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Atomic age training camp: The historical archaeology of Camp Desert Rock

Susan Edwards
University of Nevada, Las Vegas

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ATOMIC AGE TRAINING CAMP: THE HISTORICAL ARCHAEOLOGY OF CAMP DESERT ROCK

by

Susan Edwards

A thesis submitted in partial fulfillment
of the requirements for the degree of

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in

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Department of Anthropology and Ethnic Studies
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The Thesis of Susan Edwards for the degree of Master of Arts in Anthropology is approved.

Chairperson, Claude N. Warren, Ph.D.

Examining Committee Member, William G. Johnson, Ph.D.

Examining Committee Member, Malvin L. Miranda, Ph.D.

Graduate Faculty Representative, Roberta B. Williams, Ph.D.

Dean of the Graduate College, Ronald Smith, Ph.D.

University of Nevada, Las Vegas
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ABSTRACT

Located in the southeast corner of the Nevada Test Site, Camp Desert Rock was established in 1951 when U.S. military leaders decided American ground troops needed physical and psychological training in the tactics of atomic warfare. For the next six years, Camp Desert Rock was home for the nearly 60,000 soldiers that participated in military maneuvers held during atmospheric nuclear weapons testing. With the end of atmospheric testing, the camp was partially dismantled and abandoned.

The focus of this thesis was to identify and describe the material remains of Camp Desert Rock and to test the utility of Robert Schuyler's historic ethnographic approach for the investigation of Cold War related archaeological sites. A synthesis of three different yet complementary data sets (archaeological, historical, and anthropological) was employed to develop the appropriate context for the interpretation of the camp and to define its place in history.

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CHAPTER 1

INTRODUCTION

Located in the southeast corner of the Nevada Test Site (NTS), Camp Desert Rock was established in 1951 when U.S. military leaders decided American ground troops needed physical and psychological training in the tactics of atomic warfare (Figure 1). For the next six years, the camp was home for the nearly 60,000 soldiers that participated in military maneuvers and ground observer programs during atmospheric atomic weapons testing. Camp Desert Rock was abandoned when above ground nuclear testing ended. Its buildings were eventually dismantled and moved to other locations. Today, the camp appears as a sterile expanse of desert dotted with rock-lined tent platforms, concrete foundations, and trash scatters surrounded by creosote bush and bursage. Although visually unimposing, this site is rich with the history of America's nuclear weapons development and testing program. As America's only land-based atomic training facility, the camp can provide a unique insight into Cold War culture.

In recent years, the closure of many military bases and other Cold War related facilities combined with the growth of the environmental restoration

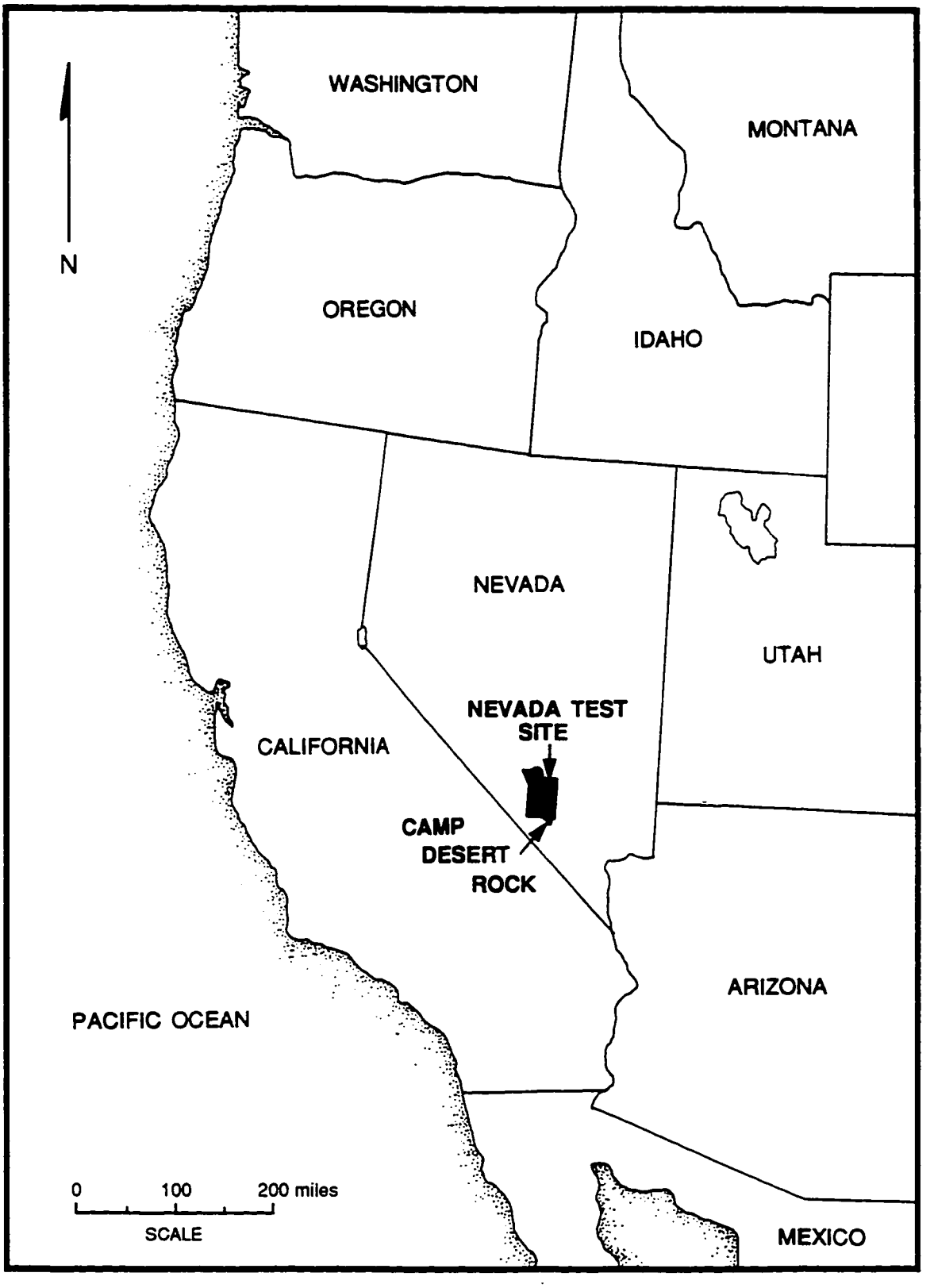

Figure 1. Location of the Nevada Test Site and Camp Desert Rock.

movement has created a wave of cultural resource management related archaeological research on sites less than 50 years old (Chatters 1992; Stapp et al. 1995; Young 1996). Typically, sites of this age and subject matter have been outside the focus of archaeological investigations. An unfamiliarity with the geographic scale, structure, and information content of Cold War sites as well as the lack of a comparative data base creates special problems. Therefore, the challenge for archaeologists involved in the management of these sites is to find an appropriate means for their evaluation, analysis, and interpretation.

The Camp Desert Rock site provides an opportunity to explore methods for the study of Cold War cultural resources, as well as contribute to a comparative database. The focus of this thesis will be to identify and describe the material remains of Camp Desert Rock and to test the utility of Robert Schuyler's (1988) historic ethnographic approach for the investigation of Cold War related archaeological sites. As Schuyler observes, researchers dealing with modern sites frequently have three different yet complementary data sets available for interpretation - the archaeological, the historical and the anthropological. Unfortunately, many archaeological investigations either ignore the written and ethnographic records completely or fail in their meaningful integration. Schuyler argues that the cultural information inherent in a site will remain inaccessible unless an appropriate interpretive context is developed through the integration of the full range of data sources. By comparing and contrasting the three data sets, I have generated a

comprehensive contextual framework for the interpretation of the material culture of Camp Desert Rock as well as identify the strengths and weaknesses of the historical ethnographic methodology.

The research strategy consisted of four phases. Initially, archival records were searched for information pertaining to the establishment and development of the camp. Sources investigated included government documents, engineering records, maps, articles from the popular press (i.e. newspapers and magazines), historic photographs, and secondary sources focusing on historical and political interpretations of the early Cold War period and issues concerning atomic veterans. The data obtained from the documentary records were used to develop the historical framework that directed the field work. In phase two, field reconnaissance was conducted to determine the extent of the camp's physical remains and to identify any unique characteristics. Phase three consisted of interviews with individuals who were once based at Camp Desert Rock and participated in the military exercises associated with atmospheric testing. These oral histories focused on the physical nature of the camp and how these individuals interacted with their physical surroundings on a daily basis. Finally, phase four combined the three data sets (archaeological, historical and anthropological) to produce a synthesis of Camp Desert Rock and explain its place in history.

CHAPTER 2

METHODOLOGICAL ORIENTATION

Introduction

Recognized as a formal field of inquiry a brief thirty years ago, Historical Archaeology, like most scholarly disciplines, has had a somewhat stormy history. At the 1967 Conference on Historic Sites Archaeology, researchers engaged in the investigation of historic sites with existing documentary and material remains struggled to define the parameters of their discipline. For more than fifty years preceding that meeting and in the three decades that have followed, questions of self-definition and intellectual orientation have continued to command the attention of those working in the field. Many individuals, both past and present, have participated in the ongoing methodological and theoretical debate and have influenced the special character of Historical Archaeology as we know it today.

In order to understand the current status of the discipline and understand why a broader methodological foundation is desperately needed, I will briefly summarize the evolution and establishment of Historical Archaeology as a formal discipline. Against this general background, Schuyler's (1988) historic

ethnographic method will be examined. In addition, the methodology used to collect and analyze the Camp Desert Rock data will be described.

