. However, subsequently, this was modified to include military participation which actually developed into a major portion of the Open Shot program. This added participation naturally caused some interference.

g. The Open Shot and Field Exercise groups held extensive exercises in the test area on D $\neq$ 1. Such a program could cause interference to the Weapons Development program on their recovery work. However, in the Teapot Operation interference was held to the minimum by delaying the FCDA Exercise as late in the day as possible.

The importance of the FCDA programs to the National Defense is recognized and is considered as essential for continued participation in subsequent test operations. However, in view of the observations listed above, it is deemed important that careful consideration be given and planning developed which would alleviate all chances of any interference to the Weapons Development Program.

CHAPTER 4 THE FIELD EXERCISE PROGRAM

Approximately four hundred Exercise participants, representing 39 States, the District of Columbia and the Territory of Hawaii were registered at Mercury by the close of registration at 2100 hours on April 22. These Field Exercise participants brought with them three fully equipped standard Civil Defense rescue trucks, three standard Civil Defense fire pumpers, two complete communications vans and associated equipment, and additional mobile communications vehicles. In addition, the Field Exercise was equipped with ten jeeps, a pick-up truck, an ambulance, and three additional pieces of fire equipment provided by Industry.

On arrival each Field Exercise participant was equipped with a standard Civil Defense helmet and coveralls donated by Industry. Male participants were housed in hutments, female participants in a dormitory set aside for the purpose by the Test Organization.

The Field Exercise group performed according to plan. A considerable portion of field exercise activities was devoted to servicing of media and observer groups. The police and warden services worked closely with NTS Security in providing crowd and traffic control and insuring compliance with safety regulations. The sanitation service supervised sanitary facilities set up for the observer groups. The mass feeding service prepared two excellent meals, one at breakfast on shot morning, and one at lunch during the tour on the day following the shot. A medical service was set up for the observer groups but had few customers. There were no casualties. Communications with all elements of the Civil Defense group were maintained by the communications service. On shot day plus one, the rescue service recovered all mannequins from damaged houses, working in conjunction with the casualty care service. The engineering service made a complete investigation of all damaged structures and filed reports with the Field Exercise Commander.

The inactivity stemming from continued postponements created a major problem for FCDA. In order to maintain continued interest and morale on the part of the exercise participants, FCDA arranged recreation tours for nearby places of interest such as Death Valley and Boulder Dam. In addition, with the concurrence of the Deputy for Military Operations, the Field Exercise participants were permitted to visit the Frenchman Flat Area to view the effects of MET and previous "effects" shots and Area 10 to view the "ESS" crater and structures remaining from the "Jangle" tests. Access to Area 10 was with the express understanding that the description of the craters would not be publicized.

While some Field Exercise participants were forced to leave because of the delay, about half remained until the end of the program.

During the shot the Field Exercise group was divided among three positions, as follows:

1. The Observer Area: Coffee service teams of the mass feeding service, a communications team, and two police teams remained at the Observer Area for service to observer and media groups and to maintain communications with other elements of Civil Defense Field Exercise.

2. Position Able: The major portion of the Civil Defense Field Exercise group witnessed the shot from Position Able, 37,000 feet from ground zero. Immediately after the shot, the Field Exercise group at this position withdrew to the Observer Area. The mass feeding service immediately set up for the preparation of breakfast. Other teams performed routine functions as assigned.

3. Position Baker: Position Baker was located 10,500 feet from ground zero on an extension of the FCDA 1.7 psi test line. The position was a trench with sandbag parapet. It was occupied by 21 Civil Defense personnel, of whom six were women, and nine media representatives. Communications with other elements of the Field Exercise group and with the Test Manager's Office were by telephone and two radio links, one on Test Organization Channel 6, and the other on Civil Air Patrol VHF. Transportation was by jeep. The vehicles were parked to the rear of the trench position and were without protection except for aluminum foil on seats and tailgates to prevent thermal damage. The Position Baker exercise was completed without incident. After the shot the group withdrew to the Observer Area.

CHAPTER 5 INDUSTRY PARTICIPATION

Industry participation in Civil Defense programs is made possible because of a provision in Public Law 920 for the acceptance by Civil Defense of donated goods and services. Under this law Industry participation in UPSHOT was restricted to donation of vehicles, mannequins, some furnishings, and services by Industry participants. However, a law enacted in 1954 also made it possible for Civil Defense and other agencies to accept donations of funds for defense purposes. This law made it possible for Industry participants in Civil Defense programs to erect structures and pay for other contractual services during Teapot.

As a consequence, 197 associations, institutes, corporations, and individuals participated under Civil Defense auspices in Operation Teapot. In addition, many more firms participated indirectly through the associations of which they were members.

Over 100 industry project personnel had direct responsibility for assisting in the conduct of Civil Defense programs and projects and nearly an equal number provided consultant service.

Much of the Industry participation took place in technical test programs and projects. However, there was also considerable Industry participation in the Open Shot. For example, Industry provided food and equipment for the mass feeding demonstrations, helmets and coveralls for Field Exercise participants, vehicles for operational use for the Field Exercise, and furniture and mannequins for the demonstration program.

It is estimated that costs to Industry for participation in series Teapot were in excess of a million dollars. This estimate includes laboratory work, personnel expenses, cost of donated materials, and cost of transporting materials to and from the Nevada Test Site, in addition to contractor's costs at NTS reimbursed through FCDA.

All Industries had an equal opportunity to participate, provided they could demonstrate Civil Defense need for the proposed test and meet the standards set by the proper review and screening committees and the FCDA Test Organization. Many more Industry tests were rejected than were accepted, most of them because no valid test was involved. In some cases the FCDA Test Operations Industry Liaison staff approached Industries with requests for participation -- the brick industry is an example. In many cases these requests for participation were reviewed by the Industry membership and finally accepted.

The objectives of the Industry program were achieved. Industry participants have generally expressed themselves as satisfied, and the majority feel that the tests have been worthwhile.

CHAPTER 6 THE CIVIL AIR PATROL

6.1 GENERAL

Air support for Civil Defense operations was provided by the Civil Air Patrol. In planning for Operation Teapot, FCDA requested the cooperation of the Civil Air Patrol through National Headquarters in Washington, and the Nevada Wing was assigned to the mission.

6.2 AIR OPERATIONS

Air operations by CAP included courier missions from the Nevada Test Site to Las Vegas and Burbank, California, for the transportation of films, tapes, and other media material. In addition, CAP flew members of the Civil Defense Operations Photo Group on a number of photo missions. Support for the mass feeding service was provided by food lifts from Las Vegas to the Test Site. Ambulance planes of CAP were available in case transportation of casualties became necessary. A total of 162 missions were flown.

Twenty-one Civil Air Patrol aircraft and three helicopters provided by the Bell and Hiller companies were used. The missions were flown by 42 flight personnel.

CAP operations were maintained at Sky Haven Airport, Desert Rock Airstrip, and Yucca Airstrip.

6.3 COMMUNICATIONS

Civil Air Patrol communications, in addition to providing the necessary air-to-air and air-to-ground operational links, provided a complete back-up emergency network for Civil Defense operations. These communications included five fixed VHF stations, three fixed medium frequency stations, and ten mobile stations. These units were operated by 32 CAP communications personnel.

CAP communications stations were located at the Joint Office of Test Information at the Las Vegas High School Auditorium, Sky Haven Airport, Desert Rock Airstrip, the office of the Chief of Civil Defense Operations at Mercury, the Control Point area, Media Hill, and Yucca Airstrip. The CAP communications network was extended to field exercise Position Baker during the brief periods when the position was activated.

Six message centers were maintained by CAP for the transmission of copy, films, tapes, and messages. These were at Media Hill; the 4700' line during tours; Yucca Airstrip; Sky Haven Airport; the High School Auditorium; and the airfield at Glendale, California.

A total of 149 Civil Air Patrol personnel were involved in the operation. Of this number, only about 20 operated from inside the Nevada Test Site at any one time.

The objectives of Civil Air Patrol participation were met, since the operation clearly demonstrated the flexibility of CAP, both in the air and on the ground. Service was provided to media representatives and the Civil Defense Operations group, and it was made clear that the integration of CAP activities with those of Civil Defense can be accomplished with little difficulty in a disaster.

PART V DEPARTMENT OF DEFENSE OPERATIONS

CHAPTER 1. GENERAL OBJECTIVES

1.1

The office of DOD Operations Coordination was established on the Test Manager's staff to provide advice, assistance, and coordination for air operations, operational training projects, Desert Rock troop participation and troop observer programs as well as the coordination of additional matters of AEC-DOD interest as required by the Test Manager and Deputy for Military Operations.

1.2

The objectives of the Operational Training Projects and Desert Rock Troop participation and Troop Observer programs were to provide training and indoctrination for troops and air crews as well as an opportunity to test Service tactics and techniques developed or being developed in connection with utilization of atomic weapons. These projects in the 40 and 41 series participated on the philosophy of non-interference with the developmental and effects programs.

1.3

In general, the Operations Training and Troop Participation Projects were conducted satisfactorily. In some cases complete realism or desired maneuvers were not realized due to limitations imposed by the scientific test programs. In addition, firing conditions, such as fall-out patterns or repeated delays, imposed operational difficulties which in some cases resulted in cancellation of proposed participation. However, for those shots on which the projects did participate, valuable experience was gained and in most cases project objectives realized. (Chapters 2 and 3 show 40 and 41 series project numbers with participation.)

1.4

There were no serious problems encountered in coordinating the 40 and 41 series project requirements. Similarly, aircraft requirements, foreign observer programs, and miscellaneous other activities were either supervised or coordinated without problems worthy of record.

CHAPTER 2. TROOP PARTICIPATION AND TROOP OBSERVER PROGRAM EXERCISE DESERT ROCK VI

2.1 INTRODUCTION

Exercise Desert Rock VI was the U. S. Army designation for the troop participation and troop observer program in Operation TEAPOT. As a continuation of similar programs in previous continental tests (Buster-Jangle, Tumbler-Snapper, Upshot/Knothole) the exercise was designed to provide orientation and indoctrination for selected individuals in the effects of atomic weapons and to conduct certain specified troop tests of doctrine, tactics, techniques and equipment.

Camp Desert Rock itself, located about 2-1/2 miles SW of Camp Mercury, is a Class I installation under the command of the Commanding General, Sixth Army, and during the operational phase (15 February to 10 May 1955) averaged a permanent party group of about 2400 personnel. On June 4, 1955 the camp reverted to a "standby" status under the command of the Commanding General, Camp Irwin, California. By 15 June 1955 the station complement, which will perform the necessary guard and allied duties and will live at Mercury, was decreased to one officer and approximately 15 enlisted men.

As in Upshot-Knothole, the Deputy for Military Operations was charged by the Test Manager with the responsibility for all military activities at the Nevada Test Site. Assistance in the discharge of this responsibility was provided by the Liaison Officer for Desert Rock Exercises, who functioned on the staff of the Test Manager under the DOD Operations Coordination Group. Through this office the Desert Rock Program was coordinated and subsequently integrated into the over-all AEC-DOD test operations.

Again, as in Operation Upshot-Knothole, by agreement between the DOD and the AEC the DOD (Exercise Director, Exercise Desert Rock VI) assumed full responsibility for the safety of troops and troop observers. The safety criteria established for all troops and troop observers (less personnel in the Volunteer Observer Program) was 5 psi of overpressure; 6 r at any test, of which no more than 3 r was prompt, whole body radiation (a maximum of 6 r in any six month period); and 1 cal/sq cm of thermal radiation. The safety criteria for the Volunteer Observer Program was 8 psi of over-pressure at ground level; 10 r in any one test, of which no more than 5 r was prompt, whole body radiation and with the further limitation that no volunteer would take more than a total of 25 r in this series of tests; and 1 cal/sq cm of thermal radiation.

The security clearances for personnel participating in Exercise Desert Rock VI included a minimum clearance of Secret for cadre and permanent party personnel, both officer and enlisted men; a minimum clearance of Confidential for troop participants included in packet and troop observer groups, both officers and enlisted men.

2.2 EXERCISE PROGRAM AND SHOT PARTICIPATION

2.2.1

The exercise program was divided into three main components - Troop Orientation and Indoctrination, Troop Operational Training Tests and Technical Service Tests.

a. Troop Orientation and Indoctrination

The troop observer program was conducted in two parts, one the indoctrination of official observers from all branches of the military services; the other the indoctrination of the troop packet units from all six Army areas and the Air Force. Each group participated in the orientation program which included lectures and films on general atomic matters, a description of the exercise, a pre-shot tour of the Camp Desert Rock display area, the observation of an atomic burst as close to ground zero as safety criteria permitted (preferably in trenches), and a postshot tour of the same display area. Initially, the planned program indicated that each observer would witness a shot in accordance with the following priority: Priority 1, one shot of 10 KT or more; Priority 2, two shots, one less than 10 KT, followed by one of 10 KT or more if feasible; Priority 3, one shot less than 10 KT. A very flexible schedule, influenced by unfavorable weather conditions and other technical factors, did not permit observers to meet these priorities. Most observers were limited to one shot, large or small, and in some cases because of the delays involved, many observers had to return to home stations without viewing an atomic detonation. (See Projects 40.11, 41.3, 41.4, 41.7, 41.8 in Table 9).

b. Troop Operational Training Tests

For the first time in Desert Rock Exercises a series of formal Troop Operational Training Tests were included in the overall program. These tests were conducted by the Infantry School, the Armored School, the Artillery School, USMC, BuShips and Hq, Sixth Army and were designed to provide data in tactics and doctrine under actual field conditions employing atomic detonations. (See Table 8 for shot participation.)

c. Technical Service Tests

In order to take advantage of testing conditions in the vicinity of an atomic detonation and to afford additional equipment and structures for the indoctrination of troops and troop observers, the technical projects described below were included in the Desert Rock program. The original plan placed Project 40.14 and Project 40.17 as a responsibility of Field Command, AFSWP. This was later changed to place both projects under the supervision of the Exercise Director, Exercise Desert Rock VI. (See Table 9 for shot participation).

2.2.2 SHOT PARTICIPATION

Exercise Desert Rock VI participated in 9 of the 15 shots, with a total of 8185 personnel in 12 Operational Training Projects and 7 Troop Participation and Troop Observer Projects distributed as indicated in Tables 8 and 9. In general, troop and observer participation consisted of the occupation of trenches between 2500 and 5500 yards from GZ prior to detonation time, and after detonation the inspection of display items within the Desert Rock display area as radiological conditions permitted. In the case of WASP, troops and troop observers viewed the detonation from News Nob because of expected radiation fallout on the prepared trenches 5000 yards SW of GZ; for ESS, which did not include an equipment display, observation of the shot was made from a position in the open 9000 yards SW of GZ; and for MET, which included the displays of the majority of the Operational Training Projects from the Technical Services, a limited number of observers were positioned in the open at 11000 yards SW of GZ. BEE and APPLE II involved the tactical and major troop participation and troop observer phase of Exercise Desert Rock VI. On BEE, the USMC tactical exercise involved maneuvering troops assisted by tactical aircraft and helicopter troop movements. On APPLE II, the Army maneuver involved tanks, armored personnel carriers, and armored artillery together with light fixed-wing and helicopter type aircraft. Both maneuvers involved extensive use of dummy ammunition and the occupation of forward area positions on D-1 Day. The Army tank exercise also utilized a limited amount of napalm and smoke grenades in the approach to and in the maneuvering area to the west of GZ. APPLE II also included a Volunteer Observer Program which consisted of ten (10) Army observers, 9 officers and 1 civilian, positioned in a six foot deep trench 2600 yards from GZ. The average dosage received by the volunteer observers was 1.3 r. In addition, the over-all exercise included a number of technical service projects which were further utilized in the troop indoctrination program as well as troop operational training project as enumerated in Table 9.

TABLE 8
ACTUAL TROOP AND TROOP OBSERVER PROGRAM
EXERCISE DESERT ROCK VI

CODE	AREA	TROOP POSITIONS GRID AZ/YDS FROM GZ	TROOP PARTICIPATION Armor	Inf	Arty	Army Packet Units	Army Vol. Obsrs.	Army Cana-dians	Army 6th Army CBR	Navy	AF	USMC	OBSERVER PARTICIPATION Army CBR Perm. Party	Army Offi-cial Obsrs	Navy	AF	USMC	AFSWP	TOTAL
WASP	T-7(4)	NEWS MOB							24				47	562	146	105	28	135	1047
MOTE	T-3	258/2500			37								40	140	3	6	4		230
TESLA	T-9b	210/2500			45				24				478	20		1	24		592
TURK	T-2	TESLA AREA 120/5500			45				24				445	14	2	2	1		533
HORNET	T-3a	NONE			45														45
BEE	T-7(1a)	Trenches 220/3500 3d MCPAEB CP 223/14500 Load Zones #1 180/22500 #2 210/14000 #3 235/16500			53				22	150		1519		153	168	112	92		2269
ESS	T-10a	248/9000			53					149			176	168		3	9		558
EADR	T-5	NONE																	
APPLE	T-4a	210/3500			49				24				550	13	2	15	28		681
WASP'	T-7(4)	NONE			49														49
HA	T-5	NONE																	
POST	T-9c	NONE			46														46
MET	FF	198/11000			48				20				163						231
APPLE II	T-1	TRENCHES 180/3500 VOL OBSRS 175/2600 TANKS 195/3100 APC'S 190/3900 ARMD ARTY 190/7000 MINE MT 212/4900 A/C W/INF 153/13000	800	200	48	523	10	57			25		57	131	36		11	6	1904
ZUCCHINI	T-7(1a)	NONE																	
		TOTALS	800	200	518 (450)	523	10	57	138	299 (149)	25	1519	1956	1201	357	244	197	141	8185 (599)

NOTE: (1) Figures in parenthesis indicate "repeat" troop participants or troop observers.

TABLE 9
ACTUAL PARTICIPATION OF OPERATIONAL TRAINING PROJECTS AND TROOP PARTICIPATION AND OBSERVER PROGRAM
EXERCISE DESERT ROCK VI

PROJECT NO.	PROJECT TITLE	AGENCY	PROJECT OFFICER	TEAPOT SHOTS: WASP	MOTH	TESLA	TURK	HORNET	BEE	ESS	HADR	APPLE	WASP	HA	POST	MET	APPLE 2	ZUCCHINI
	OPERATIONAL TRAINING PROJECTS																	
40.9	Passive Defense Training	BUSHIPS	Capt D L Carroll,USN							X								
40.11	Doctrine and Tactics (Observers)	USMC	Col E N Rydalch,USMC	X	X	X	X		X	X		X					X	
40.14	Chemical, Biological and Radiological (CBR Shelters)	ACC, ERDL	Mr E H Enquist													X		
40.14A	Chemical Studies - Foxholes	ACC, ERDL	Mr E H Enquist			X				X						X		
40.15	Engineer Field Fortifications Test	ERDL	Mr M J Davis													X		
40.15A	Engineer Heavy Equipment Test	ERDL	Mr M J Davis													X		
40.17	Effects on Transporters or Containers	TRADCOM	Lt Col D G Dow													X	X	
40.18	Location of Atomic Bursts	TAS	1st Lt J T Breunig		X	X	X	X	X	X		X	X		X	X	X	
40.19	Sixth Army Passive Defense Training	SIXTH ARMY	Col F W Ludecke	X		X	X		X			X				X		
40.20	Thermal Protection Afforded by Land Forces' Environmental and Gas Protective Clothing	QMRDL	Mr A McQuade													X		
40.21	Ordnance Vehicular Equipment Test	BRL	Mr E Bryant	X	X		X		X	X		X	X			X		
40.22	Volunteer Observer Program	USA	-														X	
	TROOP PARTICIPATION AND OBSERVER PROGRAM																	
41.1	Infantry Regimental Communications Test	TIS	Maj R Womer														X	
41.2	Test of an Armored Task Force	ARMORED SCHOOL	Maj L Gelling														X	
41.3	Observers and Troop Participants	USA	-	X	X	X	X		X	X		X				X	X	
41.4	Observers	USN	-	X	X		X		X			X					X	
41.6	Tactical Exercise w/Tactical Aircraft and Helicopters	USMC	Col E N Rydalch,USMC						X									
41.7	Troop Participation	USAF	-														X	
41.8	Observers	USAF	-	X	X	X	X		X	X		X						

CHAPTER 3. DEPARTMENT OF DEFENSE OPERATIONAL TRAINING PROJECTS (LESS DESERT ROCK)

3.1 AIR OPERATIONAL TRAINING PROJECTS

The primary purpose of the air training projects was the testing of military tactics and equipment and the training and indoctrination of aircrew personnel of the Air Force, Navy and Marine Corps. A summary of the planned and actual air participation on each event is shown in Table 10.

The Service Projects were designed to obtain the optimum training under simulated bomb drop and actual burst conditions as well as evaluating tactics and techniques previously developed. Emphasis was placed on the effects of an atomic detonation while simulating tactical delivery and fly-by maneuvers.

Rigid air safety criteria was established and maintained throughout for all participating aircraft. This was essential in consideration of the large number of aircraft operating in the immediate vicinity of the NTS at shot time. These criteria established in relation to GZ as follows: $\leq$ 10 sec in timing, $\leq$ 200 ft of assigned altitude and $\leq$ 2600 ft of azimuth track. Failure to remain within the above limitations required that the mission be aborted. To assist pilots and monitor aircraft positions at all times, MSQ-1 ground radar station, UPF 7 IFF radar, homing beacons, and air-ground radio facilities were established.

The Air Operational Training Projects were very successful in the indoctrination of crews. The experience and confidence gained will be of inestimable value in the conduct of future training and increased capability for weapon delivery. A total of 235 sorties were flown by the Operational Training Projects on actual shot days. In addition approximately 600 sorties were flown in training exercises prior to shot day to familiarize aircrews with the terrain and obtain the required proficiency prior to the actual shot.

3.2 GROUND OPERATIONAL TRAINING PROJECTS

a. Project 40.5A (Air Force Cambridge Research Center):
This project involved long range detection based on triangulation utilizing electromagnetic signals. All stations were remote from the Nevada Test Site and the only support required was information as to detonation time.

b. Projects 40.6 and 40.8 (AF)
The general objective of these projects was improvement of present techniques and the development of new techniques for gathering

TABLE 10
AIR PARTICIPATION

PROJ. NO.	PROJ. AGENCY	MISSION	TYPE AIRCRAFT	NUMBER OF AIRCRAFT PER SHOT														
				BEE	TURK	APPLE	ESS	TESLA	MOTH	HADR	WASP	HA	HORNET	WASP	POST	MET	APPLE 2	ZUCCHINI
40.1	SAC	I.B.D.A.	RB-47		4 / 4	4 / 3										4 / 4	4 / 10	3 / 3
40.2	SAC	CREW TRAINING																
		Fly by	B-36		11 / 0	11/ 0										6 / 0	5 / 0	
		Fly by	KC-97							1 / 1								
40.3	TAC	CREW TRAINING																
		Fly by	F-84F		12 / 6	12/ 1[illegible]							12 /12	12/ 12				
		Simulated LABS	F-84F				4 / 4											
		Simulated B-T9	F-84F	6 / 3			4 / 4	3 / 3	6 / 3									
		Simulated Dive Bombing	F-84F	4 / 4				4 / 3	4 / 4									
		Photo Recon.	RB-57													2 / 2		
40.4	SAC	B-36 Delivery Hand-book Demonstration	B-36		1 / 1	1 / 0										1 / 1	1 / 0	
40.5	SAC	Cloud Development Photography	RB-47		2 / 2	2 / 2										2 / 2	2 / 2	
40.10	USN	CREW TRAINING																
		Fly by Maneuver	F2H		6 / 5								7 / 2		10 /10	10 / 9	6 / 7	16/10
			TV		2 / 2								3 / 2		2 / 2	2 / 3	2 / 1	
			AJ		2 / 1	4 / 2							2 / 2			2 / 2		2 / 2
			AD		4 / 4	8 / 8							8 / 8		8 /10	8 / 7	8 / 7	2 / 0
		LOFT Maneuver	F2H												1 / 1			
		Dive Bombing	F2H												1 / 1			
40.12	USMC	CREW TRAINING																
		Dive Bombing	F-9F										3 / 3					5 / 4
40.13	USMC	CREW TRAINING																
		Fly by	R-4D													1 / 1		1 / 1
			AD	2 / 2	2 / 2	2 / 1										2 / 2	2 / 0	
			F3D	5 / 4	5 / 5	5 / 4										5 / 5	4 / 2	
			R5D	1 / 1	1 / 1	1 / 1												
40.23	ADC	CREW INDOCTRINATION	T-33							1 / 1		9 / 9						
40.24	ARDC	CREW INDOCTRINATION	F-100															3 / 2
		TOTAL		18/14	52/33	38/24	8 / 8	7 / 6	10/ 7	2 / 2	0 / 0	9 / 9	35 / 29	12/12	22 /24	45/38	38/19	32/22

NOTE: Figures above indicate number of A/C Planned/Actual respectively.

intelligence concerning foreign atomic energy events. Measurements for calibration purposes were made within and close to the NTS and involved electromagnetic measurements and cloud sampling of atomic debris.

c. Project 40.16 (Office of the Chief of Engineers):

The mission of this project was to prepare the hole for the atomic demolition munition (ESS SHOT); test and emplace the munition; prepare the munition for firing and backfill the hole. This project was under the cognizance of the Military Effects Group.

CHAPTER 4. FIELD COMMAND SUPPORT UNIT

4.1

The mission of the Field Command Support Unit (FCSU) fell within three categories:

a. Those military support functions which, due to their nature, were necessarily implemented by the military. These included pay of personnel, issuance of travel orders, military discipline, and accounting for and control of DOD property and funds.

b. Other support of the DOD test mission which experience had indicated could more economically be furnished by the use of DOD resources due partly to the relatively short duration of the peak requirements. This category included control and maintenance of DOD vehicles, local procurement, provisions for recreational and medical services, and the accomplishment of Government documents necessary to move passengers and freight by commercial carriers.

c. Assistance in specific areas as requested by the AEC. This included provision of certain transportation and clothing for the Visitors' Bureau, conduct of religious services, and furnishing of motion picture service.

4.2

The organization of the FCSU was established at Mercury with the following divisions: Logistics Division, provided for supply and procurement, transportation functions including movement control and motor pool functions; Support Division, provided for special services, reproduction, work orders, personnel, billeting and finance; and Branches to include the functions of Chaplains, Provost Marshal, medical and safety services.

The scope of FCSU operations is further indicated by the following statistics:

FCSU Personnel

Vehicle Operation and Maintenance	85
Supply, Procurement, and DOD Property Control	33
Other	16
TOTAL	134

Equipment Maintained and Operated

Vehicles	334
Miles Operated	847,000
Generators	146

Procurement of Material	$225,000.00
Cash Travel and Per Diem Payments	$333,000.00
Medical Treatments	975

CHAPTER 5. DOD UNITS ON A MISSION BASIS

5.1 1352D MOTION PICTURE SQUADRON, APCS (MATS), LOOKOUT MOUNTAIN LABORATORY DETACHMENT

This detachment, under the Director of Program 9, Military Effects Group, provided motion picture and still photography coverage of the operation in support of the DOD scientific and technical programs. In addition it provided other photography as required by DOD activities of the Test Organization including the Joint Office of Test Information. A great amount of processing was accomplished at the NTS and the remainder at Lookout Mountain Laboratory.

5.2 1ST RADIOLOGICAL SAFETY SUPPORT UNIT

The Chemical Corps Training Command, provided 15 officers and approximately 100 enlisted men as an administrative and organizational nucleus for the On-Site Radiological Safety Group. This group was augmented by personnel from other military organizations. An advance party from the unit, consisting mostly of supply personnel, arrived at NTS on 15 January 1955. The remainder of the unit arrived 15 February 1955.

Part of the unit remained at the NTS after the operation to assist in the clean-up phase.

5.3

The 3623d Ordnance Company, 6th Army, provided one officer and 40 enlisted men throughout the test period. Additional personnel was furnished by other military organizations as was required. The mission of this unit was maintenance of DOD vehicles and related equipment in support of the DOD test program.

5.4 SPECIAL WEAPONS CENTER

The Air Force Special Weapons Center accomplished the following tasks on a mission support basis during Operation Teapot:

a. Provided air support to the Atomic Energy Commission, Department of Defense, and other agencies participating in the test operation as required. Direct support of the test included air drop of devices, cloud tracking, and low level terrain surveys.

b. Planned, organized, published and disseminated information pertaining to the consolidated operation of all aircraft participating in each event to insure optimum success for all agencies involved.

c. Exercised, for the Test Manager during the test period, operational control of all aircraft participating in each event, and individual or groups of aircraft operating within the Nevada Test Site between events.

d. Provided necessary air transportation and disaster teams to meet emergencies that might occur during the test.

e. Provided limited administrative and logistic support at Indian Springs AFB, Nevada, to include: Facilities and messing for observers and experimental groups; air freight terminal services, servicing for Department of Defense and project vehicles stationed at Indian Springs AFB and transient vehicles requiring same; and fire fighting equipment and personnel for the Yucca Lake airstrip.

f. Provided limited administrative and logistic support at Kirtland AFB, New Mexico, to include: Operating facilities, billeting, messing, and use of special and standard vehicles for experimental groups; air transportation between Kirtland Air Force Base and Indian Springs Air Force Base as required; and special airlift to and from other points as required.

g. Provided for the radiological safety of personnel and for decontamination of equipment under jurisdiction of Field Test Unit No. 5.

5.5

Headquarters, 4th Weather Group, provided the weather support for Operation TEAPOT. The weather unit was responsible for furnishing the Test Manager and other organizational units with the required weather forecasts and observations for NTS and surrounding areas. (See Chapter 3, Part I.)

PART VI - NEVADA TEST SITE SUPPORT ACCOUNT

CHAPTER 1 ENGINEERING AND CONSTRUCTION

1.1 PERMANENT BASE FACILITIES

During and after Operation Upshot-Knothole it was realized that due to the increase in the number of test personnel who would be participating in future test operations, the facilities at Mercury should be expanded to provide more adequate living quarters and working space. To provide these facilities lump sum contracts were awarded for the construction of:

a. Dormitories including six for men and one for women.

b. Assembly Building.

c. An Air Weather Building

d. Addition to Buildings 120, 121, and 122 for office space.

e. Modifications to Steam Generating Plant.

f. Water Well 5C in Frenchman Flat.

g. Additional Water Storage.

h. Connect Warehouses No. 3 and 4.

i. Additions to the Motor Maintenance Building.

Some of this construction was completed prior to the beginning of Operation Teapot. However, four of the dormitories noted above were completed just in time for Teapot, February 1955.

1.2 TEST FACILITIES AND STRUCTURES

The following schedule reflects the scheduled and actual receipt of criteria for the major facilities that would be required for Operation Teapot exclusive of tower construction.

Location & Facility	Schedule	Actual
Area 2:		
Detector Pit	8/25/54	9/25/54 thru 1/12/55
Coax	9/1/54	9/14/54 thru 1/8/55
2-380 Building	9/15/54	9/29/54 thru 12/5/54
Area 9:		
9-300	9/15/54	10/1/54 thru 12/18/54
Coax	10/1/54	10/10/54 thru 1/12/55
Areas 1 & 4:	9/30/54	(1) 9/20/54 thru 2/2/55 (4) 10/1/54 thru 12/30/54
Areas 3 & 3A:	10/1/54	10/23/54 thru 1/3/55
Area 7-1:	9/15/54	10/8/54 thru 12/2/54

In view of the fact that design criteria were not received from the test participants as early as desired, it was determined that it was not possible to prepare plans and specifications for miscellaneous test structures in sufficient time to award construction contracts under unit-price bids; hence, much of this work was accomplished by the cost plus fixed fee contractor. Certain test structures on which design criteria had been received earlier were accomplished under unit-price contracts. These structures included several of a specialized nature, consisting of a 300 Building in Area 9, a 380 Building (photographic bunker) in Area 2, Buildings No. 311 (see Figure 28) and No. 372, and six FCDA houses. A unit-price contract was awarded on November 16, 1954, with work scheduled for completion within 55 days.

It was determined that towers would have to be constructed in nine test areas. Plans and specifications were initiated for release to prospective bidders to accomplish the erection of Government-furnished towers under lump sum contracts. It was determined that the required completion date of December 1 for tower in Area 2 did not allow sufficient time for formal advertising for lump sum bids. Accordingly, the tower in Area 2 was erected by contract with selected contractors bidding. Competitive bids were solicited for the erection of the rest of the towers, with the award of contract being made October 19, 1954. The following schedule reflects the description of towers and the originally scheduled completion dates and the actual completion dates. This actual completion date was due to subsequent erection modifications and changes in ready dates.

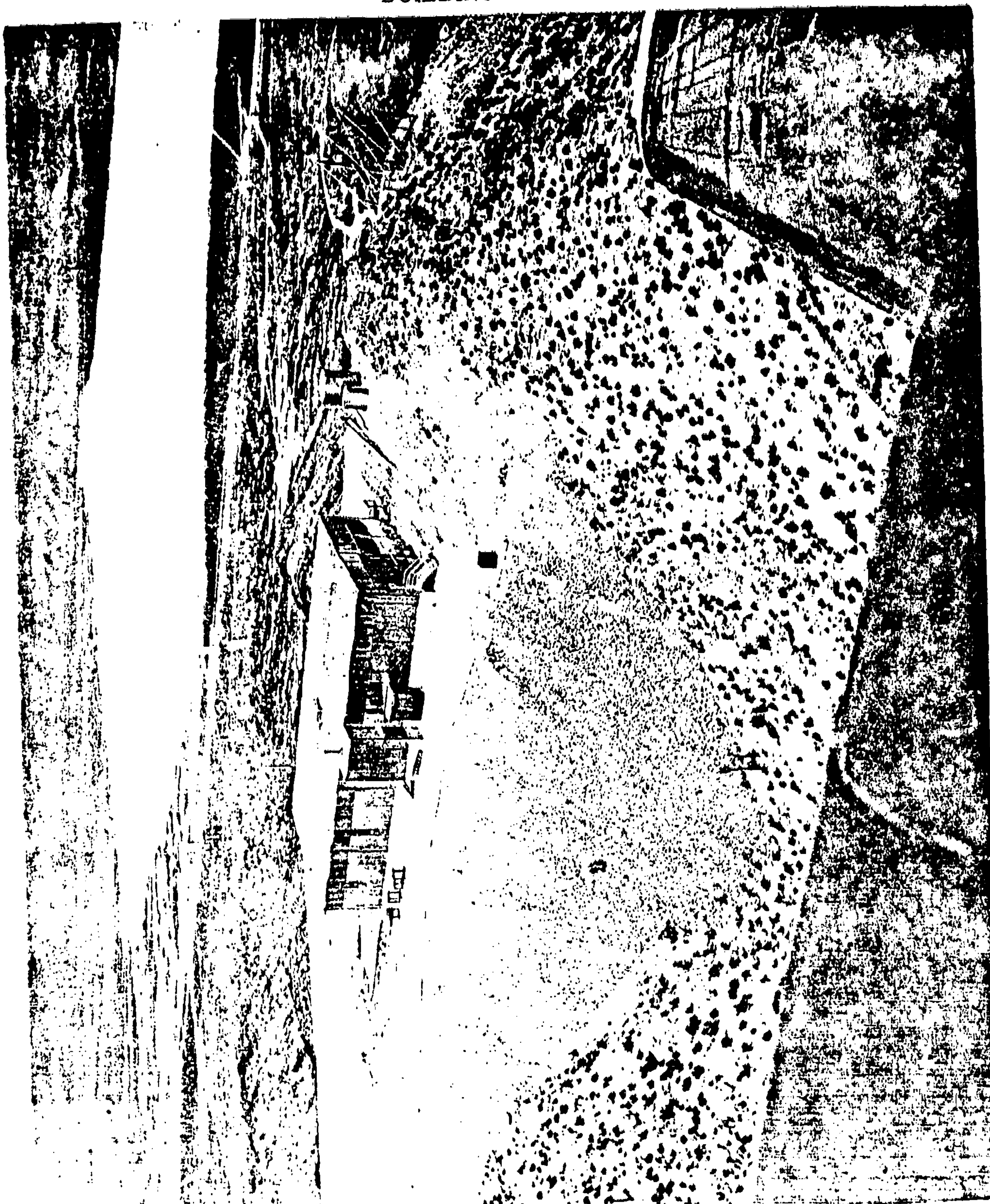


FIGURE 28

Area	Description	No. Days Allowed	Test Org.	Orig. Comp-tion Date	Actual Comp-tion Date
3	300' Triangular Tower	75	LASL	1/2/55	12/28/54
9B	300' 4-leg Tower (30T)	75	UCRL	1/2/55	1/10/55
3A	300' 4-leg Tower (100T)	95	LASL	1/22/55	1/24/55
9C	300' 4-leg Tower (100T)	85	UCRL	1/12/55	1/19/55
7.1A	500' Tower	90	LASL	1/19/55	3/7/55
FF	500' Tower	95	LASL	1/24/55	2/7/55
4	500' Tower	75	LASL	1/10/55	1/31/55
1	500' Tower	90	LASL	1/31/55	2/26/55

After the detonation of a device on March 29, 1955, the Los Alamos Scientific Laboratory determined that it was desirable to add an additional shot to the test series. This resulted in the decision to construct another tower on an existing foundation in Area 7.1A. Work was started almost immediately and the 500-foot tower was erected by the operation and maintenance contractor and completed on April 28, 1955. In order to construct this new 500-foot tower, remaining portions of the previous tower had to be removed and the area decontaminated. Thirty days had been scheduled for the completion of this tower which required the using of two shifts working seven days a week; and, even though several working days were lost due to high winds, the tower was completed within the allotted time.

Among the test facilities required, it should be noted that many speciality items were designed and constructed for Operation Teapot, such as quick closing blast doors, blast links and vacuum lines, tower reinforcing to withstand nearby adjacent blast, and reinforced concrete buildings projected above ground surface.

Figure 29 is a chart showing test construction progress curve of the overall program.

Construction requirements for a full-scale test operation normally always present the problem of meeting a tight completion schedule. The contractors were delayed to some extent due to unusually severe winter weather conditions for Nevada in December and January. Nevertheless, the construction schedule was well met, and no postponements or delays were occasioned in the test series due to construction.

1.3 SUPPORT SERVICES

The support services required during a test series consisted of supplying the necessary labor, materials and equipment to perform whatever work was required by test participants in setting up facilities for various

OVER-ALL PROGRAM

ESTIMATED AND ACTUAL

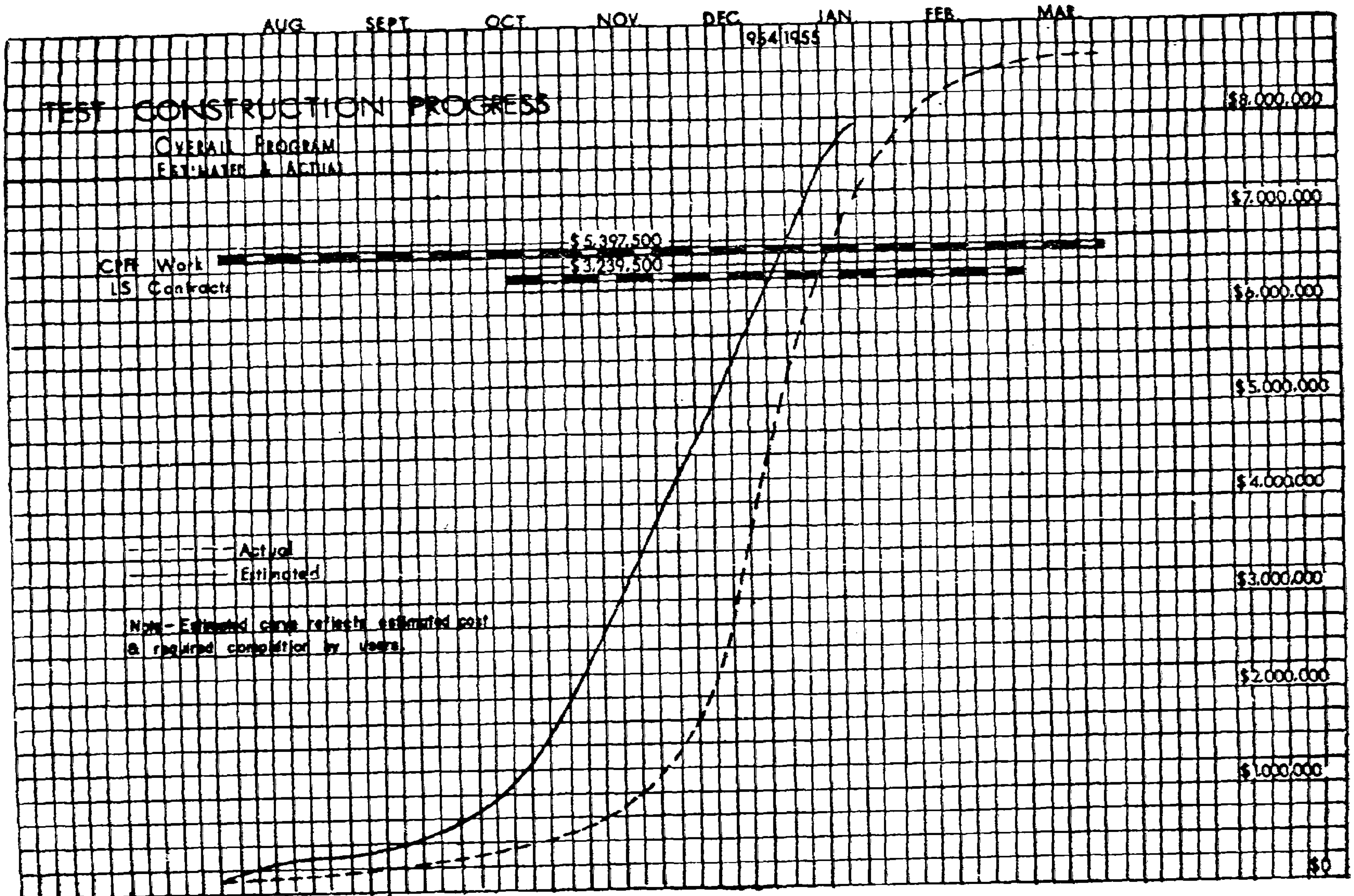


Figure 29 - Test Construction Progress Curves

tests. The demand for these support services was considered heavy due to the "dual capability" system of readiness dates for Operation Teapot. Efforts were made to utilize existing construction equipment and personnel to perform these support activities. However, this resulted in retarding to a certain degree the construction activities due to the tight schedule imposed on each agency to complete their phase of work. Accordingly, it was necessary to obtain additional equipment and personnel for the performance of full-time support work. Along with this, numerous shot postponements contributed to the increased support work due to "buttoning up" and the subsequent replacement of equipment to disarm a device when postponements were made.