The Growth and Development of Historical Archaeology

It is unclear precisely when the notion appeared that some level of cooperation between history and archaeology might be useful in the investigation of American history, but Carl Russell Fish was probably the first to articulate the need for such an approach. As early as 1910, Fish (1910) examined the relationship between the "science" of archaeology and history. In a paper presented before the Wisconsin Archaeological Society, he defined archaeology as the "scientific study of human remains and monuments," and suggested that,

> The first duty of the archaeologists is to discover such material and to verify it; the next is to secure its preservation, preferably its actual tangible preservation - but if that is not possible, by description. Then comes the task of studying it, classifying and arranging it, and making it ready for use. At this point the function of the archaeologist ceases, and the duty of the historian begins - to interpret it, and to bring it into harmony with the recognized body of information regarding the past. It is not necessary in every case, that different individuals do these different things.
>
> We must not press specialization too far. Nearly every historian should be something of an archaeologist, and every archaeologist should be something of an historian. When the archaeologist ceases from the preparation of his material, and begins reconstruction of the past, he commences to act as an historian; he has to call up a new range of equipment, a new set of qualifications (Fish 1910 reprinted in Schuyler 1979a:8).

In the above statement, we find the first evidence of the history vs. archaeology debate. The roots of what comes to be identified as the "historicalist" position

are found in the idea that archaeology is simply a useful recovery technique, while history provides the interpretive framework to give the material remains meaning.

This attitude became intimately linked to governmental programs of the 1930s under Roosevelt's New Deal public works projects. The primary objective of the Works Progress Administration and the Civilian Conservation Corps was to keep large numbers of individuals employed in programs that would benefit the public at large. Restoration and preservation oriented projects were deemed publicly beneficial. Government agencies viewed archaeology as a useful tool for satisfying their objectives. At the time, no one challenged this assumption (Schuyler 1975:46).

The restoration/preservation theme established by the governmental programs of the 1930s continued through the post-war years. The idea that archaeology was only good for filling museum cases or providing illustrations for historical monographs prevailed throughout the 1950s and into the early 1960s. Traditional American historians were inherently skeptical of non-documentary records. From their perspective, archaeological material could not really contribute on a level comparable to historical information because it could never be as complete as documentary records (Schuyler 1975:130-131).

During this period, the "archaeology as a handmaiden to history" orientation dominated historic sites research. J.C. Harrington and Noel Hume, individuals closely allied to the restoration movement, became the leading

spokesmen for the historicalist position. They proposed that history serve as the appropriate focus for the discipline's growth.

> . . . the discipline properly belongs to American history and the future development of special curricula along this line in universities should be in the history departments. When we are able to convince historians generally that archaeology really has something to contribute to the study of American history, progress will, I am hopeful, be made in this direction (Harrington 1955:128-129).

Despite these urgings, historical archaeology remained academically adrift until the late-1960s. History departments continually rebuffed all attempts to link degree programs in historical archaeology to them. Anthropology departments also failed to capitalize on this opportunity. Most archaeologists were still interested solely in prehistory. The historical projects that did come along were overwhelmingly restoration/preservation oriented. Most were one-time terminal projects, providing little incentive to the archaeologists to develop a specific expertise in historic sites investigation. The researchers either failed to recognize or simply ignored the potential of historical archaeology as a testing ground for archaeological method and theory (Schuyler 1975:132-136).

The apparent apathy on the part of archaeologists changed dramatically in the mid-1960s. Much of the change can be attributed to the turmoil created by the "new archaeology." Essentially a reaction against the old school of culture history and descriptive investigations, concepts from the new archaeology were adopted by some archaeologists involved in historic sites research. Researchers including Lewis Binford, Stanley South, Charles Cleland, and Robert Schuyler, rejected the basic tenets of the historicalist position. They

accused historians of being overly subjective, particularistic, "fact grubbers." History lacked broad explanatory potential because of its "non-scientific" use of inductive reasoning and individualistic orientation. In contrast, the "anthropological" approach to historical archaeology had much more to offer because of its more objective, "scientific" orientation. Archaeology was characterized as a process-oriented discipline which utilized deductive reasoning to search for general theories and laws. Implied in this approach is the notion that, because archaeology is a "science," its methodology and theoretical constructs are inherently superior.

Under these rather volatile conditions, historical archaeology was established as a formal discipline with the founding of the Society for Historical Archaeology in 1967. The "processual" paradigm of the 1970s fueled the reactionism against humanistic-historic scholarship and the pattern of restoration that so totally dominated the preceding years began to shift toward work focused on scholarly or "scientific" questions. During this period, the primary stated goal of historical archaeology would be the testing of archaeological methodology and theory against historical data (Cleland and Fitting 1978).

Since the founding of historical archaeology as a formal discipline, the field has generated a massive body of descriptive literature. Historical archaeologists became fairly skilled at adapting general archaeology method and theory to historic sites while expanding their control and knowledge of historic assemblages. Viewed from within, the discipline seems relatively

successful in pursuing its goals of reconstructing and interpreting historic sites. However, from an external vantage point, the discipline does not appear very productive. It is rare to find data derived from historical archaeology investigations incorporated into general social scientific or historical scholarship. Historical archaeology's impact has been negligible outside the discipline. Whether the topic is acculturation, geographical expansionism, the industrial revolution, twentieth century urbanism or global economic systems, historians and even social anthropologists ignore the results of historical archaeological research. The question of why must be asked.

Throughout the 1970s and early 1980s, the anthropological position gained momentum at the expense of the historicalists. Historical archaeology, no longer an academic orphan, was firmly linked to anthropology departments. The historicalist legacy lost much of its influence over the discipline and its dwindling impact goes a long way in explaining the present day condition of the field (Schuyler 1988). While there were pleas for a blending of the two intellectual orientations (Cleland and Fitting 1978; Deetz 1983; Fontana 1978; Schuyler 1978b; South 1977), historic site research came to focus almost exclusively on the material remains. Documentary records were often neglected. When textual sources were consulted, the archaeological remains structured the use of the written materials. By ignoring this albeit different yet equally important data source, historical archaeologists effectively limited the usefulness of their investigations.

By the mid-1980s, many researchers working on historic sites recognized

serious shortcomings in archaeology's processual orientation and rejection of culture history as a valid interpretive approach. This realization ushered in another active period in the discipline's continuing cycle of self-examination. A series of articles focusing on the current status and appropriate future directions for the discipline came out of a plenary session at the 1987 Society of Historical Archaeology Conference (Honerkamp 1988:5). The articles were an attempt to redefine the questions that should concern historical archaeologists and clarify methodological and theoretical approaches in order to move the discipline forward and prevent stagnation.

The participants in this plenary session (Charles Cleland, Kathleen Deagan, Mark Leone, Steve Mrozowski, Robert Schuyler, and Stanley South) helped set the tone and direction for much of the current activity in the field. Recognizing that capitalist and global forces have greatly influenced the development of all historical sites in the Americas, they reiterated that the focus of historical archaeology in the New World should be on the post-A.D. 1500 world cultural systems and the processes of their operation. In addition, historical archaeologists needed to develop a methodology specifically designed to take advantage of the multiple categories of data available for historic sites research. Toward this end, the discipline should resurrect the functionalist concept of culture history and employ it to develop the broad contextual foundation required for meaningful interpretation. Only when the various data sources are subjected to equal, objective analyses against an appropriate contextual framework can historical archaeology begin to contribute

to general scholarship.

Apparently, many researchers took the recommendations of that plenary session to heart. In the decade that followed, historical archaeologists have produced a substantial number of well-planned, multidisciplinary research projects. Although archaeology and anthropology remain the dominant partners in terms of methodology and theoretical framework, much of the best recent work in historical archaeology relies as much on documentary, geographical or oral history data as on archaeological data for its interpretations (e.g., Leone and Shackel 1990; Lewis 1984; Purser 1987, 1992; Yentsch 1994). Researchers have also become more adept at integrating questions of scholarly significance with the public oriented goals promoted by local, state, and federal agencies. And governmental agencies are somewhat more cognizant of the needs of researchers and an obligation to contribute to scientific knowledge. Examples of the integration of scientific and humanistic intellectual orientations include everything from the investigations at Spanish St. Augustine (Deagan and Scardaville 1985), where investigators have managed to strike a balance between scholarship, restoration, and preservation, to the Riverside Chinese Project (Great Basin Foundation 1987), which incorporated both academically trained personal and the local populace.

After a somewhat stormy adolescence, historical archaeology appears to have a promising future although many of the studies are still produced for internal consumption. As researchers learn to deal more effectively and objectively with non-archaeological data sources, the discipline's contributions

to general scholarship will increase. A growing emphasis on urban renewal and environmental restoration projects across the country provides a unique opportunity for individuals engaged in historic sites research. Multidisciplinary investigations of relatively recent sites (i.e., sites less than 50 years old) means that archaeologists will have new avenues of interpretation and new challenges to meet.

The Historic Ethnographic Approach

Conservatively defined as a subdiscipline of archaeology that seeks to understand human activity in *any time or place* for which historical documentation exists, New World historical archaeology generally focuses on the period between the "first" European contact (i.e., A.D. 1492) and the early decades of the twentieth century. Only recently have archaeologists turned their attention to the study of recent (Wood 1992) and even contemporary material culture (Rathje 1979; Rathje and Murphy 1992; Schiffer 1991). Traditionally contemporary cultural behavior investigations of industrialized societies have been undertaken by sociologists or social historians. Because of this, the studies have usually focused almost exclusively on written data sources. Oral traditions or oral history have played an ancillary role in these investigations with archaeological data being completely neglected. It is argued that historical archaeology can bring a fresh perspective to the investigation of recent cultural behavior and the historic ethnographic methodology proposed by Robert Schuyler (1988) will facilitate the development of a much broader-based

contextual framework for the interpretation of recent cultural phenomenon.

Schuyler (1988:37-38) suggests that the growth of historical archaeology as a recognized field of research should follow a three-staged progression. Speaking in terms of phases, he argues that the discipline has already advanced through Phase I - a period characterized by the establishment of a new and distinctive field of research. Phase II, the period which the discipline is currently struggling to enter, should consist of the integration of descriptive and interpretive archaeological research with general scholarship. During this period, the scale of the investigations should for practical reasons concentrate on the site level of analysis. The final phase is marked by comparative studies or as Schuyler identifies it "historic ethnology." Phase III will only be reached when a sufficient body of integrated research exists at the site level of analysis.