There were approximately 1,250 support work orders issued by 46 test participating agencies. These support work orders covered receiving, uncrating, storage, and delivery of material and equipment to various test areas; assistance in instrumentation and setting up of equipment to be tested; assistance in recovery and decontamination activities; and the packing, crating and shipment of material and equipment upon completion of the test.

CHAPTER 2 SUPPLY ACTIVITIES

To provide towers when required for an operation, it was determined that by allowing longer fabrication periods, towers could be procured considerably cheaper. Therefore, in June, 1953, bids were solicited for fabrication and delivery of 2 (30 ton) 300 foot and 2 (100 ton) 500 foot steel towers for delivery by April 14, 1954. As planning for Operation Teapot became more firm, it was necessary to obtain 3 additional 500 foot and 1 300 foot towers for delivery no later than January 2, 1955. Although all towers were not delivered strictly according to schedule, late delivery did not affect the erection or test program.

Due to the isolated location of the test site and the fact that the CPFF Contractor requires considerable aggregate in its operations, it was determined to be economically advantageous for the Commission to provide aggregate at the site for use of both lump-sum and CPFF Contractors. Consequently, 5,250 tons each of fine and coarse aggregate and 375 tons of topping aggregate was processed under a lump sum contract and assigned to the CPFF Contractor for accountability.

Supply activities of the CPFF Contractor were increased considerably immediately prior to and during the operational period, in contrast to previous operations, due primarily to the increased scope of the overall test program and the fact that a large portion of construction work, requiring supplies, material and equipment was accomplished by the CPFF Contractor rather than by lump-sum contractors who would normally have procured and installed the greater portion of materials required overall. Facilities for supply activities consisted of 12,200 sq. ft. of inside warehouse storage space and central receiving point. Outside storage consisted of 248,800 sq. ft. which was used for general stores, custodial supplies and tower yard.

To meet the demands of the test participants, approximately 12,000 line items were carried in stock ranging from bolts and screws to portable generators. Personnel was increased from a non-test strength of 9 employees to 87 during the peak of operations during which time approximately $3,500,000.00 worth of supplies and materials were issued from the warehouses.

CHAPTER 3 NTS WEATHER CONDITIONS

3.1

Figure 30 shows the temperature recordings at Frenchman and Yucca Flats from December 1954 through April 1955.

Table 11 shows the precipitation in inches at Frenchman and Yucca from July 1954 through April 1955.

TABLE 11

PRECIPITATION IN INCHES

	Frenchman	Yucca
July 1954	1.19	.763
August 1954	--	--
September 1954	.559	1.65
October 1954	.436	.656
November 1954	.606	.591
December 1954	.516	.625
January 1955	.963	1.45
February 1955	1.03	.583
March 1955	--	--
April 1955	.107	.146

CHAPTER 4 SECURITY

4.1 GENERAL

The responsibility for the security of the Nevada Test Site rested with the AEC and was administered by the Support Director. The actual operation of the security functions was performed by the security contractor.

4.2 ORGANIZATION

The Security Branch of the Support Director consisted of one Security

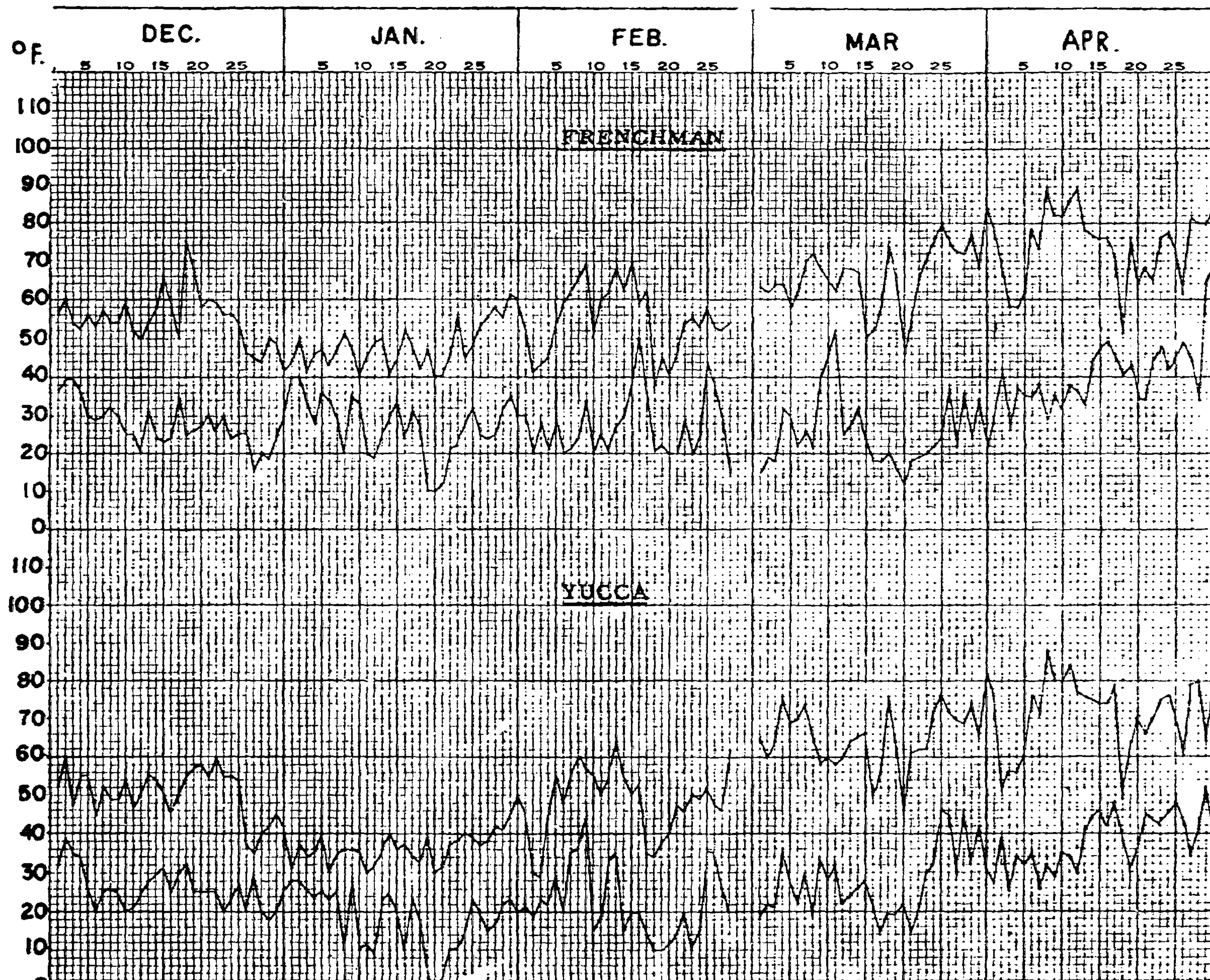


Figure 30 - Temperature Recordings

Officer, a Security Assistant and three Clerk-Stenographers and was augmented by the integration of a military security group which resulted in more effective liaison and coordination with all military units. The military security group maintained liaison with Desert Rock personnel, controlled the submission of badge requests for military personnel, supplied the AEC Security Branch with clearance information for military test participants, performed general liaison functions and acted in a general advisory capacity to the AEC Security Branch in military matters.

4.3 SECURITY OPERATIONS

The security contractor functioned under the supervision of the AEC Security Branch of the Support Director. The experience gained by the guard force supervisors during previous test operations, as well as the implementation of an effective training program contributed to a more efficient and trouble-free guard force. The Badge Office issued 32,510 badges of both temporary and permanent types. This figure does not include personnel who participated as part of the FCDA "Open Shot" Observer program or any of the Desert Rock troops entering NTS as convoys on shot mornings. The security contractor manned all guard stations, operated the Badge Office, prepared and handled security shipments, and performed courier service.

4.4 SPECIAL PROBLEMS

Basic problems encountered during the test series were relatively minor in nature and were solved at the Nevada Test Site level without referral to higher authority. The single exception to this was the requirement for the transition from Class "Q" security clearances for military personnel to the "Certified" military clearances. As a result of conferences with representatives of the Division of Military Application; the Commanding General, Field Command, AFSWP; the Director, Weapons Effects Tests; and the Director, Office of Security, SFOO, a workable procedure was developed and the transition was accomplished successfully.

CHAPTER 5 SAFETY AND FIRE PROTECTION

5.1 PLANNING

In planning for Operation Teapot relative to the establishment of safety standards, the following was incorporated in the Test Manager's Operation Order:

"Responsibility - The Support Director (Manager, Las Vegas Field Office) is responsible for over-all safety, health and fire prevention and protection at the Nevada Test Site and related facilities in the area. Operating officials of the Test organization are responsible for the application of appropriate regulations and procedures to the work under their supervision in order to minimize personal injury, property damage and fires. Each participating organization is responsible for the safety and health of its employees and of the public as affected by its operations and for providing or determining that adequate protection is being provided against accidental loss by fire or otherwise for all Government property, buildings and materials under its supervision or control.

"Coordination - During test operational periods, the Test Manager's General Safety Officer will be responsible for promulgating AEC policies and regulations pertaining to the control of accident, fire, and health hazards. Close liaison will be maintained with participating agencies in executing their safety programs in order to insure proper coordination between participants and that the opertion is being conducted in conformance with AEC accident and fire prevention policies.

"Standards - AEC Manual 0550 specifies minimum codes and standards that will be used as basic guides to the physical aspects of health, safety and fire protection and to safe working practices."

5.2 STAFFING

The Safety and Fire Protection program for Operation Teapot was implemented by safety personnel of the three main groups of the Test Manager's organization and by the Test Manager's General Safety Coordinator.

The Test Director's safety organization was composed of the Safety Director, LASL, and members of his staff; the Support Director had the services of the Architect-Engineer Chief Safety Engineer; and Field Command Support was served by AFSWP-FC Safety Officer.

5.3 SAFETY STATISTICS

Man-hours	2,500,000
Lost Time Injuries	3
Days Lost	42
Motor Vehicles	
Mileage	6,154,920
Accidents	19

Accident costs:

Government		$3,264
Other		5,394
	Total	$8,658

Rates: (Teapot rates are compared with the rates for all AEC for the first quarter of 1955)

	Teapot	AEC
Frequency rate	1.20	1.75
Severity rate	17	127
Motor Vehicle rate	0.31	1.03
Motor Vehicle Accident Cost (per 1000 miles)	$1.41	$1.41

5.4 FIRE PROTECTION

Refer to Chapter 8, Camp Facilities and Management, for a description of equipment and functions of the Mercury Fire Department. In addition to the Mercury Fire Department equipment and personnel, the Air Force supplied equipment and fire fighters for Yucca Flats Airstrip. There were no fires reported during the test period.

5.5 FIRST AID

Refer to Chapter 8, Camp Facilities and Management

5.6 PROPERTY DAMAGE

A $13,000 property damage accident occurred when a rented diesel engine of an electric generator unit exploded causing ignition of fuel and crankcase oil. Fire was caused by mechanical failure in engine and ignition of pocket of oil in the air intake chamber.

5.7 SUMMARY

The accident and fire experience for the operation is good for normal functions but is outstanding considering the fact that the Test Manager's organization was composed of units from many contractors, and whatever safety consciousness guided the units to achieve the record they did was, in the main, brought with them from their parent organization. The stresses and strains of a test program are not usually conducive to a good safety record; either and when all of these things are taken into account, the record is even more remarkable.

CHAPTER 6 TELECOMMUNICATIONS

6.1 GENERAL DESCRIPTION OF FACILITIES

Telecommunication facilities provided by the AEC at the Nevada Test Site for use by test participating agencies, the Support Director's Staff, and the various scientific and construction contractors consisted of local and long-distance telephone service; mobile and fixed-station VHF-FM radio network services; air-to-ground, point-to-point, and mobile VHF-AM and HF-AM radio network service; teletypewriter service via both commercial TWX and military networks for both classified and unclassified traffic; weather reporting services from Federal weather service networks; as well as such subsidiary services as public address systems. Installations, maintenance, and operation of the above briefly described facilities and systems were performed by various contractors to the AEC under the administrative supervision of the Support Director. Responsibility for the adequacy and continuity of the telecommunications function rested with the Support Director.

6.2 TELEPHONE SYSTEM

The telephone system in use at Nevada Test Site consisted of a 200-line private automatic exchange with four manual positions in multiple located at Mercury; a 200-line unattended private automatic exchange located at the Control Point; together with the necessary cable and open-wire plant, instrumentation, and subsidiary plant and equipment to provide service to Mercury and the forward test areas. Intercommunication between the Mercury exchange and the Control Point exchange was provided by 21 dial tie lines.

Access to commercial, long-distance toll service was provided through the medium of 20 long-distance toll circuits between the Mercury exchange and the Las Vegas, Nevada, exchange of the Southern Nevada Telephone Company. All toll calls to and from the NTS exchanges were handled through the four multiple manual positions at the Mercury exchange. Twenty manual telephone lines from the Mercury switchboard were also available and in use in the Mercury area.

By February 1, 1955, all dial lines from the Mercury exchange had been allocated, as well as 18 of the 20 manual lines. Additional requests for service were, of necessity, fulfilled by providing requesting agencies with extensions to lines and instruments already installed. This condition of one hundred percent plus loading of the automatic dial facilities at Mercury continued throughout the entire operation. Dial lines at the Control Point exchange were loaded to 95% capacity at the peak service demand period.

Some delays in local traffic, due to overload on the dial tie lines between Mercury and the Control Point were experienced during peak traffic periods. Further, delays were experienced in the completion of long-distance toll calls during peak traffic periods; however, these last-mentioned delays were due to inadequate commercial facilities in Las Vegas rather than to the overload on the 20 AEC-furnished toll trunks between Mercury and Las Vegas.

Ring-down type telephone tie lines were provided between Mercury, Indian Springs, Las Vegas and Camp Desert Rock and between the Control Point and the several test areas as required. The facilities for the provision of this type of service were loaded to 100% capacity throughout the entire operation.

6.3 TELETYPE SERVICE

The teletype Comcenter was established in Building 102 at Mercury. Adequate facilities, equipment, and personnel were provided for the efficient and expeditious handling of both classified and unclassified telegraphic traffic. In accordance with the then existing AEC cryptographic policy, the code room section of the Comcenter was staffed with AEC personnel. The section of the Comcenter which handled unclassified material only was staffed by contractor personnel. The teletype facilities provided were available for the transmission of traffic originated by any and all agencies participating in the operation. Two commercial TWX circuits, between the NTS Comcenter and the commercial TWX exchange service in Los Angeles, handled all incoming and outgoing traffic.

6.4 RADIO COMMUNICATIONS SYSTEMS

6.4.1 VHF-FM MOBILE AND FIXED STATION SERVICE

A total of 230 VHF-FM mobile radio units were installed in cars, trucks and other vehicles for administrative-type operational communications. These mobile units operating together with 44 base station units, 46 remote control units, and 33 handie-talkie units on nine separate networks provided a completely functional system of the required flexibility for on-site radio communication. The above described facilities were established on networks as indicated in the following tabular representation.

Net No.	User	Number and Kind of Units Mobile	Base Sta.	Remote	Handie-Talkie
1	Mil. Effects Test	26	9	7	13
2	AEC Security	32	11	12	0
3	On-Site Rad-Safe	15	1	1	8
4	Eng'r'g & Const.	34	6	4	0
5	Scientific (LASL)	33	6	6	6
6	UCRL & CETG	30	7	6	0
7	Reynolds Elec. & Eng. Co.	43	3	9	6
8	Program 37	13	1	1	0
9	J-13, LASL	4	1	0	0
	TOTALS	230	45	46	33

Of the above described networks, seven were operated through repeaters as duplex systems and two were operated as simplex systems. Of the seven duplex nets, six were operated through the repeater station located on a mountain west of the Control Point, while Net 9 (Program 37) operated through an air-borne repeater due to the necessity of contacting mobile units of this program at distances ranging up to 200 miles from NTS.

All radio units were installed, serviced, and maintained by the Commission's CPFF operations and maintenance contractor. Communications service obtained from the VHF-FM system was uniformly good and without service interruption.

6.4.2 VHF-AM AIR-GROUND SERVICE

A VHF-AM system was used for air-ground communications with operational aircraft within approximately a 200-mile radius of NTS. The AEC-owned transmitters used for this service performed uniformly well. Some difficulty was experienced with operational continuity of four receivers which were an integral part of this system and which were on loan to AEC.

6.4.3 UHF AIR-GROUND SERVICE

Air-ground communications with certain operational aircraft were provided in the UHF range. The equipment used, which was on loan to AEC, was of the air-borne type and not designed for continuous operation. Considerable difficulty was experienced in maintaining continuity of operation due to overheating of portions of the equipment. Remodeling of some of the equipment components during the operation brought about a satisfactory solution of the major portion of the problems presented by equipment malfunction.

6.4.4 HF-AM AIR-GROUND AND POINT-TO-POINT SERVICE

a. AFSWC Utilization:

AEC-owned equipment in this category was used by the Air Force for long-distance control of operational aircraft and for point-to-point service between NTS and Kirtland Air Force Base. Results obtained from the use of this system were consistently good and without functional difficulty.

b. Off-Site Rad-Safe Utilization:

A second HF-AM radio network was placed in service for use by Off-Site Rad-Safe. This network utilized a net control station at Mercury with eleven base stations located off-site at Glendale, Alamo, Caliente, Ely, Eureka, Lincoln Mine, Tonopah, St. George, Cedar City and Beaver. Seven of the above base stations were installed in trailers in order to facilitate changes in the network geographical pattern as dictated by fallout predictions.

Twenty mobile HF-AM units were installed in vehicles used by Off-Site Rad-Safe monitors. Communications passed to and from the mobile monitoring teams, via base stations, to and from net control at Mercury.

The functioning of this system was entirely satisfactory and completely adequate.

6.4.5 WEATHER REPORTING SERVICE

The AEC installed at Mercury a total of five commercial circuits for the receiving of weather data for use by the Weather prediction Unit. Four of these circuits were for printed, page copy predictions and one circuit was of the facsimile type for the receiving of weather maps. These circuits were entirely adequate and satisfactory.

6.5 SUMMARY OF EQUIPMENT AND TRAFFIC

Following tabular summaries depict the major features of the telecommunications equipment and facilities used during the operation, as well as a traffic count of the wire services messages chargeable to the operational period:

TABLE 12

WIRE EQUIPMENT AND CIRCUITS

NUMBER	NOMENCLATURE	LOCATION
196	Dial TP Lines	Mercury
18	Manual TP Lines	Mercury
48	Manual PBX TP Lines	Mercury
185	Dial TP Lines	Control Point
21	Dial Tie Lines	Mercury to Control Point
5	Manual Tie Lines	Mercury to Control Point
5	Manual Tie Lines	Mercury to Indian Springs
1	Manual Tie Line	Mercury to LVFO
20	Toll Trunks	Mercury to Las Vegas
3	TWX Circuits	Mercury to Las Vegas
5	Weather Circuits	Mercury
2	Private Line TP Circuits	CP to Indian Springs
1	Private Line TP Circuit	Mercury to Indian Springs
1	Private Line TT Circuit	Mercury to Control Point
1	Private Line TT Circuit	Mercury to Las Vegas
1	Private Line TP Circuit	Las Vegas to Glendale
577	Telephone Instruments	NTS
1	Unattended 200-line Dial Sw Bd	Control Point
1	Attended 200-line Dial Sw Bd	Mercury

TABLE 13

ADMINISTRATIVE RADIO COMMUNICATIONS EQUIPMENT

NUMBER	NOMENCLATURE	USE
	VHF-FM	
230	Mobile	See 6.4.1
45	Base Stations	See 6.4.1
46	Remote Units	See 6.4.1
33	Handie-Talkie	See 6.4.1

NUMBER	NOMENCLATURE	USE
	HF-AM	
4	Base Stations	Air-to-Ground
20	Mobile	Off-Site Rad-Safe
11	Base Stations	Off-Site Rad-Safe
1	Remote Unit	Off-Site Rad-Safe
	VHF-AM	
4	Base Stations	Air-to-Ground
	UHF-AM	
4	Base Stations	Air-to-Ground

TABLE 14

WIRE SERVICES TRAFFIC COUNT

Outgoing TP Toll Calls Offered	24,410
Outgoing TP Toll Calls Completed	22,878
Incoming TP Toll-Collect Calls Completed	4,394
Outgoing TT Clear-Text Messages	2,318
Incoming TT Clear-Text Messages	4,311
Outgoing TT Encrypted Messages	898
Incoming TT Encrypted Messages	921

CHAPTER 7 TRANSPORTATION

7.1 AEC MOTOR VEHICLES

The establishment of procedures for assigning and dispatching of official motor vehicles of the AEC Motor Pool during Operation Teapot and the associated vehicle utilization problems were the operational responsibility of the Support Director. The scope of this support function included the procurement of vehicles and equipment and their assignment, dispatching, repair, maintenance, and the miscellaneous related functions pertaining to transportation requirements and vehicle operation.

Prior to the test operational period, the known vehicle requirements as submitted by the various test organizational elements were reviewed and approved by the Test Division, SFOO. The vehicle requirements were fulfilled by the Support Director by the utilization of Government-owned vehicles to the extent available and then augmented by the leasing of motor vehicles from commercial sources. Increased construction activities being performed by the operating contractor under the direction of the Support Director created a heavy demand for additional motor vehicles in order to meet construction deadlines. During the time which the construction period extended into the test operational period, the status of available motor vehicles was extremely critical.

A majority of the motor vehicles was assigned and dispatched to test participants on a weekly basis with the remaining vehicles held available in the AEC Motor Pool for a day-to-day assignment. Table 15 shows a breakdown of motor vehicle assignment to elements of the Test Organization. Each test organization, the Test Manager, and the Support Director maintained continuous review of the motor vehicles assigned to their respective organizations in an attempt to maintain full control for the efficient and effective use of motor vehicles. During the operational period as soon as the operational requirements for motor vehicles permitted, the excess rental vehicles were released.

There were a total of 837 motor vehicles of all types under the control of the AEC Motor Pool. Of these, 314 were Government-owned vehicles and 523 were on a rental basis. During the operation these vehicles traveled approximately 5,500,000 miles.

7.2 AIR TRANSPORTATION

By Supplemental Agreement to an existing contract with the Carco Air Service, Carco based two single-engine airplanes at the Municipal Airport in Las Vegas, Nevada, for the purpose of furnishing air transportation service to the AEC and its contractors between Las Vegas and Mercury and for furnishing air transportation service to such other designated points as directed by the AEC as special missions or requirements developed during the operation.

A regular schedule was established for flights between Las Vegas and Mercury. This service was advantageously utilized in the transportation of critical freight, passengers on official business, and instrumentation and collection of data at remote stations. Several special flights were scheduled during the operation for the following purposes: special investigations and terrain surveys within the area surrounding NTS; for Test Organization representatives to meet with civic or special organizations in distant cities relative to specific nuclear test complaints and in connection with the public relations and education programs.

TABLE 15
OPERATION TEAPOT
MOTOR VEHICLE ASSIGNMENT BY PEAK LOAD PER USING AGENCY

USING AGENCY	DATE PEAK LOAD	VEHICLES ASSIGNED	SEDANS	PICKUPS	PANEL 1-1/2 TRUCKS	POWER WAGONS	MISC., INCL. JEEPS STA/WAG., CARRYALLS
FCDA	5-2-55	22 (16 R) (6 G)	14	2	0	0	6
Weapons Development LASL - Programs 10-19	5-2-55	47 (44 R) (3G)	27	10	0	1	9
Weapons Development UCRL - PROGRAMS 20-29	2-17-55	74 (62 R) (12 G)	47	21	0	2	4
Test Manager and Staff	3-1-55	40 (40 R)	28	10	0	0	2
CETG - Programs 30-39	3-16-55	53 (48 R) (5 G)	30	12	2	5	4
Test Director & Support (On-Site Rad-Safe, EG&G)	4-1-55	86 (78 R) (8 G)	38	44	0	0	4
Support Director (AEC & Reynolds Electrical & Engineering Co., Inc)	2-17-55	241 (160 R) (81 G)	45	170	2	2	22
Support Director (Federal Services & Security)	3-16-55	35 (20 R) (15 G)	14	20	1	0	0
Support Director (Off-Site Rad-Safe)	3-16-55	24 (23 R) (1 G)	14	10	0	0	0
Support Director (Silas Mason & Sandia)	3-1-55	40 (12 R) (28 G)	9	25	0	1	5
Motor Pool	2-17-55	71 (20 R) (51 G)	20	9	32	6	4
Sub-Total		733 (523 R) (210 G)	286	333	37	17	60
Motor Pool Misc. includes: 2 Ambulances; 4 Fire Trucks; 23 Buses & 75 All Others.	104						
Grand Total - All Vehicles	837						

LEGEND
R - Rental Vehicles
G - Government-Owned Vehicles

CHAPTER 8 CAMP FACILITIES AND MANAGEMENT

8.1 GENERAL

Mercury is the base camp for the Nevada Test Site, providing facilities for office space, living quarters, cafeterias, recreational and medical services. The operation of the housing, feeding and related personnel services was performed by a contractor under a unit-price contract.

8.2 LIVING QUARTERS AND POPULATION

There are twenty-one dormitories for male occupancy and three dormitories for female occupancy, all of one-story permanent-type frame construction. (See Figures 31 and 32). Nineteen of the male dormitories were normally occupied by six persons per room with two dormitories designed for occupancy of two persons per room. Additional living facilities for male population consisted of the hutment area of 131 (4-man) and 128 (8-man) hutments. These hutments are constructed of plywood and heated by oil stoves. Community shower and toilet facilities are available for the hutment area. Female dormitories were designed to house two persons per room. Due to the growing female population, sixteen house trailers, housing four persons each, were leased from the Bureau of Reclamation.

Table 16 gives a summary of the existing living quarters at Mercury.

In order that the various test organizations might house their own personnel together, dormitory and hutment allocations were mutually agreed upon prior to the beginning of Operation Teapot. In an effort to present Teapot population trends at Mercury in a manner most useful to planning for future operations, curve graphs have been prepared for the test organizational elements. Figure 33 shows population curves for the Test Director's total; LASL Weapons Development; UCRL Weapons Development; Military Effects Group; Civil Effects Test Group; and the Test Director's staff.

Figure 34 shows population curves for DOD Field Command Support Unit; Test Manager's staff; FCDA; lump sum contractors; NTS contractors and total personnel.

8.3 MESSING FACILITIES

Mess Hall No. 1 and No. 2 with a seating capacity of approximately 300 patrons each were operated on a cafeteria basis prior to March 1, 1955. Meals were served at a cost of one dollar. On March 1, 1955, Mess Hall No. 2 was converted from a cafeteria-type service to ala carte and short order service. This type of service met with success and provided a different type of food and service for test participants at times

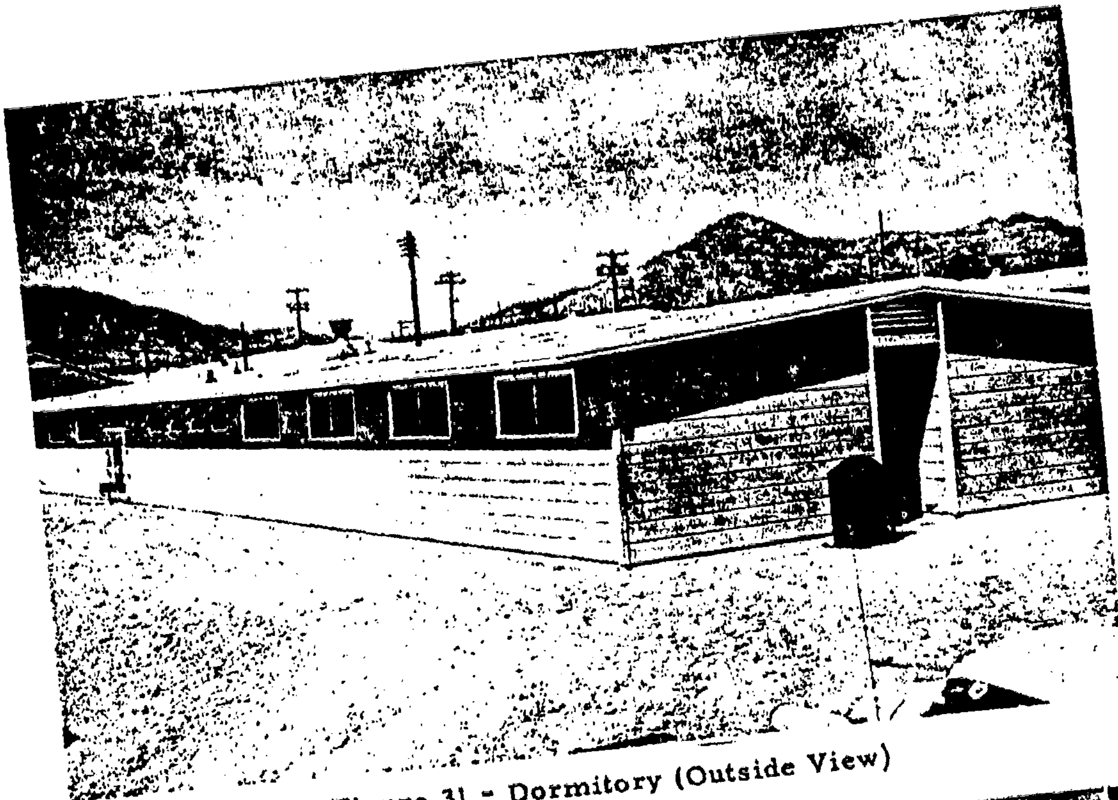


Figure 31 - Dormitory (Outside View)

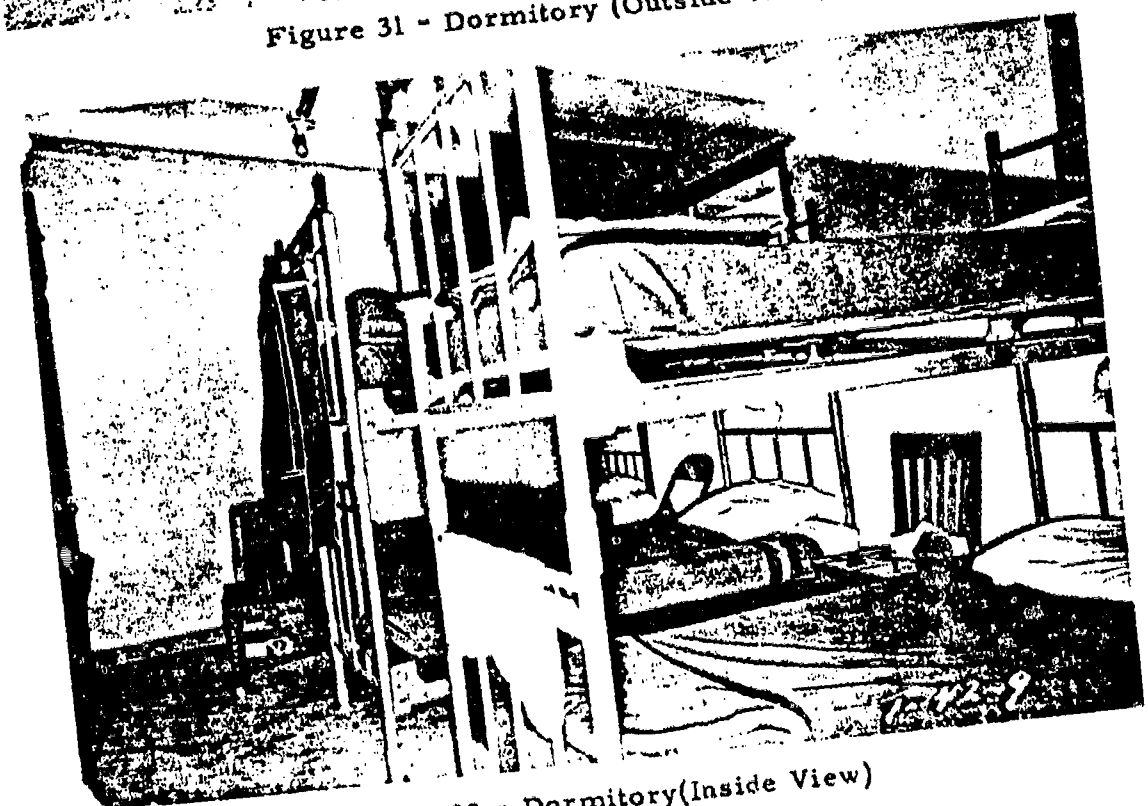


Figure 32 - Dormitory(Inside View)

TABLE 16

LIVING QUARTERS

MALE

Number of Dormitories	Normal Capacity	Total Normal Capacity
15	56	840
2	48	96
4	57	228
	Total Male Dormitory Spaces --	1164

Number of Hutments	Normal Capacity	Total Normal Capacity
131	4	524
128	8	1024
	Total Male Hutment Spaces --	1548
	Total Male Living Quarters --	2712

FEMALE

Number of Dormitories	Normal Capacity	Total Normal Capacity
2	32	64
1	44	44
	Total Female Dormitory Spaces --	108

Number of Trailers	Normal Capacity	Total Normal Capacity
16	4	64
	Total Female Living Quarters --	172

other than the normal operating hours of the cafeteria service.

A snack bar was operated at the Control Point, serving only light food. On days preceding a shot, this facility remained open on a twenty-four hour basis for the convenience of personnel working at the Control Point.

During the construction phase of the operation, a mobile food trailer with hot lunches for test area workers was operated in the forward area on an "as required basis" during extra shift hours.

Box lunches were made available to personnel working in the field, and during peak population these sales reached an average of approximately three hundred per day.

At the observer areas a minimum service of providing hot coffee, rolls and doughnuts at snack bar prices was available on mornings a detonation was scheduled.

8.4 CAMP SERVICES

The AEC, through the housing and messing contractor, maintained limited facilities for the convenience of all personnel at Mercury. These facilities included: (1) Barber Shop, (2) Western Union telegraph service, (3) Check cashing facilities, (4) Washateria, (5) Laundry and dry cleaning collection station, (6) Recreation hall, (7) Public service station for sale of gasoline, oils, etc., (8) Official bus shuttle service between Mercury and Las Vegas, and (9) A travel reservation office. Recreation facilities at the Recreation Hall included ping-pong and pool tables. Outdoor recreational facilities included horseshoe courts, volley ball and basket ball courts, and a regulation softball diamond.

Facilities for religious services were provided by the AEC with the DOD providing personnel for conducting the services.

The Assembly Building, seating approximately 330 persons, was utilized and operated by DOD personnel as a theater, showing two movies nightly.

A first-aid dispensary was staffed with qualified civilian and military medical aid men and operated under the supervision of a licensed physician. Ambulance service was available.

Police and fire protection facilities were maintained through an operating contractor. Police officers were duly authorized law enforcement officers in Nye County, Nevada, and maintained an office at Mercury. During the operational period officers were on duty twenty-four hours daily for seven days a week. The greatest problem confronting the police officers was the control of motor vehicles speeding in the forward area.

Fire protection was provided by the maintenance of two fire stations, one at Mercury and one in the Control Point area. Eleven men were regularly employed in the Fire Department and were augmented by eighteen volunteer firemen. The Fire Chief was responsible for fire fighting, building inspections, fire extinguisher maintenance and fire watch patrols. Normal fire fighting equipment was maintained at the two fire stations.

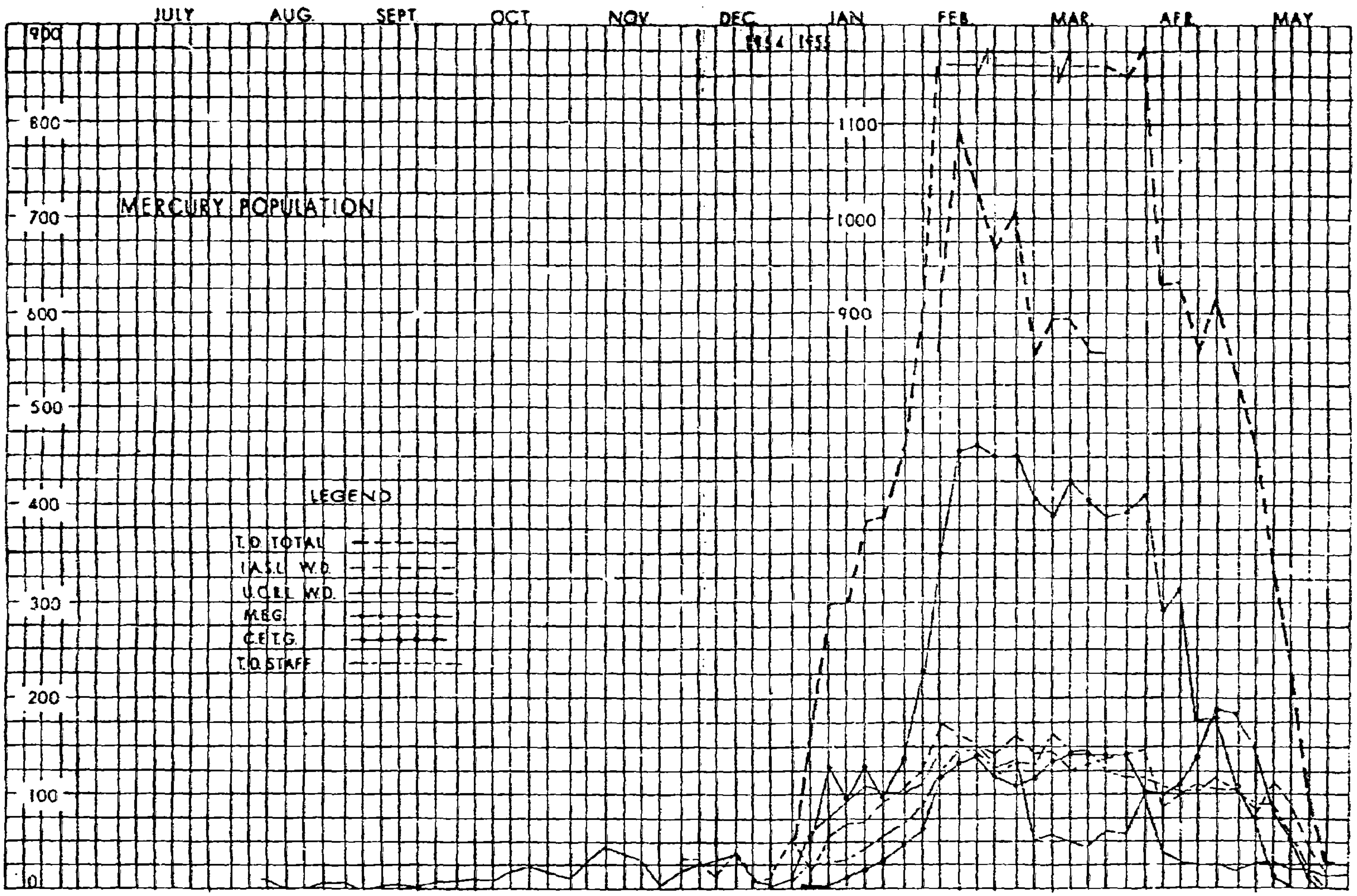


Figure 33 - Population Curves - Test Director's Organization

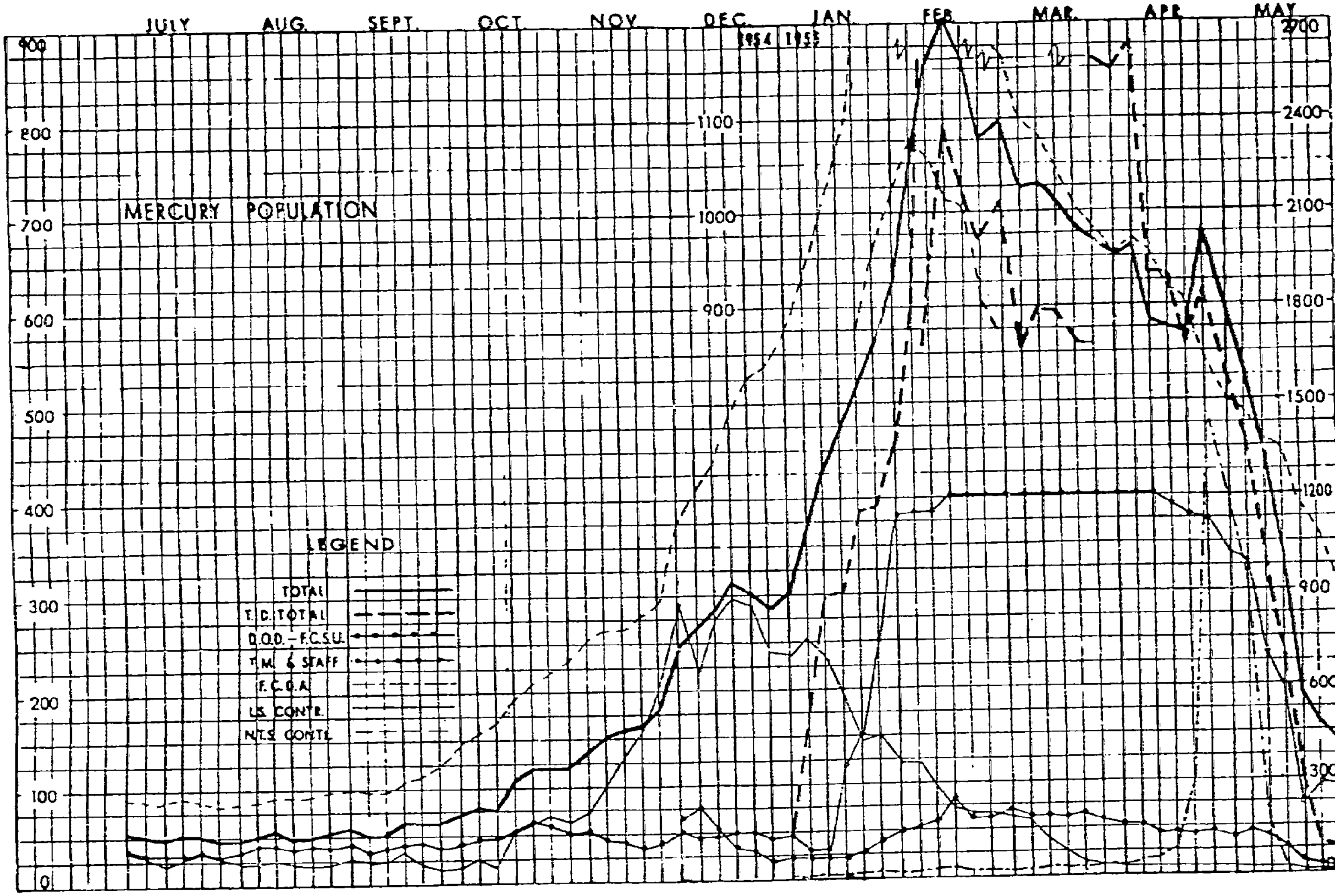


Figure 34 - Population Curves - DOD, Test Manager, FCDA, NTS Contractors and Total Personnel

PART VII TEAPOT COSTS

CHAPTER 1 - NARRATIVE COMMENTS

1. GENERAL

1.1

Based on data furnished the Manager, SFO, by the participating organizations, two basic reports have been compiled covering costs of the Operation, and are presented herewith as Chapter 2, Exhibit A and Chapter 3, Exhibit B.