As Schuyler suggests, the debate over the establishment and development of historical archaeology as a legitimate subdiscipline of anthropology is essentially finished. However, much discussion continues concerning the appropriate methodological approaches and theoretical directions needed to move the discipline forward into Phase II and make historical archaeological investigations more meaningful. Schuyler recognized the need for the development of a methodology specifically designed to incorporate the multiple data sets available to historical archaeologists early on. In his article, "The Spoken Word, the Written Word, Observed Behavior and Preserved Behavior," (Schuyler 1978c), he made a plea for the elimination of traditional disciplinary boundaries that discourage the exchange of information,

methodology, and theory. Historical archaeology enjoys a unique position because of "its simultaneous access to multiple categories of evidence bearing upon the same processes or events in past human behavior (either immediately or remotely in the past)" (Deagan 1988:7). This allows historical archaeology to make contributions not duplicable by any of the other social sciences. The discipline reflects the dual lineage of both history and anthropology "inheriting the capability to address historical or scientific questions, and to use historical or scientific methods" (Deagan 1988:7). Depending on the research questions and chronological framework used in the investigation of archaeological sites, many different data sources can assist in the interpretation of the archaeological record.

Schuyler (1988:40) argues that one productive method for joining archaeological research with general scholarship is what he terms "historic ethnography." This methodology for investigating historic sites would involve three components. First, the research should recognize that *context* is crucial. For the historical archaeologist, culture comes in the form of cohesive, functional units delimited by temporal and spatial boundaries, "not as disembodied variables or processes, nor decontextualized research topics" such as class conflict or urbanism's influence on ethnicity (Schuyler 1988:40). Second, culture can only be understood if the concept of culture is consistent and holistic. By this Schuyler means that culture should not be limited to only material or symbolic phenomenon. Technology, economy, socio-political structures and ideology must be accepted as equally important aspects of

culture. In addition, culture must be seen to exist in all types of data sources. Culture is not simply equal to people or human mental processes. All kinds of data, archaeological, written, and oral, carry cultural meaning. By employing the broadest definition of culture and utilizing the widest range of data sources, a richer and more meaningful cultural context can be developed. Finally, the historic ethnographic method requires a clear theoretical orientation and an explanation of how it is used in the research design.

Clearly, the focus of the historic ethnography method is on a functional and holistic definition of culture and a renewed interest in contextual studies. In advocating a return to functionalism and the reestablishment of a culture historic core, Schuyler provides historic ethnography as an antidote for the "psuedo-processual" studies of the 1970s and early 1980s. At the core of the historic ethnographic approach is the recognition that archaeologists too often mishandle the written record and oral testimony. Schuyler emphasizes the analysis of both archaeological and textual sources using an anthropological perspective. It is only by returning to our anthropological roots and employing this unique perspective to the analysis of written and oral data sources that we can hope to contribute new interpretations that would be of interest to other scholars.

A serious weakness on the part of historical archaeologists has been in dealing with or failing to deal with non-archaeological data sources. When written documentation exists it is sometimes ignored or used without a critical analysis of its inherent biases. Frequently, the documentary or oral history data

are not integrated into the conclusions of archaeological reports. If we attempt to extract from documents and oral testimony only information that concerns things found in the archaeological record then we limit our ability to interpret the cultural significance of the material remains and sever the links that make the material remains relevant to the interpretation of broad historical questions (Stone 1988:68). If textual and oral documentation is to be used effectively, historical archaeologists must view these data sources as equal to archaeological information rather than supplemental.

Barbara Little (1992:1-2) echoes many of Schuyler's arguments pointing out that all archaeology (even prehistoric) is text-aided to some degree. Documents, oral testimony, and ethnographic descriptions contribute to the development of an appropriate context for interpretation. If the goal of archaeology is to understand and explain human cultural behavior in both the past and the present through the study of material culture, then researchers must be willing to challenge the traditional narrowly conceived definition of "historical archaeology." She suggests that the definition of material culture needs to be expanded to include not only objects but text and oral tradition as well. We need to be concerned with how the documentary and oral history records are formed just as much as the archaeological record.

To operationalize Schuyler's historical ethnographic method it is necessary to understand how he views the difference between archaeology and history and the framework against which he evaluates the various data sources. As previously discussed, the debate over the relationship between

archaeology, anthropology and history began in the 1960s and although interest in the debate has waned in the intervening decades, there are still several unresolved problems. Some researchers (e.g., Deagan 1988; Little 1992; Schuyler 1988) believe these lingering questions have prevented the discipline from making more substantial contributions to general scholarship. Most of these difficulties revolve around the differences in the academic traditions of historians and archaeologists. While both disciplines are interested in reconstructing the past the emphasis and reference point for their investigations differ. The primary areas of divergence between the two involve at least the following three aspects. First, history investigates a specific subject as a legitimate end in itself while social science searches for generalizations through the study of a specific subject. History appreciates the singularity of historical events. In contrast, social science seeks to simplify and generalize by grouping similar phenomena. Lastly, the focus of historical research is on humans as individuals or groups. In anthropology and archaeology, the focus is culture. While the differences between history and archaeology are real, they do not create a dichotomy. The historical and social scientific orientations should be viewed as complementary rather than contradictory. History can and should be much more than a documentary narrative. The goal of many historians is not simply to produce particularistic studies. Through an examination of specific events, individuals, or social phenomena they seek to describe and explain "man in relation to his surroundings" (Braudel 1980:3). Historical archaeology is more than the quantification of archaeological data or the discovery of patterns.

Through a critical examination of the documentary record, a context may be developed by which other data sources can be evaluated and interpreted.

Originally discussed in his early theoretical research, Schuyler (1978c) suggests that there are two perspectives from which to approach the study of humans - the etic approach and the emic approach. Etic analyses involve the direct or indirect observation of human behavior. In contrast, emic studies use the views and beliefs that the subjects hold concerning their own behavior. However the two approaches are not mutually exclusive and they may be combined to include both etic and emic elements (1978c:269). The context in which the data sources are found influence the level to which etic or emic information may be accessed. If a contemporary subject is the focus of investigation (the traditional research area of cultural anthropologists and sociologists) then the researcher may directly observe the behavior, artifacts and use of the artifacts of the group or individual under study. Through participant observation, informants, or questionnaires, he may also directly examine the values and beliefs of his subjects. If the subject of investigation concerns past human behavior or events (the traditional focus of archaeologists and historians), then etic and emic information comes to the researcher indirectly through data preserved in the archaeological record, the documentary record and in human memory (Schuyler 1978c:269).

The data sources (Table 1) available to the historical archaeologists can be categorized as etic, emic or a combination of the two (Schuyler 1978c:273). Archaeological data is almost always etic in nature since artifacts provide direct

Table 1. Data Contexts Available to Historical Archaeologists (adapted from Schuyler 1978b:273).

	ETIC (BEHAVIOR)	EMIC (CONCEPTS)
ARCHAEOLOGICAL CONTEXT	Directly Available	Indirectly Available
HISTORICAL/DOCUMENTARY CONTEXT	Indirectly Available	Directly Available
ORAL HISTORY CONTEXT	Indirectly Available	Indirectly Available
ETHNOGRAPHIC CONTEXT	Directly Available	Directly Available

evidence of human behavior. Although emic information may be present, Schuyler argues that the emic element is uninterpretable since "artifacts don't speak." The emic aspect of material remains can only be studied if there is some documentation or a direct historical or general ethnographic analogy (Schuyler 1978c:269). However, other researchers disagree with this interpretation of the emic aspect of archaeological data. They suggest that information on the beliefs and value systems of a culture are reflected by patterns observable in the cultural materials (Deetz 1977:151; Rathje 1979:5-6,12).

Documentary data, the traditional domain of historians, can be subjected to both etic and emic analysis. At the etic level, documents serve as an indirect record of human behavior. In addition, documents contain emic information by directly reflecting the values and beliefs of the individual and society that produced the written material (1978c:269-270). However, all documents also reflect to various degrees the biases held by the author(s) and must therefore

be evaluated in that context. Oral history information also contains both etic and emic data, but neither are directly available to the researcher. The beliefs and values of the informant always filter and distort the past memories to some degree. Information concerning past cultural behavior and concepts may be screened through both the past and present beliefs of the informant. This does not make the data provided by oral history inferior to other information sources, simply different. Ethnographic data provides direct evidence of both etic and emic aspects, but this type of information is usually not available to historical archaeologist. When available, the theoretical and methodological biases of the ethnographer and its impact on the investigation must be considered.

Clearly, Schuyler believes that the key to the analysis of any data source, be it archaeological, documentary, oral, or ethnographic, is context. Barbara Little (1992:2) suggests that additional divisions within Schuyler's emic and etic data categories would be particularly helpful in expanding the contextual framework for evaluating the intent of the source and thereby identifying potential biases. With regard to textual material, Little contends that any data categorization scheme needs to take into account a document's source and the influence of the source on the document's intention, tone, and scope. As an example, she cites Pitt's (1972) documentary classification system that expands on the usual divisions of primary and secondary sources. Using nine categories, Little has adapted Pitt's typology to classify different types of written and oral records according to their source of origin (Table 2). The listing of specific sources is by no means complete and is meant only to provide

examples of the range of historical resources available. The classification of data by its source of origin not only aids researchers in locating potential historical sources, it also provides a framework for determining what types of opinions and priorities the source might embody.

Oral narrative provides researchers with another form of primary data that holds great potential for the interpretation of material culture. Several types of orally transmitted information exists - oral history, oral tradition, and folklore - may be available for investigation. Oral history may be defined as the reminiscences about which the narrator has first-hand knowledge (Baum 1987:1). Oral tradition involves the verbal transmission of cultural elements handed down from one generation to the next (Pentikainen 1978:238). Folklore consists of all the myths, fairytales, superstitions, riddles, and games of a culture. Typically, folklore is orally transmitted, but it may also be written (Dundes 1965). Because the focus of most historical archaeology is on sites more than 50 years old, research usually involves oral tradition rather than oral history. However, researchers investigating recent historic sites often have access to living informants with first-hand knowledge of the activities and events that occurred there.

The systematic use of oral narrative in archaeological investigations is relatively new and researchers are still struggling to integrate the techniques of oral historians. Oral narrative serves as a bridge between the documentary record and the archaeological record adding a unique dimension to historic sites investigations. On a particularistic level, oral history, oral tradition, and

Table 2. Categories of Historical Data Sources (adapted from Little 1992:3).

CATEGORY	SPECIFIC SOURCE
PUBLIC AND OFFICIAL ARCHIVES	all government documents such as reports, memoranda, meeting minutes, journals, commissioned histories, court records, policy documents, political records, military records, site records
MISSION AND CHURCH SOURCES	parish records, church journals, correspondence
BUSINESS AND COMPANY SOURCES	business records such as account books, inventories, personnel records, union records, insurance files, correspondence, contracts, reports
SCHOLARLY INSTITUTIONS (SCHOOLS, MUSEUMS, LIBRARIES)	collections and unpublished notes, interpretive monographs, autobiographies
LETTERS, DIARIES, PRIVATE PAPERS	personal correspondence, journals, ledgers, photo albums, memorabilia
LITERATURE	travelers' accounts, poetry, fiction, etiquette books
TRANSIENT DOCUMENTS	newspapers, brochures, pamphlets, directories, magazines, catalogs
LOCAL SOURCES AND OPINIONS	folk history, oral traditions, oral history
MAPS, PICTORIAL, SOUND ARCHIVES	maps, photographs, markings on artifacts, blueprints, drawings, monuments, tape/video recordings

folklore provide another perspective for the study of the material aspects of culture in their behavioral context by illuminating the form, manufacture, distribution, meaning, and use of artifacts or sites (Deetz 1970:123). On a more

general level, oral history has the potential to explain the relationships between objects and their broader social and material context allowing insights into the social, economic, political and ideological orientation of the informant and the community to which he belongs. The first level focuses on the definition of material culture, while the second level provides the contextual matrix necessary to analyze and explain it. Oral history's most significant contribution to historical archaeology may be the way it opens up our discipline to a wide range of alternative interpretations of past objects, places and technologies and their relevance to the present (Purser 1992:32). These differences force the archaeologist to come to terms with discontinuity, ambiguity, and disagreement as well as conformity and validation (Leone and Crosby 1987).

Attention needs to be given to the processes of eliciting, collecting, and interpreting oral history. Just as written documents contain the values and biases of their authors so too do oral histories. Because they are a collaborative process, oral narratives embody the past and present values and beliefs of the informant, but their content is also shaped by the biases and research agendas of the investigator. Oral historians can "ask questions which we know our respondents are going to want to answer, and they begin to give us answers which they know we are going to want to hear" (Grele 1985:203). The product of oral history is not simply a cultural report but rather a cultural construction with the information reported always a construction of the interviewer as well as of the informant (Yow 1994:1-2).

The relationships between documentary, oral and archaeological

evidence can be characterized in one of two ways. The different data sets may be viewed as "interdependent and complementary or as independent and contradictory" (Little 1992:4). Either approach or a combination of the two is valid depending on the goals and theoretical orientation of the research. Margaret Purser's investigation of 19th-century Paradise Valley, Nevada (1987, 1992) effectively illustrates the dual nature of the relationship within and between data sets. While gathering oral histories from area residents, she found her informants providing similar facts but giving them very different meanings. The discrepancies between the informants' stories reflect significant differences between each individual's perception of fact and effectively demonstrate that context and interpretation rather than "facts" are the essence of history.

Methodology

A wide variety of documentary evidence, including both primary and secondary sources, has been employed to develop an accurate historical context against which to reconstruct the historical background of Camp Desert Rock. Primary materials related to Camp Desert Rock fall mainly into the category of "public and official documents." The Department of Energy's (DOE) Coordination and Information Center (CIC) located in Las Vegas curates a vast collection of primary materials related to the U.S. nuclear weapons testing and energy development programs. A database search of their collections was undertaken and revealed that their holdings (as of January 1996) include 1,014 documents related to Camp Desert Rock and the military exercises held at the

NTS. These documents range from mundane single-paged memos to multi-volume commissioned histories. Since time constraints would not allow for the review of all of the materials, a 10 percent, non-random sample was selected. The 100+ items selected for examination were chosen by reviewing the abstracts and/or titles for all 1,014 database entries and ranking each item. Additional materials from the CIC holdings were used to develop background context related to the establishment of the NTS, the Atomic Energy Commission's (AEC) atmospheric nuclear testing program, and post-1957 AEC/DOE activities that might have impacted the Camp Desert Rock site.

Criteria utilized in the document selection process included a) subject matter, b) date of document, and c) type of document. Subject matter was the crucial element in the sampling process. Because of the archaeological focus of this research, titles or abstracts that suggested the document might contain specific information concerning the physical composition of the camp or data related to daily camp operations were ranked highest. Documents related to AEC policies and radioactive fallout patterns were ranked lowest. Record dates were used to ensure that documents reflecting the camp's full period of occupation were selected. Documents were also ranked according to type such as reports, operational plans, schedules, letters, memos, maps, photographs, etc. Maps and reports or operational plans with photos received the highest rating.

Because historic maps and photographs can contribute so much to archaeological investigations, a special effort was made to obtain these

resources. Both the historical context and archaeological context section of the study incorporate information derived from maps, photographs, and raw film footage obtained from the Engineering and Records Library in Mercury, Nevada, the Remote Sensing Laboratory in Las Vegas, and the Still Picture and Motion Picture Branches of the National Archives in Maryland.

Newspapers and contemporary magazine articles provide another form of primary information. Hundreds of articles and numerous photographs depicting Camp Desert Rock personnel and activities appeared in Nevada newspapers between 1951 and 1957. As with the CIC documents, time restrictions made it impossible to review all the local newspaper articles about the camp. Issues from a single paper, the Las Vegas Review-Journal, the largest local newspaper, were reviewed for the years 1951-1958. Information from this source was used to develop the physical description of the camp as well as general background.

While there are no secondary sources which focus exclusively on Camp Desert Rock, more than a dozen monographs have been produced concerning the plight of America's atomic veterans and civilians exposed to radioactive fallout. Many of these books include sections devoted to the oral accounts of Camp Desert Rock soldiers as well as the history of America's atmospheric nuclear weapons testing program. Whenever appropriate, information for these sources was incorporated into the historical context. There are also numerous secondary sources available on the technological development of atomic weapons, the evolution of American nuclear policies, and post-World War II

U.S. military doctrine. Because all of these topics directly relate to the establishment of Camp Desert Rock and the atomic military exercises, data derived from these studies were employed to broaden the scope of the historical setting.

Five individuals participated in the oral history portion of this investigation. Three were Camp Desert Rock veterans, another was the wife of a Desert Rock veteran, and the last was a former NTS engineer. The methodology for the oral histories followed the guidelines suggested by the Idaho Oral History Center (Ericson and Morton-Keithley 1993) and the human research policies of the University of Nevada, Las Vegas.

All the informants were initially contacted by telephone or letter and asked if they would be interested in providing oral history information for inclusion in a Master's thesis on the historical archaeology of Camp Desert Rock. They were given information on the purpose of the project, the method for recording the oral history, the amount of time involved, and the final disposition of the tapes and transcripts resulting from the interview. After receiving verbal or written consent, telephone or in-person interviews were scheduled with each of the participants. Prior to or at the time of the initial interview, each informant and the interviewer signed a "gift of deed" (release) form allowing the interview materials to be deposited with the James R. Dickinson Library, Special Collections, University of Nevada, Las Vegas. The informants were also given general biographic data forms to complete if they chose. The interviews were recorded on standard 60-minute cassettes. Written transcripts of the interview

were subject to a final review by the informant. Information derived from these interviews was employed to develop both the historical and archaeological interpretive contexts.

The archaeological fieldwork proposed for Camp Desert Rock was relatively straightforward consisting of pedestrian survey, mapping, and photographic and written documentation of the site. No collection or subsurface testing was done. The goals of the fieldwork were 1) to determine the accuracy of the historic maps and the written descriptions of the camp facilities; 2) to identify and document features not shown on existing maps (i.e., trash areas, paths, roads, tent pads, rock alignments, etc.); 3) to identify and document the location and types of artifacts that remain at the site; and 4) to identify and document the impact more recent construction activities (i.e., expansion of the airstrip, construction of a weather station) have had on the camp.

To accomplish these objectives, a ground reconnaissance of the site was conducted. Because Camp Desert Rock covers such a large area, the pedestrian survey was carried out in sections. Manmade features such as roads, pavement, earthen berms, and fence lines were used to designate the various survey areas. Each section was walked using transects spaced at 10 - 30 meter intervals. Ten-meter intervals were employed in the main portion of the camp with more widely spaced transects used in the peripheral areas. The types and general locations of artifacts were noted using the historical maps. Locations of structural remains and other features and areas of disturbance were plotted employing the historical maps and making adjustments when

appropriate. Sketch plans were made of all the concrete foundations and associated rock alignments. Photographs were taken of most of the building foundations, a representative sample of the rock alignments and the various types of artifacts, and all unique or diagnostic features.

The data derived from the archaeological fieldwork was employed to reconstruct the physical composition of the camp and establish a link between the documentary record and the material culture.

CHAPTER 3

HISTORICAL CONTEXT

American Postwar Nuclear Policy

Many factors contributed to the development of American nuclear policy after World War II. Not surprisingly, military and political historians have devoted a great deal of study to this subject (Hewlett and Anderson 1962; Hewlett and Duncan 1969; Hewlett and Holl 1989; Midgley 1986; Rhodes 1995; Rose 1980; Titus 1986). While it is beyond the scope of this thesis to investigate the topic in much detail, a brief summary is required.

Following World War II, the American government faced the decision of how to manage the legacy of its wartime nuclear program. U.S. policy makers opted for a dual approach asserting that the United States should continue development of both military and civilian uses of atomic energy (Titus 1986:22-23). Against this backdrop, Congress passed the Atomic Energy Act in 1946 creating the Atomic Energy Commission (AEC), a civilian-controlled panel charged with overseeing the production and use of nuclear energy in *all* its forms (Hewlett and Anderson 1962:415). From the beginning defense and weapons development programs would dominate the AEC's policy decisions

for the act mandated that the commission's "paramount objective...at all times" would be "assuring the common defense and security [of the nation]." Even before the act took effect in January 1947, defense priorities and security worries were directing American nuclear policy.