Exhibit A: This report, with supporting Schedules A-1, A-2 and A-3, reflects costs to the Government of Weapons Effects, Weapons Development, and Civil Effects Programs and Projects, with costs segregated between Scientific Operations, Expendable Construction and Logistical Operations.

Exhibit B: This report, with supporting Schedules B-1, B-2 and B-3, reflects the AEC 3000 Program Full Scale Test Activity and related Reimbursable Work costs by organization, in the form and detail used in compilation of the SFO Budget for Full Scale Tests.

Included in Chapter I are two charts, Figure 35 and Figure 36 which present graphically the relation of certain cost factors to population factors. The data used in preparation of these charts also was furnished by participating organizations.

Figure 35 shows the relation of support costs and the number of scientific personnel at the site, reflecting the increased support requirements with the increase in scientific personnel as the test period is approached, and corresponding decrease in support requirements and scientific personnel subsequent to the test period.

Figure 36 shows the trend of costs for maintenance and operation of NTS Facilities in relation to the total population trend as the test period is approached and passed.

No attempt is made here to develop conclusions from these charts but it is believed that comparison of these and similar charts to be made for other test operations may result in development of conclusions which will be useful in future test planning.

1.2

Total cost reflected on Exhibit A, Chapter 2, includes actual costs reported at May 31, 1955, and estimated cost to complete, for all participating organizations in each of the following categories:

1. Scientific Operations

2. Expendable Construction

3. Logistical Operations

Scientific Operations includes the cost incurred by AEC, DOD and FCDA scientific contractors, laboratories, experimental and/or development centers, etc. in connection with such activities as scientific test direction, preparation for and carrying out of field experiments, post test laboratory analysis, data reduction, etc.

Expendable Construction includes the cost of all construction items charged to test operation expense because of being subject to destruction or damage, special design, limited useful life, etc. Examples of the kind of items included are towers, scientific stations, temporary access roads, temporary power, signal and communications lines in test areas.

Logistical Operations includes the cost incurred by AEC, DOD and FCDA in connection with logistical support to the scientific programs and projects. Examples of activities included are: operation and maintenance of test site facilities and auxiliary support facilities during the period of test operations, direct field support to scientific programs and projects, and the general and administrative costs not charged in normal accounting either directly or indirectly to scientific operations or the expendable construction program.

1.3

Final cost of AEC participation, compared with the Financial Plan based on Midyear Review, covering contractor activities in construction of expendable test facilities, operation and maintenance of NTS facilities, security operations and scientific program support for F. Y. 1955 as at May 31, 1955 was approximately 25% in excess of the anticipated cost for the same period.

Breakdown of the final costs on a percentage basis shows distribution of the AEC Full Scale Test Dollar to be as follows:

	Gross Cost Including Reimbursable Work	Per-Cent	Gross Cost Excluding Reimbursable Work	Per-Cent
Test Planning & Evaluation	$ 5,875,249	30	$ 5,278,832	32
Expendable Test Facilities	8,656,722	45	6,599,446	41
Test Site Operations	4,892,085	25	4,442,856	27
	$19,424,056	100	$16,321,134	100

Various factors contributed to the excess of actual cost over financial plan estimates. The following are the factors which apparently influenced costs most, although it is not possible to determine from the information available, the dollar importance of the individual factors, most of which hinge primarily on the element of time:

A. Revisions and changes resulted in delays in completion of work orders and necessitated additional help and overtime to meet deadlines. On April 2, due to developments in earlier shots, decision was made for an additional shot to follow what was then scheduled as the final shot of the series. This decision called for erection of an additional tower in Area 7, to be completed by April 30. Preliminary to erection of this tower it was necessary to remove the remains of a previous tower and decontaminate the area. Work was started immediately on a two shift, seven days per week basis, and the tower was completed on April 28, 1955.

B. Delays in tests due to unfavorable weather and other causes resulted in additional costs for various reasons. Each shot postponed resulted in additional expenditures for buttoning-up, stand-by time, non-productive firing parties and recovery teams. Many productive hours were lost due to changes in schedules. Delays also resulted in additional cost for rent and service on a large number of vehicles and items of equipment required by the test personnel until completion of the tests.

C. Support work requirements which could not be pre-planned or scheduled, involved work which had to be performed on short notice. Such work required extra work forces and equipment, resulting in higher costs than for regularly scheduled work.

D. In most areas lump sum contract work was in progress simultaneously with the support contractor's personnel. Due to the necessity of giving preference to the lump sum contractor as to working conditions and hours this resulted in delays for the support contractor and made it necessary to put in overtime hours to meet support requirements.

E. Additions and modifications were made by users after submittal of original criteria, resulting in final costs exceeding estimates.

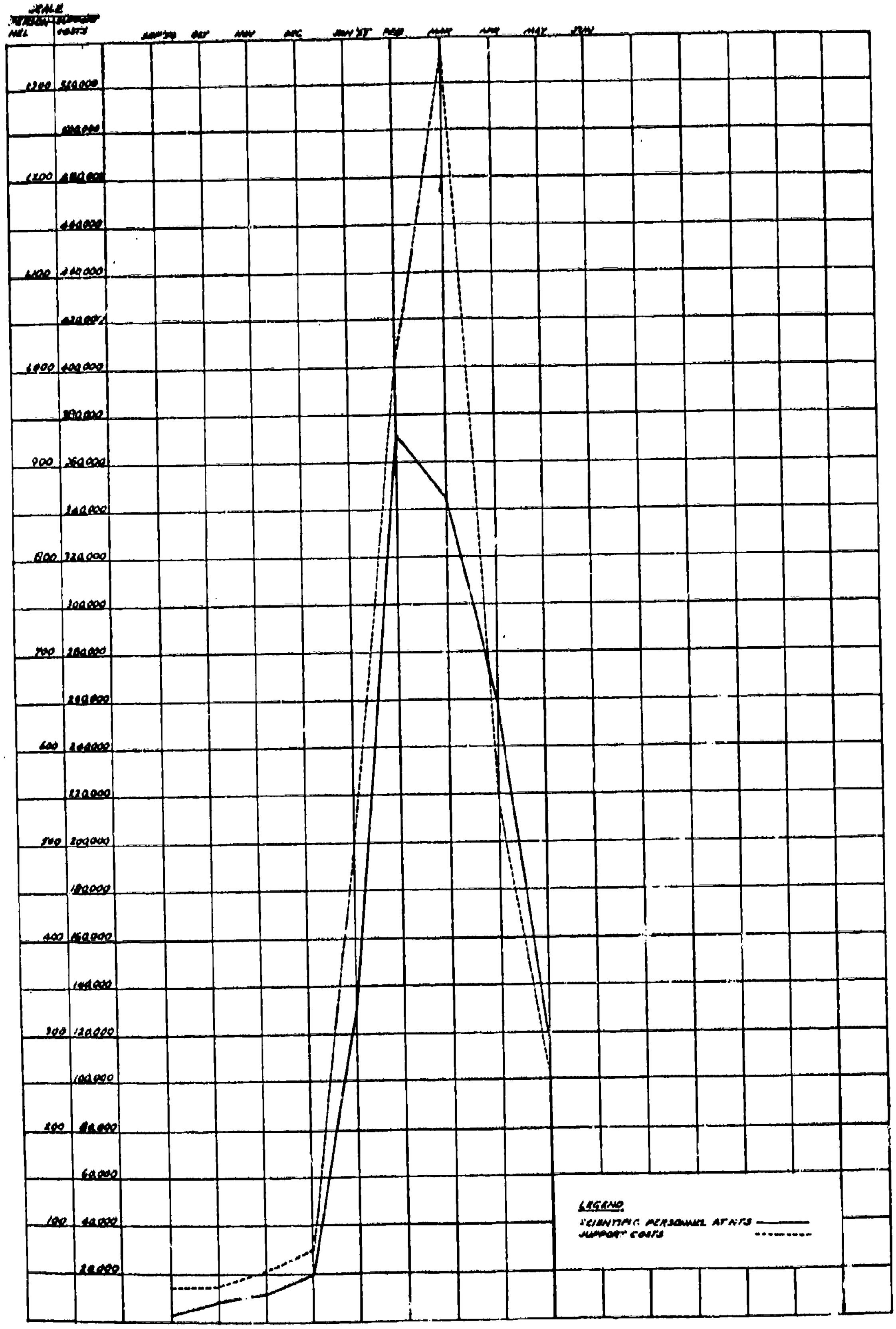


Figure 35 - Relation of Support Costs to Scientific Personnel at NTS

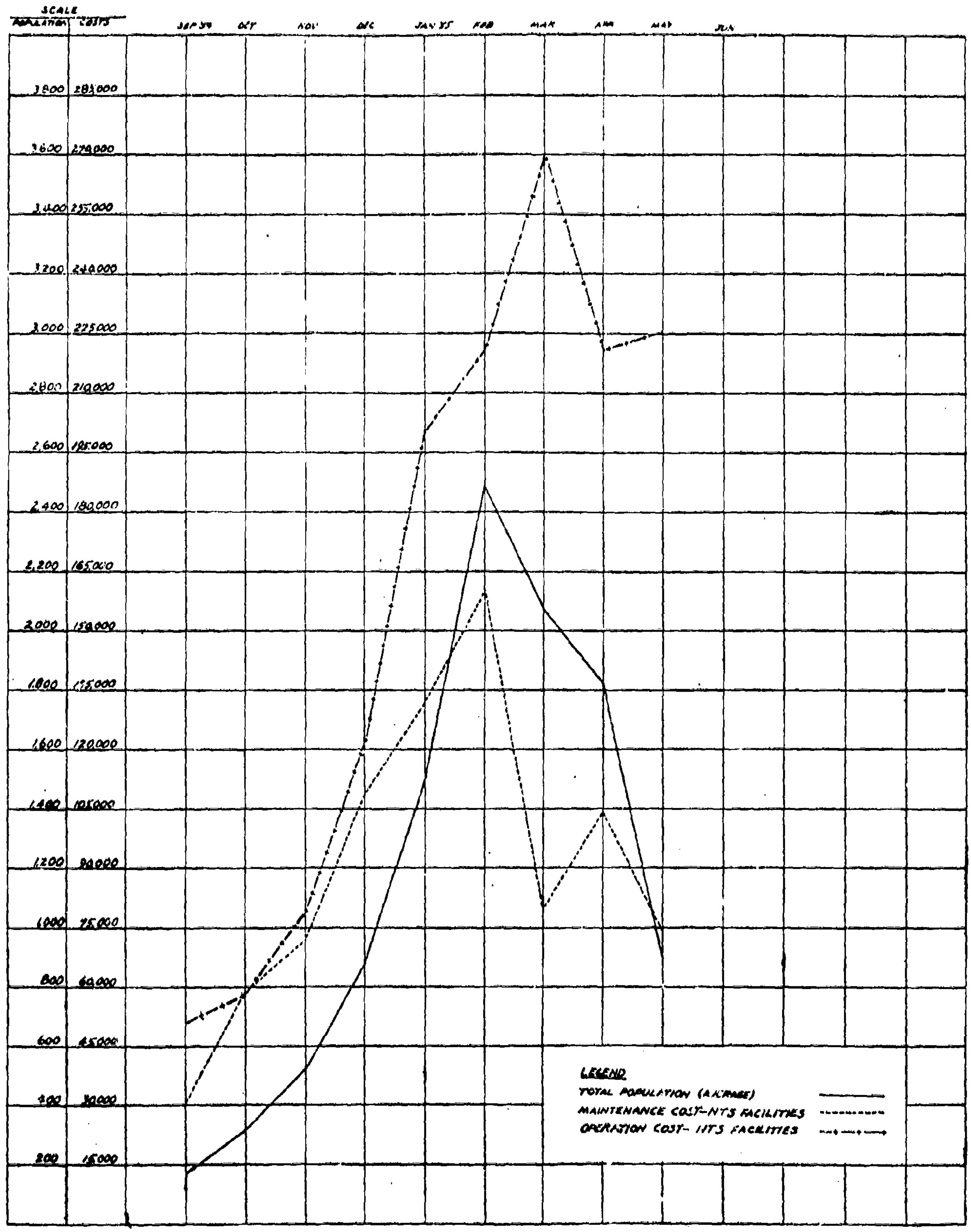


Figure 36 - Relation of Maintenance and Operation Costs To Total Population

CHAPTER 2 CONSOLIDATED COST REPORT

2.1

The Consolidated Summary Cost Report, Exhibit A, presents all reported incremental costs to the United States Government for Operation Teapot. The costs are presented classified by program groups as follows:

Military Effects Programs

LASL - Weapons Development Programs

UCRL - Weapons Development Programs

Civil Effects Programs

The costs are further classified as Scientific Operations, Expendable Construction, and Logistical Operations. Program Costs are further broken down by projects on Schedules A-1, A-2, and A-3, and Agency as follows:

A-1 Atomic Energy Commission Participation

A-2 Department of Defense Participation

A-3 Federal Civil Defense Administration Participation

2.2

Special attention is directed to the fact that military costs included in the consolidated report, Exhibit A, and supporting schedules include only incremental or budgeted test costs. Troop pay, costs of aircraft operation, normal operating and maintenance costs, etc., are not included since such costs are associated with the DOD mission under which the activity is budgeted.

OPERATION TEAPOT
COST REPORT

CONSOLIDATED SUMMARY

SUMMARY BY PROGRAM

Program No.	Program Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	MILITARY EFFECTS PROGRAMS				
1	BLAST PRESSURE MEASUREMENTS	$ 883,048	$ 336,298	$ 42,298	$ 1,261,644
2	NUCLEAR MEASUREMENTS AND EFFECTS	300,810	26,990	8,549	336,349
3	STRUCTURES	292,125	278,995	18,338	589,458
5	AIRCRAFT STRUCTURES	1,965,698	70,477	16,075	2,052,250
6	SERVICE EQUIPMENT & OPERATIONS	119,999	-0-	3,119	123,118
8	THERMAL MEASUREMENTS & EFFECTS	432,081	58,585	6,264	496,930
9	GENERAL TEST ITEMS-SCIENTIFIC	371,932	445,261	16,068	833,261
	TOTAL MILITARY EFFECTS PROGRAMS	4,365,693	1,216,606	110,711	5,693,010
	LASL - WEAPONS DEVELOPMENT PROGRAMS				
10	HYDRODYNAMIC YIELD	46,811	-0-	2,872	49,683
11	RADIOCHEMISTRY	302,856	-0-	3,567	306,423
12	EXTERNAL NEUTRON MEASUREMENTS	127,941	16,776	8,203	152,920
13	GAMMA RAY MEASUREMENTS	784,507	1,068,604	117,038	1,970,149
14	XR MEASUREMENTS	98,937	14,037	17,915	130,889
15	PHOTOPHYSICS	342,912	944,742	88,673	1,376,327
16	REACTION HISTORY	288,844	463,082	52,470	804,396
18	THERMAL RADIATION & SPECTROSCOPY	554,592	252,874	49,061	856,527
	TOTAL LASL WEAPONS DEVELOPMENT PROGRAMS	2,547,400	2,760,115	339,799	5,647,314
	UCRL WEAPONS DEVELOPMENT PROGRAMS				
21	RADIOCHEMISTRY	209,934	-0-	2,670	212,604
22	HISTORY OF THE REACTION	615,667	659,194	84,950	1,359,811
23	SCIENTIFIC PHOTOGRAPHY	214,443	153,066	3,797	371,306
24	EXTERNAL NEUTRON MEASUREMENTS	36,177	38,728	15,951	90,856
29	TECHNICAL PHOTOGRAPHY	-0-	-0-	1,355	1,355
	TOTAL UCRL WEAPONS DEVELOPMENT PROGRAMS	1,076,221	850,988	108,723	2,035,932
	CIVIL EFFECTS PROGRAMS				
30	EVALUATION AND DOCUMENTATION OF RADIOLOGICAL CONTAMINATION	70,308	1,068	15,991	87,367
31	RESPONSE OF RESIDENTIAL, COMMERCIAL, INDUSTRIAL STRUCTURES & MATERIALS TO NUCLEAR EFFECTS	22,926	250,554	27,571	301,051
32	EXPOSURE OF FOODS AND FOODSTUFFS TO NUCLEAR EXPLOSIONS	1,547	-0-	8,247	9,794
33	BIOLOGICAL & MEDICAL INVESTIGATIONS	119,177	4,518	15,676	139,371
34	SHELTERS FOR CIVIL POPULATIONS	79,293	186,198	50,778	316,269
35	UTILITIES, SERVICES AND ASSOCIATED EQUIPMENT EXPOSED TO NUCLEAR EXPLOSION	6,157	56,756	19,257	82,170
36	MOBILE HOUSING AND EMERGENCY VEHICLES	13,309	-0-	3,249	16,558
37	FALL-OUT STUDIES	111,914	-0-	6,894	118,808
38	CIVIL DEFENSE RADEF STUDIES	15,460	-0-	3,575	19,035
39	PROGRAM INSTRUMENTATION AND PHOTOGRAPHY	223,712	37,973	49,485	311,170
	TOTAL CIVIL EFFECTS PROGRAMS	$ 663,803	$ 537,067	$ 200,723	$ 1,401,593

(Continued next page)

CONSOLIDATED SUMMARY

SUMMARY BY PROGRAM

Program No.	Program Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	ITEMS COMMON TO DOD ACTIVITIES				
50	ITEMS COMMON TO SCIENTIFIC PROGRAMS	$ 41,739	$ 195,536	$ 45,533	$ 282,808
51	ITEMS COMMON TO LOGISTICAL OPERATIONS	-0-	147,718	850,126	997,844
52	DOD OPERATIONAL TRAINING	-0-	202	4,111	4,313
	TOTAL ITEMS COMMON TO DOD ACTIVITIES	41,739	343,456	899,770	1,284,965
	COMMON TO AEC SCIENTIFIC PROGRAMS				
60	LASL PROGRAMS	-0-	1,645,734	149,198	1,794,932
61	UCRL PROGRAMS	149,906	559,069	126,056	835,031
62	BIO-MED PROGRAMS	-0-	-0-	862	862
63	AEC PROGRAMS	121,709	613,360	169,980	905,049
	TOTAL COMMON TO AEC SCIENTIFIC PROGRAMS	271,615	2,818,163	446,096	3,535,874
	COMMON TO FCDA ACTIVITIES				
70	SCIENTIFIC PROGRAMS	-0-	-0-	19,031	19,031
71	FCDA DEMONSTRATIONS & OBSERVERS PROGRAM	-0-	-0-	60,999	60,999
	TOTAL COMMON TO FCDA ACTIVITIES	-0-	-0-	80,030	80,030
	COMMON TO OPERATIONS - AEC				
80	OFFICE OF TEST MANAGER	159,327	29,758	111,544	300,629
81	OFFICE OF TEST DIRECTOR	538,971	131,820	433,205	1,103,996
82	OFFICE OF SUPPORT DIRECTOR	106,595	8,603	2,677,100	2,792,298
	TOTAL COMMON TO OPERATIONS - AEC	804,893	170,181	3,221,849	4,196,923
	TOTAL OPERATION COST INCURRED MAY 31, 1955	9,771,364	8,696,576	5,407,701	23,875,641
	ESTIMATED TO COMPLETE - ALL PROGRAMS	573,286	-0-	373,909	947,195
	TOTAL OPERATION COST - INCURRED AND ESTIMATED	$ 10,344,650	$ 8,696,576	$ 5,781,610	$ 24,822,836