Although the combat use of the atomic bomb had effectively ended World War II, American scientists and military strategists actually understood very little about the power and potential effects of nuclear weapons (Titus 1986:38). Concerned by this lack of knowledge and determined to maintain American preeminence in atomic weapons development, U.S. military leaders began a campaign for a full-scale nuclear testing program. The Truman Administration proved receptive to this concept. By mid-1946, the Joint Chiefs of Staff received presidential approval for an atomic weapons development and testing program along with the establishment of a permanent testing site in the South Pacific (Hewlett and Anderson 1962:580-582). The first series of postwar atomic tests, Operation Crossroads, took place at the Pacific Proving Ground (PPG) in the Marshall Islands in July 1946. A second program of testing designated Operation Sandstone followed in 1948.

Establishment of a Continental Test Site

Though pleased with the success of the tests conducted at the PPG, its remote location caused serious logistical and security difficulties for the government. The long-distance efforts needed to coordinate Pacific tests proved costly in both time and money. Under pressure from the scientific laboratories

and the military, the AEC began searching for an alternative testing area closer to home. In 1948 the Armed Forces Special Weapons Project (AFSWP) conducted a top secret study designated "Project Nutmeg" (AFSWP 1948). The investigation's objective was to identify and evaluate suitable locations for a continental test site. To the disappointment of military planners and the nuclear laboratories, the AFSWP report concluded that the physical difficulties and complex domestic political considerations made creation of a continental facility impractical given the current conditions. Based on the report's findings, the AEC decided on continued utilization of the PPG for nuclear testing and advised that a continental test site would only be considered in the case of an emergency (Pike 1949).

However, world affairs changed substantially after the issuance of the Project Nutmeg report. A series of events improved the political climate for the creation of a continental test site. First, the United Soviet Socialist Republic (U.S.S.R.) detonated their first atomic device in September of 1949. The following month, the communist regime of Mao Tse-tung formally took power in Beijing and began making overtures to Moscow concerning a Sino-Soviet alliance. Combined with the outbreak of the Korean War in the summer of 1950, these events rekindled an immediate interest in finding a suitable continental test site (Dean 1950a; U.S. AEC 1950). American military and political leaders feared that the Korean conflict would spread throughout the Far East threatening Pacific shipping lanes and subsequently the PPG.

Working together, the AEC and Department of Defense (DOD) used the

original Project Nutmeg report to assist in the selection process. The five potential locations for the continental testing program included Pamilco Sound/Camp LeJeune, North Carolina; White Sands, New Mexico; Dugway Proving Ground, Utah; an area between Fallon and Eureka, Nevada; and a portion of the Las Vegas-Tonopah Bombing and Gunnery Range northwest of Las Vegas, Nevada. The southern Nevada site was chosen over the others for a variety of reasons (Bradbury 1950; Dean 1950b). The location provided the largest operational area and its proximity to the nuclear development facilities (i.e., Los Alamos Scientific Laboratory (LASL), Sandia Laboratory) made it relatively economical in terms of time and money. Its distance from populated areas and favorable meteorological conditions minimized radioactive fallout concerns. Because the land was already part of a military reservation, there were no jurisdictional difficulties with state or local authorities. This site's isolation also made maintenance of security and secrecy much easier.

The Nevada Proving Ground was created on December 21, 1950 when the AEC and the Air Force signed an agreement surrendering a portion of the Las Vegas Bombing and Gunnery Range to the AEC for the establishment of a permanent test site. The arrangement pleased political leaders, military planners, and the scientific laboratories. With lead times reduced and lower costs, the new test site would allow a faster buildup of the nuclear stockpile, especially of low-yield weapons (Titus 1986:55). This would not only insure continued U.S. nuclear dominance, but would also influence the direction of the Army's evolving tactical nuclear doctrine.

The Evolution of American Tactical Nuclear Doctrine

To understand the evolution of American nuclear doctrine and the role Camp Desert Rock played in its development, it is necessary to differentiate between tactical and strategic atomic weapons. Tactical nuclear weapons are associated with military missions of limited scope that require swift results. They can be characterized as relatively short-range, low-yield weapons deployed in the immediate area of combat in support of a military commander's planned maneuver against enemy forces. In contrast, strategic nuclear weapons are typically employed against one or more selected enemy targets with the purpose of destroying the enemy's war-making capabilities and demoralizing the enemy forces. Strategic weapons are higher yield and depend on long-range delivery systems such as bombers or missiles (Joint Chiefs of Staff 1974: 314, 326). Today both types of weapons are included in America's nuclear stockpile, but this was not always the case.

The development of tactical nuclear weapons after the end of World War II was far from certain. Initially, perceived technological limitations and an inability to predict the potential of these weapons created a reluctance to consider atomic weapons as anything other than "strategic" (Van Cleave and Cohen 1978:3). Several prominent nuclear researchers were skeptical that a tactical atomic arsenal was a viable goal. The distinguished scientist Vannevar Bush stated:

> The atomic bomb cannot be subdivided. This is inherent in the physics of the situation... There will be no shells for guns carrying atomic explosives, nor will they be carried by marine torpedoes or

> small rockets... Atomic bombs will be used only against important targets to which it pays to devote a large effort (Bush 1949:106-107).

The newly formed Air Force supported a continued emphasis on strategic nuclear operations believing that the large destructive force weapons and bomb delivery system they possessed in 1947 were precisely what was needed. Several studies supported this view suggesting that atomic weapons were best suited to strategic bombing and that the Air Force should assume primary responsibility for their development and deployment (Midgley 1986:2). Even the U.S. Army command staff was uncertain on how to employ nuclear weapons in combat. When undertaking the revision of the Army field manuals, Brigadier General Herbert Loper stated, "Show me how to use this weapon tactically. It is not a tactical weapon" (cited in Reinhardt 1964:4).

Viewed against the virtual American nuclear hegemony during the late 1940s, this attitude is not particularly surprising. U.S. atomic development efforts had always focused on large yield devices designed for delivery via long-range bombers. The successful completion of two nuclear test series, Operation Crossroads and Operation Sandstone, in the Pacific reassured American political and military leaders that they were well ahead of the rest of the world in their ability to develop and maintain a strategic nuclear arsenal. There appeared to be little need or support for the development of tactical nuclear weapons. Some individuals even suggested that because of the atomic bomb's destructive power, conventional forms of land and naval warfare would eventually become obsolete.

However, the dramatic changes in the international situation that led to the establishment of a continental test site also contributed to a re-evaluation of U.S. nuclear doctrine. The Soviet Union's successful detonation of an atomic bomb followed by the fall of China to Mao Tse-tung's Communist Party and the outbreak of war on the Korean peninsula created a great deal of turmoil for U.S. military and political strategists. These events, combined with recent technological advances in America's atomic weapons program, stimulated renewed interest in tactical nuclear armaments. The growing interservice rivalry over wartime control of America's atomic stockpile also contributed to an intensification of the tactical nuclear weapons development program as the Army and Navy struggled to redefine their mission in the nuclear age.

Worried about a marginalization of its role in future combat operations, the Army undertook a study to identify viable battlefield applications for nuclear weapons and to establish a doctrine for their tactical use (Rose 1980:84-85). This study resulted in the publication of a field manual devoted to the land combat use of atomic weapons (U.S. Army 1951a). The new Army doctrine encouraged the development of nuclear warfare curriculum at the military colleges and influenced the character and training of American ground troops beginning in 1951. The planning of military atomic training exercises and the establishment of Camp Desert Rock as an atomic warfare indoctrination and training facility clearly reflects the growing importance of tactical nuclear doctrine.

Operation Ranger

Against this background, the first series of atmospheric tests took place at the newly established continental testing facility. An atomic device had not been detonated in the United States since the 1946 Trinity event at Alamogordo, New Mexico, but over 13 days in late January and early February, 1951, five atmospheric tests took place in the Nevada desert (Table 3). Code named Operation Ranger, these shots inaugurated the Nevada Proving Ground (NPG).

Table 3. Summary of Operation Ranger Events (adapted from Maag, Rohrer et al. 1982:4).

SHOT	DATE	LOCAL TIME	LOCATION	TYPE OF DETONATION	YIELD	DESERT ROCK PARTICIPATION
ABLE	01/27/51	0545	Area 5	Airdrop	1 kt	No
BAKER	01/28/51	0552	Area 5	Airdrop	8 kt	No
EASY	02/01/51	0547	Area 5	Airdrop	1 kt	No
BAKER-2	02/01/51	0549	Area 5	Airdrop	8 kt	No
FOX	02/06/51	0547	Area 5	Airdrop	22 kt	No

Surrounded by the gunnery range except along its southern border, the proving ground consisted of two geographic areas, Frenchman Flat and Yucca Flat (Figure 2). Frenchman Flat dominated in the southern portion of the test site and included a large dry lake. Yucca Flat spread across the northern portion of the proving ground and consisted of an extensive desert valley surrounded by mountains. It too contained a dry lake near its southeastern corner. Both of these forward areas would be the site of dozens of atmospheric nuclear

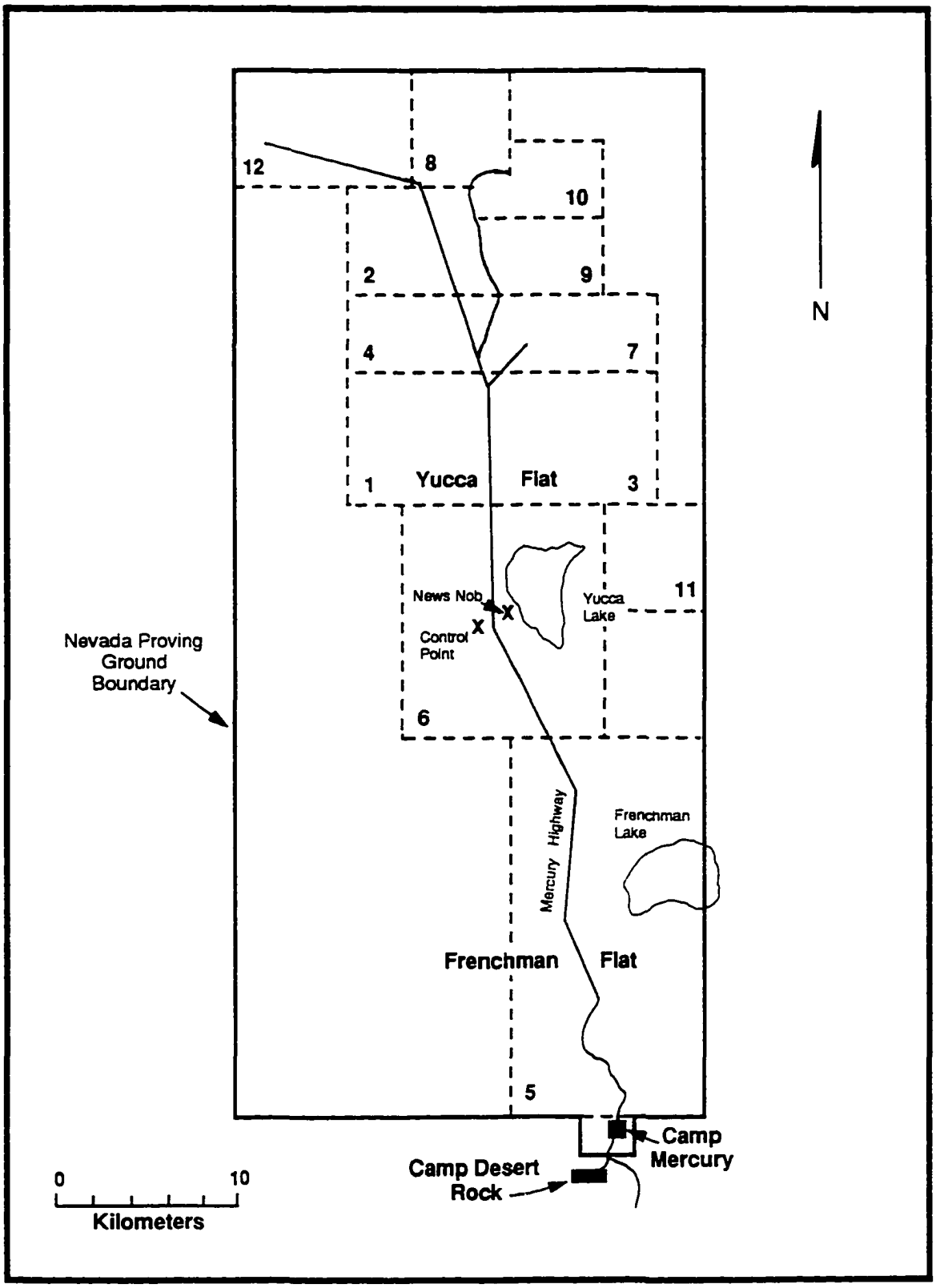

Figure 2. Map of the Nevada Proving Ground showing forward areas, 1951 - 1958.

weapons tests, although only Frenchman Flat was used for the Operation Ranger testing program.

Scientists and military planners scrambled to take full advantage of the first nuclear detonations in 3 years. The last series of events had taken place in the Pacific in 1948 and researchers were anxious to test new weapons designs. The primary objective of the operation was to acquire the necessary design data required to establish design criteria for future weapons development. They were especially interested in evaluating the triggering devices that would be used for the high-yield Operation Greenhouse events scheduled for spring at the PPG (Maag, Rohrer et al. 1982:17). Establishment of the NPG was actually accelerated by the need for LASL scientists to conduct a series of low-yield tests prior to Greenhouse. Researchers set up more than a dozen experiments for each of the shots. Since the Army and Navy were particularly interested in the development of tactical nuclear weapons, military strategists set up experiments under Project Gamma that would focus on weapons effects (Miller 1986:85). They wanted to examine how a nuclear blast would affect various types of military equipment such as machine guns, transport vehicles, and tanks. Military planners were also interested in the impact an atomic detonation would have on field fortifications such as trenches and foxholes. A series of experiments was even set up to evaluate the thermal blast resistance of various types of fabric. These experiments were needed to determine which types of uniforms and tents would afford the most protection (Maag, Rohrer et al. 1982:43-51).

Released over Frenchman Flat, all of the shots were air drops detonated at various heights over the same target. The five shots (ABLE, BAKER, EASY, BAKER-2, and FOX) ranged from 1 kiloton to 22 kilotons (kt) in size. Military officials, pleased with the results of Project Gamma, looked forward to expanded participation in the next test series, Operation Buster-Jangle (Reines 1980).

Operation Buster-Jangle

Divided into two phases, the Operation Buster-Jangle series of atmospheric tests was slated for the fall of 1951. The Buster phase consisted of five low to medium yield events, while the Jangle portion of the series included only two shots (Table 4). The purpose of the second scheduled nuclear testing program at the NTS was to evaluate nuclear devices for possible inclusion in the nation's nuclear arsenal and to improve military tactics, training, and equipment (Ponton, Rohrer, Maag, Shepanek et al. 1982:1).

Exercise Desert Rock I

The groundwork for U.S. ground troop participation in an actual nuclear test had been laid during the summer of 1951. The DOD submitted a proposal to the Military Liaison Committee for a series of military exercises at the new continental test site. After the committee passed the request on to the AEC with a favorable recommendation, the commission chairman approved the proposed operation. It fell to the Sixth U.S. Army Command headquartered at the Presidio

Table 4. Summary of Operation Buster-Jangle Events (adapted from Ponton, Rohrer, Maag, Shepanek et al. 1982:6).

SHOT	PHASE	DATE	LOCAL TIME	LOCATION	TYPE OF DETONATION	YIELD	DESERT ROCK PARTICIPATION
ABLE	Buster	10/22/51	0600	Area 7	Tower	0.1 kt	No
BAKER	Buster	10/28/51	0720	Area 7	Airdrop	3.5 kt	No
CHARLIE	Buster	10/30/51	0700	Area 7	Airdrop	14 kt	No
DOG	Buster	11/01/51	0730	Area 7	Airdrop	21 kt	Yes
EASY	Buster	11/05/51	0830	Area 7	Airdrop	31 kt	No
SUGAR	Jangle	11/19/51	0900	Area 9	Surface	1.2 kt	Yes
UNCLE	Jangle	11/29/51	1200	Area 10	Underground	1.2 kt	Yes

of San Francisco, California to organize the military exercises for the upcoming series of atomic tests. Lieutenant General Joseph M. Swing assumed the role of overall Exercise Supervisor with Major General W.B. Kean taking on-site responsibility as the Exercise Director (U.S. Army 1951b:3).

Scheduled in conjunction with the Buster phase of the Buster-Jangle series, Exercise Desert Rock I was designed to provide realistic training in the tactical aspects of atomic warfare. The original Desert Rock operational plan (U.S. Army 1951c:2-3) specified multiple objectives for the first exercise. The primary goal was to provide the troops with indoctrination training in the tactical use of atomic weapons and in essential physical protection measures. The Army also wanted to indoctrinate selected military personnel and test their psychological reactions to viewing an atomic blast, participating in military maneuvers in the area of the detonation, and to viewing equipment exposed to

the forces of an atomic explosion. Determining what types of special physical protective measures or equipment would be needed against nuclear weapons was another important goal as was evaluating the effects of a nuclear blast on all types of ground forces equipment and field fortifications and, through the use of animals, the probable physical effects on personnel. Finally, the Army wanted to evaluate the effectiveness of current military doctrines and tactical formations, both offensive and defensive, as they applied to the battlefield use of atomic weapons.

To meet these objectives, the Army produced an operational plan that included the establishment of a temporary camp (Camp Desert Rock) adjacent to the NPG, the development of an orientation/indoctrination program for all exercise participants and support service personnel, and the formulation of a battle scenario requiring the utilization of a tactical nuclear weapon. To determine the effectiveness of its training program and motivational methods, the DOD contracted with the Human Resources Research Organization (HumRRO), George Washington University to perform psychological evaluations of the troops. Detailed plans were also developed to test standard military materials, equipment and field emplacements by placing selected items or erecting typical fortifications at various distances from ground zero (GZ).

Local newspaper stories indicated that anywhere from 5,000 to 12,000 soldiers were to participate in the first atomic exercises (Las Vegas Morning Review Journal [LVMRJ] 15 September 1951:1, 20 September 1951:1). However, official documents (U.S. Army 1951c) indicate that approximately

2,800 observers, 2,500 support service troops, 6 ten-man evaluation teams, and an 883-man battalion combat team from the 11th Airborne Division participated in Desert Rock I. The camp and military exercises were managed separately from the AEC test organization. Army personnel staffed and administered Camp Desert Rock which was designated as an installation of the Sixth U.S. Army. In addition to his duties as Exercise Director, General Kean also functioned as the camp commander (Ponton, Rohrer, Maag, and Massie 1982a:14).

Service units, charged with the establishment, maintenance, and operation of Camp Desert Rock, arrived in the camp between September 13 and October 9, 1951 with some of the first units assisting with the initial construction and setup activities. Support service personnel were drawn from bases from across the country (U.S. Army 1951c:4-8). Soldiers from Camp Roberts, California and Fort Lewis, Washington comprised the Headquarters III Corps which provided the Administrative staff for the construction, maintenance, and operation of the base camp and the Operations staff for the planning and execution of the exercise. Adjutant General staff also came from Ft. Lewis as did all of the medical personnel. The Engineering Section was comprised of personnel from Ft. Huachuca, Arizona, Camp Cooke, California, and Fort Lewis. All of the Military Police (MP) came from the 505th MP Battalion stationed at Camp Roberts, California. Ordnance support troops came from Camp Cooke. Soldiers from Fort Lewis and the Utah General Depot manned the Quartermaster Division. Signal Corps personnel came from Camp Cooke and Sacramento Signal Depot, California while units from Camp Stoneman,

California and Camp Roberts provided transportation support. Most of these units arrived via Las Vegas or Indian Springs Air Force Base located 65 miles south and 18 miles east respectively. According to local newspapers (LVMRJ 18 September, 1951:1), "Las Vegas railroad yards were jammed with trucks, jeeps, and other heavy equipment ... to supply the men on the desert training expedition."