FUNDING SUMMARY

Agency	Weapons Development	Military Effects	Civil Effects	Total
Atomic Energy Commission	$ 16,187,629	$ 120,169	$ 684,114	$ 16,991,912
Department of Defense	-0-	6,953,564	-0-	6,953,564
Federal Civil Defense Administration	-0-	-0-	877,360	877,360
Total	$ 16,187,629	$ 7,073,733	$ 1,561,474	$ 24,822,836

OPERATION TEAPOT
COST REPORT
ATOMIC ENERGY COMMISSION PARTICIPATION

Program & Project No.	Program and Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	MILITARY EFFECTS				
1	BLAST PRESSURE MEASUREMENTS				
1.1	Blast Prussure Measurements		$ 2,857	$ 768	$ 3,625
1.2	Shock Velocity vs Time and Distance on High Altitude Shot		7,808	154	7,962
1.3	Microbarographic Pressure Measurements at Ground Level from High Altitude	$ 7,868		6,098	13,966
1.5	Pre-Shock Sound Velocity Measurements in the Air		7,422	1,768	9,190
1.6	Crater Measurements		27,555	24	27,579
1.7.1	Basic Free Field Measurements		7,200	2,492	9,692
1.9	Material Velocity Measurements on High Altitude Shot	15,736	1,077	6,842	23,655
1.10	Overpressure and Dynamic Pressure vs Time and Distance		118,724	7,674	126,398
1.11	Special Measurements of Dynamic Pressures vs Time and Distance	107,531	29,425	3,080	140,036
1.12	Measurements of Directional Drag Loading of Simple Shapes		22,667	3,052	25,719
1.13	Measurements of Dust Concentration in Precursor Region		73,881	6,066	79,947
1.14	Measurement of Directional Drag Forces on Various Shapes		37,682	4,172	41,854
1.99	Common to Blast Pressure Measurements			108	108
	Total Cost Program 1	131,135	336,298	42,298	509,731
	Less: Reimbursable Work	10,966	336,298	42,298	389,562
	Net AEC Cost Program 1	120,169	-0-	-0-	120,169
2	NUCLEAR MEASUREMENTS AND EFFECTS				
2.1	Gamma Dose vs Distance		1,291	60	1,351
2.2	Neutron Flux vs Distance		1,504	2,590	4,094
2.3	Gamma Spectra of Residual Radiation			60	60
2.4	Gamma Dose Rate vs Time		1,913	363	2,276
2.5.1	Fall-out Studies		22,282	2,114	24,396
2.5.2	Fall-out Studies			1,419	1,419
2.6	Beta and Soft Gamma Studies			200	200
2.7.1	Shielding Studies			1,743	1,743
	Total Cost Program 2	-0-	26,990	8,549	35,539
	Less: Reimbursable Work	-0-	26,990	8,549	35,539
	Net AEC Cost Program 2	$ -0-	$ -0-	$ -0-	$ -0-

OPERATION TEAPOT
COST REPORT
ATOMIC ENERGY COMMISSION PARTICIPATION

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	MILITARY EFFECTS (Con'd.)				
3	STRUCTURES				
3.1	Response of Equipment in the Precursor Zone		$ 409	$ 689	$ 1,098
3.2	Study of Drag Loading of Structures in and out of the Precursor Zone		20,258	2,882	23,140
3.3.1	Underground Structures		29,907	9,259	39,166
3.3.2	Underground Structures		14,761	434	15,195
3.4	Effects of Air Blasts on Buried Structures		7,465	536	8,001
3.6	Evaluation of Earth Cover as Protection to Above-Ground Structures		18,227		18,227
3.7	Effect of Load Duration on Structural Response		161,502	1,471	162,973
3.8	Test of Concrete Panels		22,944	114	23,058
3.9	Response of Petroleum Storage Tanks		1,813		1,813
3.10.1	Structures Instrumentation		1,709	2,952	4,661
3.99	Common to Structures			1	1
	Total Cost Program 3	-0-	278,995	18,338	297,333
	Less: Reimbursable Work	-0-	278,995	18,338	297,333
	Net AEC Cost Program 3	-0-	-0-	-0-	-0-
5	AIRCRAFT STRUCTURES				
5.1	Destructive Loads on Aircraft in Flight		4,053	6,660	10,713
5.2	Thermal Effects on Fighter Type Aircraft in Flight		5,708	895	6,603
5.4	Effects of Nuclear Explosion on Ballistic Missiles		25,362	1,225	26,587
5.5	Effects of Nuclear Explosion on Aircraft Components		35,354	7,271	42,625
5.99	Common to Aircraft Structures			24	24
	Total Cost Program 5	-0-	70,477	16,075	86,552
	Less: Reimbursable Work	-0-	70,477	16,075	86,552
	Net AEC Cost Program 5	$ -0-	$ -0-	$ -0-	$ -0-

OPERATION TEAPOT
COST REPORT
ATOMIC ENERGY COMMISSION PARTICIPATION

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	MILITARY EFFECTS (Con'd.)				
6	SERVICE EQUIPMENT AND OPERATIONS				
6.1.1	Evaluation of Military Radiac Equipment			$ 83	$ 83
6.1.2	Evaluation of Military Radiac Equipment			9	9
6.2	Effects of Selected Components and Materials			1	1
6.3	Field Test of a Detonation Locator			2,981	2,981
6.99	Common to Service Equipment and Operations			45	45
	Total Cost Program 6	$ -0-	$ -0-	3,119	3,119
	Less: Reimbursable Work	-0-	-0-	3,119	3,119
	Net AEC Cost Program 6	-0-	-0-	-0-	-0-
8	THERMAL MEASUREMENTS AND EFFECTS				
8.1	Measurement of Direct and Ground			675	675
8.2	High Altitude Measurements	139,990			139,990
8.3	Thermal Radiation Attenuating Cloud Studies		13,262	1,877	15,139
8.4	Basic Thermal Radiation Measurements		45,323	3,599	48,922
8.99	Common to Thermal Measurements and Effects			113	113
	Total Cost Program 8	139,990	58,585	6,264	204,839
	Less: Reimbursable Work	139,990	58,585	6,264	204,839
	Net AEC Cost Program 8	-0-	-0-	-0-	-0-
9	GENERAL TEST ITEMS - SCIENTIFIC				
9.1	Thermal Photography	175,564	25,561	3,967	205,092
9.2	Timing Signals	124,510	56,305	169	180,984
9.3	Soil Stabilization and Ground Surface Preparations		360,770	5,311	366,081
9.4	Atomic Cloud Growth Studies	52,939	2,625	6,134	61,698
9.5	Power Supply for Technical Projects			327	327
9.99	Common to General Test Items - Scientific			160	160
	Total Cost Program 9	353,013	445,261	16,068	814,342
	Less: Reimbursable Work	353,013	445,261	16,068	814,342
	Net AEC Cost Program 9	-0-	-0-	-0-	-0-
	WEAPONS DEVELOPMENT				
10	HYDRODYNAMIC YIELD				
10.1	Fireball Analysis	42,130			42,130
10.2	Time of Arrival	4,681			4,681
10.99	Common to Program Ten			2,872	2,872
	Net AEC Cost Program 10	46,811	-0-	2,872	49,683

OPERATION TEAPOT
COST REPORT
ATOMIC ENERGY COMMISSION PARTICIPATION

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	WEAPONS DEVELOPMENT (Con'd.)				
11	RADIOCHEMISTRY				
11.1	Radiochemical Analysis	$ 272,570		$ 432	$ 273,002
11.2	Sampling	30,286		610	30,896
11.99	Common to Program Eleven			2,525	2,525
	Net AEC Cost Program 11	302,856	-0-	3,567	306,423
12	EXTERNAL NEUTRON MEASUREMENTS				
12.99	Common to Program Twelve	127,941	16,776	8,203	152,920
	Net AEC Cost Program 12	127,941	16,776	8,203	152,920
13	GAMMA RAY MEASUREMENTS				
13.1	Close-in Alpha and Transit-Time Measurements	550,281	879,603	56,691	1,486,575
13.2	Fluor and Teller Light Investigations	172,588	148,085	16,322	336,995
13.3	Development	61,638	5,420	2,051	69,109
13.99	Common to Program Thirteen		35,496	41,974	77,470
	Net AEC Cost Program 13	784,507	1,068,604	117,038	1,970,149
14	XR MEASUREMENTS				
14.1	XR Measurements	74,203	7,066	454	81,723
14.2	Telemetering	24,734	407	1,811	26,952
14.99	Common to Program Fourteen		6,564	15,650	22,214
	Net AEC Cost Program 14	98,937	14,037	17,915	130,889
15	PHOTOPHYSICS				
15.1	Fireball Photography & Bhangmeters	285,787	100,885	7,277	393,949
15.2	Photonephography			84	84
15.3	Temperature - Opacity Measurements		85,471	47,527	132,998
15.4	[redacted] Photography	57,125	16,958	964	75,047
15.99	Common to Program Fifteen		741,428	32,821	774,249
	Net AEC Cost Program 15	342,912	944,742	88,673	1,376,327
16	REACTION HISTORY				
16.1	Temperature Measurements	57,769	392,820	14,323	464,912
16.2	[redacted] Measurements	57,769	38,496	1,488	97,753
16.3	Electromagnetic Measurements	158,864	1,856	16,296	177,016
16.99	Common to Program Sixteen	14,442	29,910	20,363	64,715
	Net AEC Cost Program 16	288,844	463,082	52,470	804,396

OPERATION TEAPOT
COST REPORT
ATOMIC ENERGY COMMISSION PARTICIPATION

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	WEAPONS DEVELOPMENT (Con'd.)				
18	THERMAL RADIATION & SPECTROSCOPY				
18.1	High Temperature Measurements	$ 310,832		$ 10,431	$ 321,263
18.2	High Altitude Measurements	139,990		361	140,351
18.3	[redacted] Measurements	34,537			34,537
18.4	High-Resolution Spectroscopy			702	702
18.5	Disturbed Air Experiment	64,552	$ 7,195	945	72,692
18.99	Common to Program Eighteen	4,681	245,679	36,622	286,982
	Net AEC Cost Program 18	554,592	252,874	49,061	856,527
21	RADIO CHEMISTRY				
21.1	Fission and Fusion Yields	1/ 209,934		2	209,936
21.2	Sample Collection	1/			
21.99	Common to Program 21			2,668	2,668
	Net AEC Cost Program 21	209,934	-0-	2,670	212,604
22	HISTORY OF THE REACTION				
22.1	[redacted]	1/ 615,667	13,741	10	629,418
22.2	Diagnostic Developments	1/	30,333	2,207	32,540
22.99	Common to Program 22		615,120	82,733	697,853
	Net AEC Cost Program 22	615,667	659,194	84,950	1,359,811
23	SCIENTIFIC PHOTOGRAPHY				
23.1	Ball of Fire and Bhangmeter	137,850		19	137,869
23.2	Cloud Photography			46	46
23.3	[redacted] Photography	76,593			76,593
23.99	Common to Program 23		153,066	3,732	156,798
	Net AEC Cost Program 23	214,443	153,066	3,797	371,306
24	EXTERNAL NEUTRON MEASUREMENTS				
24.1	Neutron Spectra	36,177	34,845	2,039	73,061
24.99	Common to Program 24		3,883	13,912	17,795
	Net AEC Cost Program 24	36,177	38,728	15,951	90,856
29	TECHNICAL PHOTOGRAPHY				
29.99	Common to Program 29	-0-	-0-	1,355	1,355
	Net AEC Cost Program 29	-0-	-0-	1,355	1,355

1/ Represents UCRL costs which contractor has not segregated between these projects.

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	CIVIL EFFECTS				
30	EVALUATION AND DOCUMENTATION OF RADIOLOGICAL CONTAMINATION				
30.1	Automatic Measurement & Recording of Radiation Levels	$ 35,378		$ 3,507	$ 38,885
30.2	Utilization of Telemetering Techniques in Evaluating Residual Radioactive Contamination	2,352	$ 1,068	8,023	11,443
30.3	Development and Evaluation of Aerial Survey Techniques for Fallout Surface Contamination	22,273		1,658	23,931
30.99	Common to Program 30	10,305		2,803	13,108
	Net AEC Cost Program 30	70,308	1,068	15,991	87,367
31	RESPONSE OF RESIDENTIAL, COMMERCIAL, INDUSTRIAL STRUCTURES AND MATERIALS TO NUCLEAR EFFECTS				
31.1	Damage to Conventional and Special Types of Residences Exposed to Nuclear Effects		183,705	8,534	192,239
31.2	Damage to Commercial, Institutional, and Industrial Structures and Contents Exposed to Nuclear Effects		43,552	6,870	50,422
31.3	Structural Behavior of Components of Commercial and Industrial Structures under Blast Loadings			54	54
31.4	Comparison Slab Test		23,297	2,628	25,925
31.5	Thermal Ignition and Response of Materials			5,412	5,412
31.6	Methods of Determining Yields and Location of Nuclear Exposions			3,415	3,415
31.99	Common to Program 31	22,926		658	23,584
	Total Cost Program 31	22,926	250,554	27,571	301,051
	Less: Reimbursable Work	21,379	250,554	27,571	299,504
	Net AEC Cost Program 31	1,547	-0-	-0-	1,547
32	EXPOSURE OF FOODS AND FOODSTUFFS TO NUCLEAR EXPLOSIONS				
32.1	The Effects on Bulk Staples			12	12
32.2	The Effects on Canned Foods			219	219
32.99	Common to Program 32	1,547		8,016	9,563
	Total Cost Program 32	1,547	-0-	8,247	9,794
	Less: Reimbursable Work	-0-	-0-	8,247	8,247
	Net AEC Cost Program 32	1,547	-0-	-0-	1,547
33	BIOLOGICAL & MEDICAL INVESTIGATIONS				
33.1	Effects of Overpressures on Biol Systems	93,258	3,506	9,976	106,740
33.2	The effects of Noise in Blast Resistant Shelters	9,560	1,012	1,409	11,981
33.4	Distribution and Density of Missiles from Nuclear Explosions	14,812		3,182	17,994
33.99	Common to Program 33	1,547		1,109	2,656
	Net AEC Cost Program 33	119,177	4,518	15,676	139,371

OPERATION TEAPOT
COST REPORT
ATOMIC ENERGY COMMISSION PARTICIPATION

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	CIVIL EFFECTS (Con'd)				
34	SHELTERS FOR CIVIL POPULATIONS				
34.1a	Evaluation of Indoor Home-Shelters Exposed to Nuclear Effects	$ 2,777	$ 32,698	$ 2,649	$ 38,124
34.1b	Evaluation of Outdoor Family-Shelters Exposed to Nuclear Effects	13,883	5,918		19,801
34.2	Investigation of Rise Time and Duration of Pressures in Certain Regions	51,368	16,721	5,282	73,371
34.3	Structural Behavior of Group Shelters Under Various Blast Loadings	9,718	130,861	28,645	169,224
34.4	Nuclear Effects on Machine Tools			14,159	14,159
34.99	Common to Program 34	1,547		43	1,590
	Total Cost Program 34	79,293	186,198	50,778	316,269
	Less: Reimbursable Work	26,378	169,477	31,337	227,192
	Net AEC Cost Program 34	52,915	16,721	19,441	89,077
35	UTILITIES, SERVICES, AND ASSOCIATED EQUIPMENT EXPOSED TO NUCLEAR EXPLOSION				
35.1	Electric Utilities		22,030	7,051	29,081
35.2	Communications Equipment		6,872	3,227	10,099
35.4	Industrial and Domestic Gas Storage and Distribution		14,879	7,967	22,846
35.4a	Industrial and Domestic Gas Storage and Distribution-Natural and Manufactured Gas		12,975		12,775
35.99	Common to Program 35	6,157		1,012	7,169
	Total Cost Program 35	6,157	56,756	19,257	82,170
	Less: Reimbursable Work	4,610	56,756	19,257	80,623
	Net AEC Cost Program 35	1,547	-0-	-0-	1,547
36	MOBILE HOUSING AND EMERGENCY VEHICLES				
36.2	Operational Use of Civil Defense Emergency Vehicles			181	181
36.99	Common to Program 36	13,309		3,068	16,377
	Total Cost Program 36	13,309	-0-	3,249	16,558
	Less: Reimbursable Work	11,762	-0-	3,249	15,011
	Net AEC Cost Program 36	1,547	-0-	-0-	1,547
37	FALL-OUT STUDIES				
37.1	The Factors Influencing the Biological Fate and Persistence of Radioactive Fall-out	29,809		2,798	32,607
37.2	The Phenomenology of Fall-out at Near Distance	76,446		4,096	80,542
37.3	Evaluation of Inhalation Exposures in Rabbits	4,112			4,112
37.99	Common to Program 37	1,547			1,547
	Total Cost Program 37	111,914		6,894	118,808
	Less: Reimbursable Work	-0-		-0-	-0-
	Net AEC Cost Program 37	111,914	-0-	6,894	118,808

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	CIVIL EFFECTS (Cont'd)				
38	CIVIL DEFENSE RADEF STUDIES				
38.1	Civil Defense Monitoring Techniques			$ 364	$ 364
38.2	Indoctrination and Training of RADEF Pers.			66	66
38.3	Evaluation of Civil Defense RADEF Instrs.			253	253
38.99	Common to Program 38	$ 15,460		2,892	18,352
	Total Cost Program 38	15,460		3,575	19,035
	Less: Reimbursable Work	13,913		3,575	17,488
	Net AEC Cost Program 38	1,547	$ -0-	-0-	1,547
39	PROGRAM INSTRUMENTATION AND PHOTOGRAPHY				
39.1	Gamma and Neutron Radiation Measurements	40,214		1,408	41,622
39.2	Static and Dynamic Overpressure Measurements	16,660	8,696	21,398	46,754
39.3	Thermal Radiation Measurements	5,294			5,294
39.4	Technical Photography	50,582	15,709	13,101	79,392
39.5	Measurement and Permanent Recording ofFast Neutrons by Effects on Semi-Conductors	24,064		181	24,245
39.6	Measurement of Initial and Residual Radiation by Chemical Methods	13,537		1,466	15,003
39.7	Physical Dosimetry of Neutrons and Gamma Rays in Terms of Rep.	71,814	13,568	10,713	96,095
39.99	Common to Program 39	1,547		1,218	2,765
	Total Cost Program 39	223,712	37,973	49,485	311,170
	Less: Reimbursable Work	66,070	20,427	23,468	109,965
	Net AEC Cost Program 39	157,642	17,546	26,017	201,205
	ITEMS COMMON TO DOD ACTIVITIES				
50	ITEMS COMMON TO SCIENTIFIC PROGRAMS (1 thru 9)				
50.1	Special Device			35	35
50.2	Met Tower		192,328	2,724	195,052
50.5	Other Test Area Requirements		3,208	42,774	45,982
	Total Cost Program 50	-0-	195,536	45,533	241,069
	Less: Reimbursable Work	-0-	195,536	45,533	241,069
	Net AEC Cost Program 50	-0-	-0-	-0-	-0-

OPERATION TEAPOT
COST REPORT
ATOMIC ENERGY COMMISSION PARTICIPATION

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	ITEMS COMMON TO DOD ACTIVITIES (Cont'd)				
51	ITEMS COMMON TO LOGISTICAL OPERATIONS				
51.1	Supplies and Materials			$ 21,413	$ 21,413
51.2	Personnel and Equipment Assistance (Camp Mercury)		$ 284	4,462	4,746
51.3	Generator Repair			3,782	3,782
51.4	Overhead-Joint Rec. & Shipping Facility			3,413	3,413
51.5	Packing and Crating			351	351
51.6	Communications			11,595	11,595
51.7	Rehab. & Alt. of Real Property (Camp Mercury)		54,741	15,049	69,790
51.8	Roads		72,204	6,697	78,901
51.9	Targets		20,489	296	20,785
51.11	Flood Control			25,083	25,083
	Total Cost Program 51	$ -0-	147,718	92,141	239,859
	Less: Reimbursable Work	-0-	147,718	92,141	239,859
	Net AEC Cost Program 51	-0-	-0-	-0-	-0-
52	DOD OPERATIONAL TRAINING				
52.1	Army			85	85
52.3	TAC		202	1,797	1,999
52.4	Marine			55	55
52.6	AF			2,174	2,174
	Total Cost Program 52	-0-	202	4,111	4,313
	Less: Reimbursable Work	-0-	202	4,111	4,313
	Net AEC Cost Program 52	-0-	-0-	-0-	-0-
	COMMON TO AEC SCIENTIFIC PROGRAMS				
60	LASL PROGRAMS				
60.99	Common to LASL Programs 10 thru 19	-0-	1,645,734	149,198	1,794,932
	Net AEC Cost Program 60	-0-	1,645,734	149,198	1,794,932
61	UCRL PROGRAMS				
61.99	Common to UCRL Programs 20 thru 29	149,906	559,069	126,056	835,031
	Net AEC Cost Program 61	149,906	559,069	126,056	835,031
62	BIO-MED PROGRAMS				
62.99	Common to AEC Bio-Med Programs	-0-	-0-	862	862
	Net AEC Cost Program 62	-0-	-0-	862	862