These units assisted in the construction of the camp and provided basic services in the camp area such as housing, food service, sanitation, power generation, water supply, medical services, equipment maintenance, communication, transportation, and security. These troops were also responsible for setting up and maintaining a "Visitors Bureau and Camp" area that housed the several thousand observer troops. Support staff officers managed the orientation and indoctrination training for all Exercise Desert Rock personnel (U.S. Army 1951c). Support troops also performed most of the tasks in the forward areas in preparation for Desert Rock activities.

George Younkin (1996), a veteran of the Pacific Theater in World War II, participated in the 1951 Desert Rock exercises. Reactivated when the Korean War broke out in 1950, Younkin returned to the Army Signal Corps as a Second Lieutenant. Stationed at Camp Cooke near Lompoc, California in the fall of 1951, he received temporary duty orders sending him to Camp Desert Rock as part of the 314th Signal Construction Battalion. Arriving on October 15, he was confronted with a typical "field" camp just like the ones he had lived in overseas. The troops resided in squad tents, slept on cots with blankets and ate out of

mess gear. Food preparation took place in rudimentary field kitchens. Latrines were open trenches.

Younkin spent the next two months as part of the Desert Rock support staff although he never worked on the communications systems in the camp. His assigned duties kept him in the forward areas on a daily basis. His company was tasked to construct communication pole lines and lay communication wires throughout the test area. The pole line was part of the weapons effects tests, so the lines didn't actually connect to anything. Younkin recalls that various sections - Ordnance, Quartermaster, Signal Corps, and Engineer - had equipment and fortifications displayed for the weapons effects tests.

The military exercises required a lot of forward area preparation. Signal Corps personnel also set up public address systems in the observation areas and the equipment display positions for pre- and post-shot troop briefings. The Engineering Battalions prepared the equipment display areas and constructed field fortifications. They graded roads and prepared the observer area. The Transportation units maintained the motor pool and provided transport between Camp Desert Rock and the forward areas, 10 or more miles to the north. MP's provided security and traffic control within the camp and in the forward areas for exercise rehearsals and shot-day activities. The Quartermaster Corps supplied the camp, but also equipped exercise troops in the forward areas. Medical units manned the camp dispensary and established first aid stations on Yucca Flat. A special radiological safety unit monitored radiation exposure of equipment and personnel (Ponton, Rohrer, Maag, and Massie 1982a:62-66). While some of the

military support personnel would witness the first three atomic blasts, the troop maneuvers scheduled in conjunction with the fourth event, Shot DOG, would be the centerpiece of the first exercise.

Tactical units from the 11th Airborne Division based at Camp Campbell, Kentucky as well as a small contingent from Fort Lewis, comprised the Battalion Combat Team (BCT). Arriving at Camp Desert Rock between October 14 and 20, 1951, these units received the same general camp orientation and atomic warfare indoctrination as the support and observer troops. However, they also engaged in at least one rehearsal for the tactical exercise several days prior to the actual event (LVMRJ 25 October 1951:1). The BCT was also responsible for preparing a tactical defensive position consisting of foxholes and trenches although these positions would not be occupied at the time of the event (U.S. Army 1951c:13).

The ABLE event, detonated on October 22, was the first tower shot at the NPG. It was followed by two airdrop shots, BAKER and CHARLIE, fired on October 28 and 30, respectively. None of these shots were slated for formal observer programs by Exercise Desert Rock personnel, but soldiers providing forward area logistical support witnessed the tests. Even the relatively low yield ABLE shot made an impression on those who saw it. George Younkin (1996) remembers the tower shot vividly. The soldiers sat on the ground with their backs to ground zero with heads between their knees and hands placed behind the neck. He remembers the intense white light and "you could feel the heat on the back of your neck and across your hands - just like somebody had put a

blowtorch across them." After a few seconds, the troops were allowed to turn around and look at the blast through special glasses. He describes the sight as "looking into Dante's Inferno."

Initially, the Army saw no need to make sweeping changes to its organizational structure or principle tenets of warfare. Atomic weapons capabilities would simply be grafted onto the conventional forces. Army planners were primarily interested in demonstrating that atomic bombs could be effectively employed as part of a ground campaign without altering the fundamental tactical approach used by Army units (Midgley 1986:14-16). The battlefield scenario developed for the first Desert Rock Exercise reflects the view that nuclear weapons would be used exclusively as a type of expanded artillery preparation.

The tactical scenario for the battle simulation consisted of the landing of a powerful aggressor/enemy force (i.e., Soviets or Chinese) on the Northwest Coast of the U.S. followed by the enemy's advance to the southeast where they established a strong defensive line extending from Caliente, Nevada on the east to the coast of California on the west. After repeated unsuccessful attempts to breakthrough the enemy's defensive position using conventional weapons, the decision was made to use an atomic weapon. A tactical nuclear weapon would be detonated over the enemy position allowing the U.S. Army III Corps to launch an offensive and drive the enemy northward. Ground troops would advance toward the enemy lines after deployment of the weapon (U.S. Army 1951c:9-10). Code named "Operation Thundercloud," the tactical maneuver

involved approximately 883 soldiers attacking towards GZ.

The 2,800 observer troops arrived from bases all over the country. They bivouacked in an area at the northeast corner of the camp. The length of their stay was intended to be brief - usually several days or a week at most. Most arrived just 2-3 days prior to Shot DOG via plane (LVMRJ 30 October 1951:1). Initially, military leaders believed that actual participation in tactical maneuvers by thousands of troops would have been time and cost prohibitive. The observer program allowed a greater number of military personnel to witness an atomic blast while minimizing logistical expenses. Participants in the observer program were drawn from the Army, Air Force, Marine Corps, AFSWP, and several of the service academies with the Army supplying the largest contingent - nearly 2,300 people (Ponton, Rohrer, Maag, and Massie 1982a:66).

Training for the event included films and lectures explaining the characteristics of an atomic blast and the proper procedures to follow during the test. Some observers also participated in a rehearsal of shot-day activities including a pre-shot inspection of the equipment display areas and field fortifications. George Younkin (1996) remembers receiving both the basic atomic warfare indoctrination lectures as well as more extensive radiological training. He recalls taking copious notes and actually using those notes for lectures after he left the service and returned to work for Westinghouse.

Expanding on the military's blast effects experiments conducted during Operation Ranger, additional tests were scheduled as part of Exercise Desert Rock I. Designed to further investigate the impact of overpressure, thermal

effects and nuclear radiation on military equipment, emplacements, and personnel, the experiments consisted of typical field gear, fortifications and animals positioned at various distances and directions from GZ. Pre-shot and post-shot photographs as well as visual inspection of the materials were conducted to assess the damage suffered by each item or emplacement. Formal evaluations of the damage were provided by 6 teams, each with an estimated 10 participants (Ponton, Rohrer, Maag, and Massie 1982a).

Shot DOG took place on November 1, 1951 at 7:30 am. The airdrop shot, detonated over Area 7, yielded 21 kt. Both the tactical and observer troops witnessed the event from a position some 6 miles south of GZ. The troops sat on the ground with their backs to the blast. Instructions delivered over a public address system notified the soldiers when they could turn around and view the growing mushroom cloud (Figure 3). After the shot, the troops executed the tactical maneuver and then toured the display areas. Once the soldiers completed viewing the blast damaged equipment, the units returned to the Yucca Pass for a decontamination check and then traveled back to Camp Desert Rock (U.S. Army 1951c:52-70).

As part of his duties with the 314th Signal Corps Battalion, Younkin participated in post-shot activities. Because he was an electrical engineer in civilian life, Younkin was made the safety officer for one of the Signal Corps camera crews assigned to take 35mm black-and-white film footage of the post-shot blast damage to equipment in the display areas. The crew had a vehicle with motion picture cameras mounted on the rear. Younkin sat on the vehicle's

Figure 3. Exercise Desert Rock I troops observing Shot DOG, November 1, 1951 (*National Archives*).

front bumper monitoring radiation levels with a Geiger counter as they drove slowly through the display areas. It was his responsibility to keep the crew from getting too close to radioactive "hot spots." He recalls that whenever the crew approached "anything metal ... like a tank or a plane, the residual radiation ... was horrendous." He had to wave them off (G. Younkin 1996).

Within hours of the blast, Major General William H. Kean, commander of the exercise, declared the operation a great success. "The first step toward military tactical employment of the nuclear weapon was most successful. It has every indication of producing effective results which will, when evaluated, be greater than anticipated" (LVMRJ 2 November 1951:1). The military command arranged a press conference on the day following the test so that the media could speak with several of the exercise participants. Eleven GIs, most members of the BCT, took part in the event held at the Hotel Last Frontier (Las Vegas Review Journal [LVRJ] 2 November 1951:1). All admitted to a little fear or nervousness, but all were grateful for the experience. The press conference revealed that the Camp Desert Rock support detachment had also been given the opportunity to view the atomic blast.

By November 3, 1951, most of the military observers had already left the camp (LVMRJ 3 November 1951:1). Many of the Camp Desert Rock support personnel also returned to their home stations immediately following the conclusion of the first exercise. However, some of the service troops remained at the camp for the upcoming, although much smaller, Exercises Desert Rock II and III (LVMRJ 6 November 1951; Ponton, Rohrer, Maag, and Massie

1982b:47).