OPERATION TEAPOT
COST REPORT
ATOMIC ENERGY COMMISSION PARTICIPATION

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	COMMON TO AEC SCIENTIFIC PROGRAMS (Cont'd.)				
63	AEC PROGRAMS				
63.99	Common to All AEC Programs	$ 121,709	$ 613,360	$ 169,980	$ 905,049
	Net AEC Cost Program 63	121,709	613,360	169,980	905,049
	COMMON TO FCDA ACTIVITIES				
70	SCIENTIFIC PROGRAMS				
70.99	Common to Scientific Programs	-0-	-0-	19,031	19,031
	Less: Reimbursable Work	-0-	-0-	19,031	19,031
	Net AEC Cost Program 70	-0-	-0-	-0-	-0-
71	FCDA DEMONSTRATIONS & OBSERVERS PROGRAM				
71.99	Common to Demonstrations & Observers Program	-0-	-0-	60,999	60,999
	Less: Reimbursable Work	-0-	-0-	60,999	60,999
	Net AEC Cost Program 71	-0-	-0-	-0-	-0-
	COMMON TO OPERATIONS - AEC				
80	OFFICE OF TEST MANAGER				
80.1	Office of Test Manager		5,308	20,482	25,790
80.2	Advisory Panel			1,332	1,332
80.3	Staff Services Group			681	681
80.4	Public Relations		11,687	32,364	44,051
80.5	Weather Prediction Unit	28,403	9,209	32,647	70,259
80.6	Fallout Prediction Unit			1,383	1,383
80.7	Blast Prediction Unit	130,924		15,154	146,078
80.99	All Other Staff Services		3,554	7,501	11,055
	Net AEC Cost Program 80	159,327	29,758	111,544	300,629
81	OFFICE OF TEST DIRECTOR				
81.1	Office of Test Director			11,043	11,043
81.2	On-Site Rad-Safe			134,246	134,246
81.3	Documentary Photography		975	14,395	15,370
81.4	Assembly and Arming	222,934	8,848	43,701	275,483
81.5	Timing & Firing	316,037	106,659	36,225	458,921
81.6	Air Operations		15,338	12,634	27,972
81.99	All Other Staff Services			180,961	180,961
	Net AEC Cost Program 81	538,971	131,820	433,205	1,103,996

OPERATION TEAPOT
COST REPORT
ATOMIC ENERGY COMMISSION PARTICIPATION

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	COMMON TO OPERATION - AEC (Cont'd.)				
82	OFFICE OF SUPPORT DIRECTOR				
82.1	Office of Support Director	$ -0-	$ -0-	$ 223,039	$ 223,039
82.2	Operation & Maint. of Proving Ground Facilities			1,694,421	1,694,421
82.3	Security			637,012	637,012
82.4	Off-site Rad-safe	106,595		90,275	196,870
82.5	Expendable Base Facilities		8,603	2,816	11,419
82.99	All other staff services			29,537	29,537
	Net AEC Cost Program 82	106,595	8,603	2,677,100	2,792,298
	Total Cost Incurred, May 31, 1955	5,988,070	8,696,576	4,649,716	19,334,362
	Less: Reimbursable Work	648,081	2,057,276	449,230	3,154,587
	Net AEC Cost Incurred	5,339,989	6,639,300	4,200,486	16,179,775
	Estimated Cost to Complete	573,286	-0-	373,909	947,195
	Less: Estimated Reimbursable Work	75,058	-0-	60,000	135,058
	Net Estimated Cost to Complete	498,228	-0-	313,909	812,137
	Total AEC Cost Incurred & Estimated	$5,838,217	$6,639,300	$4,514,395	$16,991,912

SUMMARY OF AEC FUNDING

	Weapons Development	Military Effects	Civil Effects	Total
AEC - Santa Fe Operations, Weapons Program	$15,050,806	$ 120,169	$ 14,159	$15,185,134
AEC - San Francisco Operations	1,136,823	-0-	-0-	1,136,823
AEC - Division of Biology & Medicine	-0-	-0-	669,955	669,955
Total AEC Cost	$16,187,629	$ 120,169	$ 684,114	$16,991,912

OPERATION TEAPOT
COST REPORT
DEPARTMENT OF DEFENSE PARTICIPATION

Program & Project No.	Program and Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
1	MILITARY EFFECTS BLAST PRESSURE MEASUREMENTS				
1.1	Blast Pressure Measurements	$156,598	2,857	768	160,223
1.2	Shock Velocity vs Time and Distance on High Altitude Shot	49,684	7,808	154	57,646
1.3	Microbarographic Pressure Measurements at Ground Level from High Altitude	658		6,098	6,756
1.5	Pre-Shock Sound Velocity Measurements in the Air	83,432	7,422	1,768	92,622
1.6	Crater Measurements	31	27,555	24	27,610
1.7.1	Basic Free Field Measurements	30,000	7,200	2,492	39,692
1.7.2	Underground Structures Instrumentation	50,000			50,000
1.9	Material Velocity Measurements on High Altitude Shot	1,316	1,077	6,842	9,235
1.10	Overpressure and Dynamic Pressure vs Time and Distance	168,000	118,724	7,674	294,398
1.11	Special Measurements of Dynamic Pressures vs Time and Distance	8,992	29,425	3,080	41,497
1.12	Measurements of Directional Drag Loading of Simple Shapes	80,310	22,667	3,052	106,029
1.13	Measurements of Dust Concentration in Precursor Region	86,059	73,881	6,066	166,006
1.14	Measurement of Directional Drag Forces on Various Shapes	47,799	37,682	4,172	89,653
1.99	Common to Blast Pressure Measurements			108	108
	Total Cost Program 1	$762,879	336,298	42,298	1,141,475
2	NUCLEAR MEASUREMENTS AND EFFECTS				
2.1	Gamma Dose vs Distance	$ 31,955	1,291	60	33,306
2.2	Neutron Flux vs Distance	110,672	1,504	2,590	114,766
2.3	Gamma Spectra of Residual Radiation	24,976		60	25,036
2.4	Gamma Dose Rate vs Time	54,183	1,913	363	56,459
2.5.1	Fall-out Studies	37,040	22,282	2,114	61,436
2.5.2	Fall-out Studies	5,320		1,419	6,739
2.6	Beta and Soft Gamma Studies	12,100		200	12,300
2.7.1	Shielding Studies	3,961		1,743	5,704
2.7.2	Shielding Studies	3,370			3,370
2.8	Contact Radiation Hazard Associated with a Contaminated Aircraft	17,233			17,233
2.99	Common to Nuclear Measurements and Effects				-0-
	Total Cost Program 2	$ 300,810	26,990	8,549	336,349

OPERATION TEAPOT
COST REPORT
DEPARTMENT OF DEFENSE PARTICIPATION

Program & Project No.	Program and Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	MILITARY EFFECTS (Cont'd.)				
3	STRUCTURES				
3.1	Response of Equipment in the Precursor Zone	$ 78,238	409	689	79,336
3.2	Study of Drag Loading of Structures in and out of the Precursor Zone	32,297	20,258	2,882	55,437
3.3.1	Underground Structures	12,335	29,907	9,259	51,501
3.3.2	Underground Structures	10,026	14,761	434	25,221
3.4	Effects of Air Blasts on Buried Structures	20,516	7,465	536	28,517
3.6	Evaluation of Earth Cover as Protection to Above-Ground Structures	3,671	18,227		21,898
3.7	Effect of Load Duration on Structural Response	66,398	161,502	1,471	229,371
3.8	Test of Concrete Panels	1,501	22,944	114	24,559
3.9	Response of Petroleum Storage Tanks		1,813		1,813
3.10.1	Structures Instrumentation	67,143	1,709	2,952	71,804
3.99	Common to Structures			1	1
	Total Cost Program 3	$292,125	278,995	18,338	589,458
5	AIRCRAFT STRUCTURES				
5.1	Destructive Loads on Aircraft in Flight	$1,768,043	4,053	6,660	1,778,756
5.2	Thermal Effects on Fighter Type Aircraft in Flight	196,382	5,708	895	202,985
5.4	Effects of Nuclear Explosion on Ballistic Missiles	1,273	25,362	1,225	27,860
5.5	Effects of Nuclear Explosion on Aircraft Components		35,354	7,271	42,625
5.99	Common to Aircraft Structures			24	24
	Total Cost Program 5	$1,965,698	70,477	16,075	2,052,250

OPERATION TEAPOT
COST REPORT
DEPARTMENT OF DEFENSE PARTICIPATION

Program & Project No.	Program and Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	MILITARY EFFECTS (Cont'd.)				
6	Service Equipment and Operations				
6.1.1	Evaluation of Military Radiac Equipment	$ 9,299		83	9,382
6.1.2	Evaluation of Military Radiac Equipment	5,868		9	5,877
6.2	Effects on Selected Components and Materials			1	1
6.3	Field Test of a Detonation Locator	95,068		2,981	98,049
6.4	Test of IBDA Equipment	9,764			9,764
6.5	Test of Airborne Radar as IBDA Equipment				-0-
6.99	Common to Service Equipment and Operations			45	45
	Total Cost Program 6	$ 119,999	-0-	3,119	123,118
8	Thermal Measurements and Effects				
8.1	Measurement of Direct and Ground Reflected Thermal Radiation at Altitude	$ 4,158		675	4,833
8.2	High Altitude Measurements	139,990			139,990
8.3	Thermal Radiation Attenuating Cloud Studies	110,983	13,262	1,877	126,122
8.4	Basic Thermal Radiation Measurements	176,950	45,323	3,599	225,872
8.99	Common to Thermal Measurements and Effects			113	113
	Total Cost Program 8	$ 432,081	58,585	6,264	496,930
9	General Test Items - Scientific				
9.1	Thermal Photography	$ 184,151	25,561	3,967	213,679
9.2	Timing Signals	124,510	56,305	169	180,984
9.3	Soil Stabilization and Ground Surface Preparations		360,770	5,311	366,081
9.4	Atomic Cloud Growth Studies	63,271	2,625	6,134	72,030
9.5	Power Supply for Technical Projects			327	327
9.6	Special Meteorological Measurements				-0-
9.99	Common to General Test Items - Scientific			160	160
	Total Cost Program 9	$ 371,932	445,261	16,068	833,261

OPERATION TEAPOT
COST REPORT
DEPARTMENT OF DEFENSE PARTICIPATION

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	ITEMS COMMON TO DOD ACTIVITIES				
50	Items Common to Scientific Programs (Thru 9)				
50.1	Special Device			35	35
50.2	Met Tower		192,328	2,724	195,052
50.5	Other Test Area Requirements	41,739	3,208	42,774	87,721
	Total Cost Program 50	$ 41,739	195,536	45,533	282,808
51	Items Common to Logistical Operations				
51.1	Supplies and Materials			352,168	352,168
51.2	Personnel and Equipment Assistance (Camp Mercury)		284	417,171	417,455
51.3	Generator Repair			3,782	3,782
51.4	Overhead-Joint Rec. & Shipping Facility			3,413	3,413
51.5	Packing and Crating			351	351
51.6	Communications			26,116	26,116
51.7	Rehab. & Alt. Of Real Property (Camp Mercury)		54,741	15,049	69,790
51.8	Roads		72,204	6,697	78,901
51.9	Targets		20,489	296	20,785
51.10	Smoke for Targets				-0-
51.11	Flood Control			25,083	25,083
	Total Cost Program 51	$	147,718	850,126	997,844
52	DOD Operational Training				
52.1	Army			85	85
52.2	Navy				-0-
52.3	TAC		202	1,797	1,999
52.4	Marine			55	55
52.6	AF			2,174	2,174
52.12	USMC				-0-
	Total Cost Program 52	$ -0-	202	4,111	4,313
	Total Cost Incurred, May 31, 1955	$4,287,263	1,560,062	1,010,481	6,857,806
	Estimate to Complete	50,758	-0-	45,000	95,758
	Total Cost Incurred and Estimated	$4,338,021	1,560,062	1,055,481	6,953,564

OPERATION TEAPOT
COST REPORT
DEPARTMENT OF DEFENSE PARTICIPATION

FUNDING SUMMARY

	Weapons Development	Military Effects	Civil Effects	Total
Costs Incurred Directly by DOD		$4,541,279		$4,541,279
Work Performed by AEC on Reimbursable Basis		2,412,285		2,412,285
Total DOD Cost		$6,953,564		$6,953,564

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OPERATION TEAPOT
COST REPORT
FEDERAL CIVIL DEFENSE ADMINISTRATION PARTICIPATION

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	CIVIL EFFECTS				
31	Response of Residential, Commercial, Industrial Structures & Materials to Nuclear Effects				
31.1	Damage to Conventional and Special Types of Residences Exposed to Nuclear Effects		183,705	8,534	192,239
31.2	Damage to Commercial, Institutional, and Industrial Structures and Contents Exposed to Nuclear Effects		43,552	6,870	50,422
31.3	Structural Behavior of Components of Commercial and Industrial Structures under Blast Loadings			54	54
31.4	Comparison Slab Test		23,297	2,628	25,925
31.5	Thermal Ignition and Response of Materials			5,412	5,412
31.6	Methods of Determining Yields and Location of Nuclear Explosions			3,415	3,415
31.99	Common to Program 31	21,379		658	22,037
	Total Cost Program 31	21,379	250,554	27,571	299,504
32	Exposure of Foods and Foodstuffs to Nuclear Explosions				
32.1	The Effects on Bulk Staples			12	12
32.2	The Effects on Canned Foods			219	219
32.99	Common to Program 32			8,016	8,016
	Total Cost Program 32	-0-	-0-	8,247	8,247
34	Shelters for Civil Populations				
34.1a	Evaluation of Indoor Home-Shelters Exposed to Nuclear Effects	2,777	32,698	2,649	38,124
34.1b	Evaluation of Outdoor Family-Shelters Exposed to Nuclear Effects	13,883	5,918		19,801
34.3	Structural Behavior of Group Shelters Under Various Blast Loadings	9,718	130,861	28,645	169,224
34.99	Common to Program 34			43	43
	Total Cost Program 34	26,378	169,477	31,337	227,192

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OPERATION TEAPOT
COST REPORT
FEDERAL CIVIL DEFENSE ADMINISTRATION PARTICIPATION

Schedule A-3

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	CIVIL EFFECTS (Cont'd)				
35	Utilities, Services, and Associated Equipment Exposed to Nuclear Explosion				
35.1	Electric Utilities		22,030	7,051	29,081
35.2	Communications Equipment		6,872	3,227	10,099
35.4	Industrial and Domestic Gas Storage and Distribution		14,879	7,967	22,846
35.4a	Industrial and Domestic Gas Storage and Distribution - Natural and Manufactured Gas		12,975		12,975
35.99	Common to Program 35	4,610		1,012	5,622
	Total Cost Program 35	4,610	56,756	19,257	80,623
36	Mobile Housing & Emergency Vehicles				
36.2	Operational Use of Civil Defense Emergency Vehicles			181	181
36.99	Common to Program 36	11,762		3,068	14,830
	Total Cost Program 36	11,762	-0-	3,249	15,011
38	Civil Defense RADEF Studies				
38.1	Civil Defense Monitoring Techniques			364	364
38.2	Indoctrination and Training of RADEF Personnel			66	66
38.3	Evaluation of Civil Defense RADEF Instruments			253	253
38.99	Common to Program 38	13,913		2,892	16,805
	Total Cost Program 38	13,913	-0-	3,575	17,488
39	Program Instrumentation & Photography				
39.2	Static & Dynamic Overpressure Measurements	16,660	4,718	10,903	32,281
39.3	Thermal Radiation Measurements	5,294	-0-	-0-	5,294
39.4	Technical Photography	44,116	15,709	11,760	71,585
39.99	Common to Program 39			805	805
	Total Cost Program 39	66,070	20,427	23,468	109,965

OPERATION TEAPOT
COST REPORT
FEDERAL CIVIL DEFENSE ADMINISTRATION PARTICIPATION

Program & Project No.	Program & Project Title	Scientific Operations	Expendable Construction	Logistical Operations	Total
	COMMON TO FCDA ACTIVITIES				
70	Scientific Programs				
70.99	Common to Scientific Programs			19,031	19,031
	Total Cost Program 70	-0-	-0-	19,031	19,031
71	FCDA Demonstrations & Observers Program				
71.99	Common to Demonstrations & Obserers Program			60,999	60,999
	Total Cost Program 71	-0-	-0-	60,999	60,999
	Total Cost Incurred, May 31, 1955	144,112	497,214	196,734	838,060
	Estimate to Complete	24,300	-0-	15,000	39,300
	Total Cost Incurred and Estimated	$ 168,412	$ 497,214	$ 211,734	$877,360

FUNDING SUMMARY

	Weapons Development	Military Effects	Civil Effects	Total
Cost Incurred Directly by FCDA			$ 51,664	$ 51,664
Work Performed by AEC on Reimbursable Basis			825,696	825,696
Total FCDA Cost			$ 877,360	$877,360

CHAPTER 3 AEC COST REPORTS

3.1

The AEC Cost Report for Full Scale Test Activity, Exhibit B, presents all the Operation Teapot costs reported against the AEC Full Scale Test Budget together with related reimbursable work. Supporting schedules B-1 - Test Planning and Evaluation, B-2 - Expendable Test Facilities, and B-3 - Test Site Operations present costs by participating organization, detailed by AEC Cost Budget Category and the functions and sub-functions comprising each category.

3.2

The Net Cost Incurred by AEC, as reported on Exhibit B, includes cost of reimbursable work performed for AEC by other Federal Agencies but does not include:

a. The cost of experimental weapons used in Tests, except for standard Weapons Components diverted from current production

b. Any permanent capital cost or depreciation of capital assets

c. Any share of AEC administrative program costs

d. Non-reimbursable services and materials furnished by other Federal Agencies

EXHIBIT 3

OPERATION TEAPOT
COST REPORT
AEC FULL SCALE TEST ACTIVITY

SUMMARY BY COST-BUDGET CATEGORY

Cost-Budget Category	University of California (LASL)	University of California (UCRL)	Sandia Corporation	Reynolds Elec & Engr Company	Mason&Hanger Silas Mason Company	Edgerton Germeshausen & Grier	Naval Research Laboratory	Other AEC Organizations 2/	Total
3810 TEST PLANNING & EVALUATION (Schedule B-1)									
Gross Costs	$ 1,116,940	$ 1,079,173	$ 771,004			$ 1,666,827	$ 647,771	$ 134,998	$ 5,415,713
Less: Reimbursable Work - DOD			10,966			353,013	139,990		503,969
Reimbursable Work - FCDA			43,038			49,410			92,448
Net Costs Incurred by AEC to May 31, 1955	1,116,940	1,079,173	717,000			1,264,404	507,781	134,998	4,820,296
Add: Estimated Cost to Complete	129,660	57,650	10,869			115,700	49,830	94,827	458,536
Net Costs Incurred and Estimated	1,246,600	1,136,823	727,869	$ -0-	$ -0-	1,330,104	557,611	229,825	5,278,832
3820 EXPENDABLE TEST FACILITIES (Schedule B-2)									
Gross Costs				$ 5,154,928	$ 3,501,794 1/				8,656,722
Less: Reimbursable Work - DOD				1,102,185	457,877				1,560,062
Reimbursable Work - FCDA				312,550	184,664				497,214
Net Costs Incurred by AEC to May 31, 1955				3,740,193	2,859,253				6,599,446
Add: Estimated Cost to Complete				-0-	-0-				-0-
Net Costs Incurred and Estimated				3,740,193	2,859,253				6,599,446
3830 TEST SITE OPERATIONS (Schedule B-3)									
Field Office Administration (Schedule B-3a)								213,120	213,120
Maintenance of Test Site (Schedule B-3b)				868,915 3/					868,915
Operation of Test Site - Net (Schedule B-3c)				715,505 3/				107,026	822,531
Security (Schedule B-3d)				98,292				538,350	636,642
Scientific Program Support (Schedule B-3e)				1,857,514	164,352			15,102	2,036,968
Gross Costs				3,540,226	164,352			873,598	4,578,176
Less: Reimbursable Work - DOD				223,570	28,925				252,495
Reimbursable Work - FCDA				188,474	8,260				196,734
Net Cost Incurred by AEC to May 31, 1955				3,128,182	127,167			873,598	4,128,947
Add: Estimated Cost to Complete				234,300	5,233			74,376	313,909
Net Costs Incurred and Estimated				3,362,482	132,400			947,974	4,442,856
TOTAL COSTS	1,116,940	1,079,173	771,004	8,695,154	3,666,146	1,666,827	647,771	1,008,596	18,651,611
Less: Total Reimbursable Work - DOD			10,966	1,325,755	486,802	353,013	139,990		2,316,526
Total Reimbursable Work - FCDA			43,038	501,024	192,924	49,410			786,396
Net Cost Incurred by AEC to May 31, 1955	1,116,940	1,079,173	717,000	6,868,375	2,986,420	1,264,404	507,781	1,008,596	15,548,689
Add: Total Estimated Cost to Complete	129,660	57,650	10,869	234,300	5,233	115,700	49,830	169,203	772,445
Net Cost Incurred and Estimated	$ 1,246,600	$ 1,136,823	$ 727,869	$ 7,102,675	$ 2,991,653	$ 1,380,104	$ 557,611	$ 1,177,799	$ 16,321,134

MEMORANDUM

Prior Year Cost included in Cost Above (See Schedules B-1,2 and 3 for detail by Cost-Budget Category)			$ 93,193	$ 241,403	$ 118,129	$ 109,682	$ 7,911	$ 1,399	$ 572,017
6000 Biology & Medicine Program Work Performed by 3000 Program (Weapons) Contractors - (Assistance of SFO Weapons Contractors on Biology & Medicine Studies Conducted in Connection with Full Scale Test Operations)	$ 6,250	$ -0-	$ 105,355	$ 94,620	$ 7,413	$ 33,622	$ -0-	$ -0-	$ 2[illegible]

1/ Includes Lump Sum Construction Contractor Costs of $2,992,322.
2/ Includes Unit Price Housing, Messing and Security Contract Costs.
3/ Excludes $55,392 reported as Undistributed Cost in Category 10300 on the May 31, 1955 Cost-Budget Report.

OPERATION TEAPOT
COST REPORT
AEC FULL SCALE TEST ACTIVITY

3810 - TEST PLANNING AND EVALUATION

Program No.	Scientific Program Title	University of California (LASL)	University of California (UCRL)	Sandia Corporation	Edgerton Germeshausen & Grier	Naval Research Laboratory	Miscellaneous SFOO	Total
1	BLAST PRESSURE MEASUREMENTS			$ 131,135				$ 131,135
8	THERMAL MEASUREMENTS & EFFECTS					$ 139,990		139,990
9	GENERAL TEST ITEMS - SCIENTIFIC				$ 353,013			353,013
10	HYDRODYNAMIC YIELD	$ 46,811						46,811
11	RADIOCHEMISTRY	302,855						302,855
12	EXTERNAL NEUTRON MEASUREMENTS	127,941						127,941
13	GAMMA RAY MEASUREMENTS	246,554			537,953			784,507
14	IR MEASUREMENTS			98,937				98,937
15	PHOTOPHYSICS	57,125			285,787			342,912
16	REACTION HISTORY	288,843						288,843
18	THERMAL RADIATION & SPECTROSCOPY	46,811				507,781		554,592
21	RADIO CHEMISTRY		$ 209,934					209,934
22	HISTORY OF THE REACTION		615,667					615,667
23	SCIENTIFIC PHOTOGRAPHY		76,593		137,851			214,444
24	EXTERNAL NEUTRON MEASUREMENTS		36,177					36,177
34	SHELTERS FOR CIVIL POPULATIONS			26,378				26,378
39	PROGRAM INSTRUMENTATION AND PHOTOGRAPHY			16,660	49,410			66,070
61	COMMON TO UCRL SCIENTIFIC PROGRAMS & PROJECTS		140,802	9,104				149,906
63	COMMON TO AEC SCIENTIFIC PROGRAMS & PROJECTS			121,708				121,708
80	COMMON TO OPERATION AEC - OFFICE OF THE MANAGER			130,924			$ 28,403	159,327
81	COMMON TO OPERATION AEC - OFFICE OF TEST DIRECTOR			236,158	302,813			538,971
82	COMMON TO OPERATION AEC - OFFICE OF SUPPORT DIRECTOR						1/ 106,595	106,595
	TOTAL - TEST PLANNING & EVALUATION	1,116,940	1,079,173	771,004	1,666,827	647,771	134,998	5,416,713
	LESS: REIMBURSABLE WORK - DOD			10,966	353,013	139,990		503,969
	REIMBURSABLE WORK - FCDA			43,038	49,410			92,448
	NET COST INCURRED BY AEC - MAY 31, 1955	1,116,940	1,079,173	717,000	1,264,404	507,781	134,998	4,820,296
	ADD: ESTIMATED COST TO COMPLETE	129,660	57,650	10,869	115,700	49,830	94,827	458,536
	NET COST INCURRED AND ESTIMATED	$ 1,246,600	$ 1,136,823	$ 727,869	$ 1,380,104	$ 557,611	$ 229,825	$ 5,278,832
	PRIOR YEAR COST INCLUDED IN COST ABOVE	$ -0-	$ -0-	$ 93,193	$ 109,682	$ 7,911	$ 3,399	$ 214,185

Notes:
1/ Represents costs incurred by Public Health Service.

Schedule B-[illegible]
Page 1 of 3

OPERATION TEAPOT
COST REPORT
AEC FULL SCALE TEST ACTIVITY
EXPENDABLE TEST FACILITIES

Area	Description	Decontamination	Towers	Scientific Stations & Structures	Cable & Trenching	Other	Total Cost	Total by Contractor: Reynolds Elec. & Engr. Co.	Total by Contractor: Mason - Hanger Silas Mason Co.	Fixed Price Contracts
General	Rehabilitation of Signal Lines in CP Area				$ 29,664		$ 29,664	$ 27,495	$ 2,169	
	Station 311			$ 139,831			139,831	19,245	17,849	$ 102,737
	Power & Signal to Station 311				16,777		16,777		1,219	15,558
	Power & Signal to Station 372				12,363		12,363		811	11,552
	Road to Station 311					$ 24,509	24,509	24,028	481	
	Experimental Water Well No. 7					81,952	81,952		13,012	68,940
	Miscellaneous Additions at CP			48,558	22,403	975	70,946	66,510	4,436	
	Roads & Paved Areas					19,994	19,994	18,750	1,244	
	Observers' Areas					11,687	11,687	10,765	922	
	All Other		$ 11,954	[illegible]	32,521	[illegible]	78,036	37,567	29,339	11,130
	TOTAL AEC COST - GENERAL AREA		$ 11,954	$ 219,310	$ 92,726	$[illegible],767	$ 435,759	$ [illegible],360	$ 71,182	$ [illegible],217
1	Miscellaneous Additions to/and Rehabilitation of Power, Signal, Timing and Telephone Systems				$ 57,339		$ 57,339	$ 54,465	$ 2,874	
	500 Foot Tower, including strengthening		$420,678				420,678	5,511	23,584	$ 391,583
	Seven 300 foot pipes on Tower and Three Vacuum pumps on pipes.			$ 232,734			232,734		4,084	228,650
	Structure 390-Photographic Bunker			145,741			145,741	146,425	5,316	
	Area Paving					$ 49,820	49,820		1,625	48,195
	Structure 304			16,460			16,460	527	1,377	14,556
	Structure 1-490			31,306			31,306	29,436	1,870	
	Modifications to Structure 1-380			83,591			83,591	81,011	2,580	
	Modifications to Stations 301, 302, 303, 304 and 482			24,056			24,056	22,813	1,243	
	Decontamination - Area and Steel	$ 27,124					27,124	26,562	562	
	Baffles - Station 1-15			19,853			19,853	18,525	1,328	
	All other			9,664		7,777	17,441	16,347	1,094	
	TOTAL AEC COST - AREA 1	$ 27,124	$420,678	$ 563,405	$ 57,339	$ 57,597	$1,126,143	$ 395,622	$ 47,537	$ 682,984
2	Cable and Trenching for Power, Signal and Telephone				$341,575		$ 341,575	$ 330,730	$ 4,845	
	Tower Observation and Instrumentation		$ 62,514				62,514	16,719	45,795	
	Decontamination	$ 22,804					22,804	21,871	933	
	500 Foot Tower including Foundation and Detector Pit		261,528				261,528	68,906	20,738	$ 171,884
	Structure 380			$ 77,076			77,076	18,165	6,606	52,307
	Mod. and/or Rehab. to Structures 2-53, 300, 301, 302 and 303			15,730			15,730	15,059	671	
	Power and Transformer Vaults, Stations 2-55 and 61			23,867			23,867	23,613	254	
	Miscellaneous Station 2-22			21,401			21,401	20,173	1,228	
	Road Construction and Repair					$ 13,527	13,527	13,193	334	
	All Other			3,354			3,354	3,299	55	
	TOTAL AEC COST-AREA 2	$ 22,804	$324,042	$ 141,428	$341,575	$ 13,527	$ 843,370	$ 537,728	$ 81,457	$ 224,19[illegible]
3	Signal and Telephone Line Additions				$ 42,890		$ 42,890	$ 39,255	$ 3,635	
	Rehabilitate Power, Signal, Timing and Telephone Cable				14,752		14,752	13,097	1,655	
	300 Foot Triangular Tower		$157,600				157,600	4,028	5,683	$ 147,889
	Cable and Trenching				10,147		10,147	9,145	1,002	
	Mod. and/or Rehab. of Structures, 3-53, 54, 55a, 300, 301, 302, 303			$ 21,983			21,983	20,712	1,271	
	Decontamination	$ 14,416					14,416	13,555	861	
	All other			3,199		$ 9,447	12,646	11,773	873	
	TOTAL AEC-COST AREA 3	$ 14,416	$157,600	$ 25,182	$ 67,789	$ 9,447	$ 279,434	$ 116,565	$ 14,980	$ 147,889

Schedule B-2
Page 2 of 3

OPERATION TEAPOT
COST REPORT
AEC FULL SCALE TEST ACTIVITY
EXPENDABLE TEST FACILITIES

Area	Description	Decontamination	Towers	Scientific Stations & Structures	Cable & Trenching	Other	Total Cost	Total by Contractor: Reynolds Elec. & Engr. Co.	Total by Contractor: Mason - Hanger Silas Mason Co.	Fixed Price Contracts
3A	Decontamination	$ 12,419					$ 12,419	$ 12,419		
	300-Foot Tower		$ 141,991				141,991	8,761	$ 6,638	$ 126,592
	Structure 304-A			$ 32,303			32,303	15,085	2,676	14,542
	Cable & Trenching				$ 53,346		53,346	51,900	1,446	
	Observation & Instrumentation, 300 Ft. Tower		6,964				6,964		6,964	
	Additions & Rehab. Power, Signal, Timing & Telephone Cable				10,062		10,062	9,574	38	
	Road Construction and Repair					$ 12,381	12,381	12,083	298	
	All other			6,958		3,127	10,085	9,036	1,049	
	TOTAL AEC COST - AREA 3A	$ 12,419	$ 148,955	$ 39,261	$ 63,408	$ 15,508	$ 279,551	$ 119,258	$ 19,159	$ 141,134
4	Decontamination	$ 20,036					$ 20,036	$ 19,316	$ 720	
	Structure 390			$ 143,764			143,764	138,656	5,108	
	Collimating Baffles			57,797			57,797		657	$ 57,140
	Cable and Trenching				$ 99,829		99,829	97,101	2,728	
	Structure 330			90,521			90,521	80,546	9,975	
	500 Foot Tower and Foundation		$ 220,452				220,452	40,050	17,011	163,391
	Structure 16A - Detector Pit			279,587			279,587	267,668	11,919	
	Detector Station 30A			28,640			28,640	13,164	836	14,640
	Miscellaneous Additions to and Rehab. of Power, Signal, Timing and Telephone System				67,098		67,098	63,108	3,990	
	Vacuum Line			129,925			129,925		4,655	125,270
	Modification to Station 4			60,656			60,656	58,869	1,787	
	Modification and/or Rehab. of Stations 4-300, 301, 302, 303, 357, 380 and 482			120,182			120,182	116,486	3,696	
	All Other			8,537		$ 23,000	31,537	27,834	3,703	
	TOTAL AEC COST - AREA 4	$ 20,036	$ 220,452	$ 919,609	$ 166,927	$ 23,000	$ 1,350,324	$ 922,798	$ 66,785	$ 360,441
7	Modification of Structure 300			$ 70,787			$ 70,787	$ 68,986	$ 1,801	
	(2) 500 Foot Towers		$ 478,951				478,951	196,721	24,174	$ 258,056
	Structures 301A, 302, 303, 304A and 305A			90,364			90,364		6,094	84,270
	Cable and Trenching				$ 382,536		382,536	378,740	3,796	
	Trenching and Pipe from 7-300				55,299		55,299	54,355	944	
	Additions to Structures 301A, 302, 303, 304A and 305A			20,713			20,711	20,343	364	
	Miscellaneous Additions to and Rehab. of Power, Signal, Timing and Telephone System				32,252		32,252	29,745	2,507	
	Road Construction and Repair					$ 23,497	23,497	23,022	475	
	All other	$ 10,370		3,523		7,395	21,288	19,944	1,344	
	TOTAL AEC COST - AREA 7	$ 10,370	$ 478,951	$ 185,385	$ 470,087	$ 30,892	$ 1,175,685	$ 791,856	$ 41,503	$ 342,326
9	(2) 300 Foot Towers (9B & 9C)		$ 257,614				$ 257,614	$ 23,967	$ 10,530	$ 223,117
	Structure 300			$ 163,324			163,324	17,580	11,934	133,810
	Detector Pits			36,216			36,216	34,795	1,421	
	Cable and Trenching				$ 48,068		48,068	48,068		
	Additions to Telephone & Signal Lines				317,771		317,771	314,428	3,343	
	Structures 24, 53, 55A and 356			67,663			67,663	65,868	1,795	
	Miscellaneous Additions to Power System			35,059		$ 10,911	45,970	45,367	603	
	All Other			41,198		1,856	43,054	38,913	4,141	
	TOTAL AEC COST-AREA 9		$ 257,614	$ 343,460	$ 365,839	$ 12,767	$ 979,680	$ 558,986	$ 33,767	$ 356,927
10	Power and Signal Additions				$ 24,759		$ 24,759	$ 24,576	$ 183	
	TOTAL AEC COST - AREA 10				$ 24,759		$ 24,759	$ 24,576	$ 183	

Schedule B-2

Page 3 of 3

OPERATION TEAPOT
COST REPORT
AEC FULL SCALE TEST ACTIVITY
EXPENDABLE TEST FACILITIES

Area	Description	Decon-tamination	Towers	Scientific Stations & Structures	Cable & Trenching	Other	Total Cost	Total by Contractor: Reynolds Elec.&Engr. Co.	Total by Contractor: Mason - Hanger Silas Mason Co.	Fixed Price Contracts
F										
	Structure 304			$ 24,906			$ 24,906	$ 8,744	$ 1,610	$ 14,552
	Miscellaneous Additions to Power System			776	$ 15,200	$ 8,430	24,406	24,154	252	
	All Other			4,959	298	466	5,723	5,546	177	
	TOTAL AEC COST - AREA F			$ 30,641	$ 15,498	$ 8,896	$ 55,035	$ 38,444	$ 2,039	$ 14,552
	TOTAL AEC CONSTRUCTION - ALL AREAS	$ 107,169	$ 2,020,246	$ 2,481,681	$ 1,665,949	$ 324,401	$ 6,599,446	$ 1/ 1,740,193	$ 2/ 378,552	$ 2,480,661
	Reimbursable Construction:									
	DOD		$ 177,411	$ 778,828	$ 114,550	$ 489,273	$ 1,560,062	$ 1,102,185	$ 97,390	$ 360,486
	FCDA			480,896	16,318		497,214	312,550	33,489	151,175
	TOTAL REIMBURSABLE CONSTRUCTION		$ 177,411	$ 1,259,724	$ 130,868	$ 489,273	$ 2,057,276	$ 1,414,735	$ 130,880	$ 511,661
	GRAND TOTAL EXPENDABLE CONSTRUCTION	$ 107,169	$ 2,197,657	$ 3,741,405	$ 1,796,817	$ 813,674	$ 8,656,722	$ 5,154,928	$ 509,472	$ 2,992,322

1/ Includes prior year cost of $192,375 and excludes $126,354 of non-Teapot cost.

2/ Includes prior year cost of $103,893 and excludes $22,886 of non-Teapot cost.

CORRECTION NOTICE

REPORT OF THE TEST MANAGER
JOINT TEST ORGANIZATION
OPERATION TEAPOT

Chapter 3 - AEC Cost Reports

Please enter correct amounts as listed below:

	(LVFO) Olympic Housing & Feeding Cont.	Total
Schedule B-3c		
Operation of Test Site		
Gross Expenses		
Cafeteria	$391,001	$412,107
Housing	132,762	273,560
Cash Revenues		
Cafeteria	$347,901	$347,901
Housing	151,651	151,651

Corrections made - 21 Sep 55

OPERATION TEAPOT
COST REPORT
AEC FULL SCALE TEST ACTIVITY

SCHEDULE B-3
Page 1 of 2

TEST SITE OPERATIONS
July 1, 1954 to June 30, 1955

Schedule B-3a	Las Vegas Field Office
Field Office Administration	
Total Cost Incurred May 31, 1955	$ 213,120
Estimated Cost to Complete	18,900
Total Cost Incurred & Estimated	$ 232,020

Schedule B-3b	Reynolds Elec & Engr. Co.
Maintenance of Test Site	
Water	$ 30,992
Steam	30,107
Electricity	30,833
Permanent Buildings	235,691
Temporary Buildings	148,820
Roads & Parking Areas	132,127
Communications - Radio	206,851
Communications - Telephone & Other	10,973
Sewerage	3,563
Expendable Test Facilities	38,958
Total Maintenance Incurred May 31, 1955	868,915
Estimated Cost to Complete	71,100
Total Cost Incurred & Estimated	$ 940,015

Schedule B-3c	Reynolds Elec & Engr. Co.	(LVFO) Olympic Housing & Feeding Cont.	Total
Operation of Test Site			
Gross Expenses			
Water	$ 25,423		$ 25,423
Steam	98,227		98,227
Electricity	170,284		170,284
Cafeteria	21,106	$ 132,762	~~153,868~~ 412,107
Housing	140,798	391,001	~~531,799~~ 275,560
Fire Department		43,990	43,990
Police Department		20,160	20,160
Janitorial Services		18,665	18,665
Buildings Other than Messing & Housing	56,280		56,280
Refuse Collection & Disposal	56,265		56,265
Sewerage	8,642		8,642
Communications - Radio	83,734		83,734
Communications - Telephone & Other	131,769		131,769
First Aid & Pest Control	48,899		48,899
Safety & Fire	30,946		30,946
Vehicle Operations	(171,485)		(171,485)
Miscellaneous	18,273		18,273
Total Gross Expenses	1/ 719,161	2/ 606,578	1,325,739
Cash Revenues			
Cafeteria		151,651	151,651
Housing		347,901	347,901
Miscellaneous	3,656		3,656
Total Cash Revenues	3,656	499,552	503,208
Net Operations Cost Incurred May 31, 1955	715,505	107,026	822,531
Add: Estimated Cost to Complete	80,000	15,471	95,471
Total Cost Incurred & Estimated	$ 795,505	$ 122,497	$ 918,002

1/ Cash Reimbursable work of $74,666 and $7,732 Reimbursable work performed for Camp Desert Rock excluded from this cost as not being applicable to Operation Teapot.

2/ $1,750 cost excluded as not being applicable to Operation Teapot.

TEST SITE OPERATIONS (CON'D)
July 1, 1954 to June 30, 1955

Schedule B-3d	Reynolds Elec. & Engr. Co.	(LVFO) Federal Services Inc.	Total
Security			
Guard Force			
Total Man Hours 131,736.3	xxx	xxx	xxx
Cost per hour $ 3.355	xxx	xxx	xxx
Total Guard Force	xxx	$ 441,928	$ 441,928
Pass Office			
Total Man Hours 30,296.3	xxx	xxx	xxx
Cost per hour $ 3.137	xxx	xxx	xxx
Total Pass Office	xxx	95,040	95,040
Vehicle Support	$ 56,918	xxx	56,918
Other	41,374	1,382	42,756
Total Cost Incurred to May 31, 1955	98,292	538,350	636,642
Estimated Cost to Complete	4,700	40,005	44,705
Total Security Cost Incurred & Estimated	$ 102,992	$ 578,355	$ 681,347

Schedule B-3e	Mason & Hanger Silas Mason Company	Reynolds Elec. & Engr. Co.	Las Vegas Field Office	Total
Scientific Program Support				
LASL Programs & Projects	$ 21,003	$ 467,993		$ 488,996
UCRL Programs & Projects	4,338	230,441		234,779
Common to All AEC Programs and Projects	22,107	162,033		184,140
Common to Operations	79,719	585,003	$ 15,102	679,824
Department of Defense	28,925	223,570		252,495
Federal Civil Defense Admin.	8,260	188,474		196,734
Total Cost Incurred to May 31, 1955	1/ 164,352	2/ 1,857,514	15,102	2,036,968
Less: Reimbursable Work DOD	28,925	223,570		252,495
Reimbursable Work FCDA	8,260	188,474		196,734
Net Cost Incurred	127,167	1,445,470	15,102	1,587,739
Add: Estimated Cost to Complete	5,233	78,500		83,733
Total Support Cost Incurred & Estimated	$ 132,400	$ 1,523,970	$ 15,102	$ 1,671,472

1/ Includes F/Y 1954 cost of 14,536.

2/ Includes F/Y 1954 cost of $49,028 and excludes $56,270 Reimbursable Work performed for Sandia Corporation and GMX-6 not applicable to Operation Teapot, and $5,997 Reimbursable Work performed for DOD on interim services.