Exercises Desert Rock II and III

Exercises Desert Rock II and III followed right on the heels of the first exercise. Conducted in conjunction with the AEC Operation Jangle, these two exercises were designed to complement and supplement the data obtained during Exercise Desert Rock I. The emphasis for the two operations clearly appeared to be on weapons effects. The stated purpose of the exercises was "to obtain information relative to the effects of surface and underground nuclear explosions on typical army field emplacements, equipment and material, and to determine, insofar as possible, the probable effects on personnel" (U.S. Army 1951d:5). The specific test objectives for both exercises were essentially the same: to determine the nature and extent of damage incurred by standard military emplacements when subjected to a nuclear surface/underground blast; to determine the type and scope of damage sustained by military equipment and material subjected to a nuclear surface/underground blast and to assess the serviceability for its immediate combat use; to ascertain the level of protection afforded by standard field fortifications from radiation and blast effects; and to determine through indirect methods, using film badges and observation of damage to field emplacements, the likely effects on personnel when exposed to an atomic blast (U.S. Army 1951d:37, 159). While the Army conducted additional indoctrination and training programs for observers during Desert Rock II and III (Figure 4), no tactical maneuvers were conducted.

Much smaller in scale than Exercise Desert Rock I, the second and third exercises were administered by a single organizational structure The administrative units were essentially the same, but the BCT was omitted. Brigadier General Burdette M. Fitch assumed the Exercise Director and Camp Commander responsibilities for Exercises Desert Rock II and III (U.S. Army 1951d).

To gather data to satisfy the above stated goals, typical and special Army field equipment was placed at various test positions located between 100 yards to 1000 yards from ground zero. Interspersed between the equipment areas were two lines of typical fortifications consisting of both revetted and un-revetted two-man foxholes. A wide variety of field equipment was positioned in the display areas for exposure to blast effects. Items included compasses, canned rations, perishable rations, medical supplies, gas masks, machine guns, rifles, telephones, radios, dummies clad in various types of uniforms, tents, wire, jeeps, trucks, tanks, artillery pieces, and a "Bailey" bridge (U.S. Army 1951d:45-48, 167-171).

Exercise Desert Rock II took place on November 19, 1951. Observer troops witnessed the SUGAR event consisting of a 1 kt nuclear explosion detonated at ground level. The surface shot occurred at 9:00am in Area 9 in the northern portion of Yucca Flat. Soldiers viewed the blast from a prepared vantage point located approximately 5.75 miles to the south of ground zero. The number of Exercise Desert Rock II personnel is unknown (Ponton, Rohrer, Maag, and Massie 1982b:19). No official estimates of troop participation are

HEADQUARTERS
CAMP DESERT ROCK, NEVADA

OBSERVERS' INSTRUCTION SCHEDULE

DATE	HOUR	SUBJECT	INSTRUCTOR	PLACE
Wednesday	0800-0810	Introductory Remarks	General Fitch	Theater Tent
28 Nov 1951	0810-0820	Security Orientation	Mr. Leesch	Theater Tent
	0820-0850	Desert Rock III and test objectives	Major Jessup	Theater Tent
	0900-1300	Trip to and inspection of test layout	Major Stefanowicz	Test Site
	1430-1520	Basic Weapons	Major Senior	Theater Tent
	1530-1650	Nuclear Physics	Major Senior	Theater Tent
Thursday	0551-1200	Visit to Test Site	Major Smith	Test Site
29 Nov 1951	1330-1420	Bomb Physics	Major Senior	Theater Tent
	1430-1520	Bomb Effects (initial nuclear radiation, thermal radiation, and incendiary effects)	Cmdr Pollock	Theater Tent
	1530-1620	Bomb Effects (shock from air, underground, and underwater bursts)	Cmdr Pollock	Theater Tent
Friday	0900-0950	Bomb Effects (initial nuclear radiation, thermal radiation, and incendiary effects)	Cmdr Pollock	Theater Tent
30 Nov 1951	1000-1145	Bomb Effects (shock from air, underground, and underwater bursts)	Cmdr Pollock	Theater Tent
	1330-1630	Meeting of Seminar Groups for discussion and preparation of reports	Group Leaders	Group Tents
Saturday	0800-1200	Visit to Test Site	Major Stefanowicz	Test Site
1 Dec 1951	1330-1430	Medical Aspects of Atomic Disaster	Lt. Col. Mc Donnel	Theater Tent
	1430-1500	Effects at Hiroshima and Nagasaki	Brig. Gen. Sims	Theater Tent

Figure 4. Desert Rock III Observers' Instruction Schedule (U.S. Army 1951d:212).

provided by the Army's after-action report (U.S. Army 1951d). Only local newspaper articles give any clue as to the number of military observers suggesting that approximately 250 soldiers witnessed the test with an unspecified number assisting in the layout of equipment display areas and construction of field fortifications (LVMRJ 20 November 1951:1).

Exercise Desert Rock III also involved observer personnel. The UNCLE event occurred at noon on November 29, 1951. The device, buried 17 ft below the surface of Yucca Flat, produced a yield of 1 kt. Speculation by the press suggested that the purpose of the underground explosion was to test the theory that a radioactive "Maginot Line" might be developed through a series of underground detonations thereby enhancing NATO's ability to combat any ground force aggression in time of war (LVMRJ 3 November 1951). The troops viewed the blast from a distance of 6 miles. Again, the exact number of Desert Rock participants is unknown. A bus roster and a report by an officer observer are the only official documents that mention numbers of exercise personnel suggesting approximately 210 soldiers saw the UNCLE test (Ponton, Rohrer, Maag, Shepanek et al. 1982:27). The media reported a substantially higher number of participants, indicating that some 1,200 troops, mostly serving as observers, took part in Exercise Desert Rock III (LVMRJ 30 November 1951:1). A number of the soldiers also assisted in the preparation of the observer areas, construction of the test field fortifications, and set up of the display areas.

Publicly, Army leaders quickly declared the success of Exercise Desert Rock I, II and III. Their positive assessment of the atomic training program paved

the way for future military exercises and insured expanded participation by tactical and observer troops. By mid-November 1951 plans were already in development for Exercise Desert Rock IV and construction activities to "winterize" Camp Desert Rock were underway (LVMRJ 14 November 1951:1).

Yet in spite of the glowing appraisal, the DOD noted several weaknesses in the program. The first problem involved disruptions to the military's operational timetable caused by AEC scheduling changes. The second weakness involved a "lack of realism" in the exercise conditions. This problem is probably best summarized in the after-action psychological reports. The HumRRO psychological evaluation team concluded:

> The results [of the psychological tests] were highly indeterminate and unconvincing... No well-controlled studies could be undertaken which could presume even superficial validity ... To attempt to probe into men's private fears and anxieties when all danger of death and injury has been excluded by the exercise seemed superfluous (U.S. Army 1952a).

The psychologists attributed their inconclusive results to the tightly controlled and artificial nature of the military's participation in the atomic tests. The criticism on the unrealistic training would play a significant role in future Desert Rock Exercises.

Operation Tumbler-Snapper

The third set of atmospheric tests slated for the NPG took place in the spring of 1952, between April 1 and June 5. Code named Operation Tumbler-Snapper, the series consisted of eight above-ground detonations divided into

two phases (Table 5). The TUMBLER phase events, jointly sponsored by DOD and LASL, involved weapons effects tests. Designed primarily to provide information on the effect of the height of burst on the overpressure caused by a nuclear blast, shots ABLE, BAKER, CHARLIE, and DOG were all airdropped devices (Ponton, Maag, Barrett et al. 1982:1). The SNAPPER phase of the series concentrated on weapons development experiments. LASL conducted four tower shots, EASY, FOX, GEORGE, and HOW, to evaluate different weapons for inclusion in the atomic arsenal. These events were also designed to study and refine testing techniques for the Operation IVY series scheduled for the PPG in the fall of 1952. The CHARLIE and DOG events yielded both weapons effects and weapons development data and were part of both phases of the operation.

Exercise Desert Rock IV

Exercise Desert Rock IV expanded on the procedures and training programs established the previous fall. The stated goals of the exercise were to maximize Army participation in "providing indoctrination training in tactical operations featuring tactical employment of atomic devices, to provide training in essential protective measures, to observe psychological effects of atomic explosions on individuals, and, to a lesser degree than in Exercises Desert Rock I, II, and III, to provide indoctrination training in the effects of atomic explosion on equipment, material, and emplacements" (U.S. Army 1952a:7). The Army leaders also felt it "was desirable that Army participation continue its

Table 5. Summary of Operation Tumbler-Snapper Events (adapted from Ponton, Maag, Barrett et al. 1982:9).

SHOT	PHASE	DATE	LOCAL TIME	LOCATION	TYPE OF DETONATION	YIELD	DESERT ROCK PARTICIPATION
ABLE	Tumbler	04/01/52	0900	Area 5	Airdrop	1 kt	Minimal
BAKER	Tumbler	04/15/52	0930	Area 7	Airdrop	1 kt	Minimal
CHARLIE	Tumbler/ Snapper	04/22/52	0930	Area 7	Airdrop	31 kt	Yes
DOG	Tumbler/ Snapper	05/01/52	0830	Area 7	Airdrop	19 kt	Yes
EASY	Snapper	05/07/52	0415	Area 1	Tower	12 kt	Yes
FOX	Snapper	05/25/52	0400	Area 4	Tower	11 kt	Yes
GEORGE	Snapper	06/01/52	0355	Area 3	Tower	15 kt	Yes
HOW	Snapper	06/05/52	0355	Area 2	Tower	14 kt	No

progress, within reasonable bounds of peacetime safety requirements, toward the objective of actual close-in operation of Army troops in the face of atomic explosions, approximating as nearly as possible actual war-time conditions" (U.S. Army 1952a:5). In keeping with these objectives, tactical maneuvers played an enhanced role in Desert Rock IV. In addition, military personnel were positioned much closer to GZ during the Tumbler-Snapper tests than they had been at the Desert Rock I, II, and III exercises. U.S. Army personnel were also given greater independent responsibility for radiological safety than at the previous tests.

According to DOD documents (Ponton, Maag, Barrett et al. 1982:1), approximately 7,350 Army, Navy, and Marine personnel participated in Exercise Desert Rock IV. However, this figure may only include the observers and tactical

maneuver troops. The organizational structure remained essentially unchanged (Figure 5). Lieutenant General Joseph M. Swing continued in command of the Sixth Army and served as the overall Exercise Supervisor with Brigadier General Harry P. Storke (U.S. Army 1952a:2) serving as the Camp Commander and Exercise Director. Army units from across the U.S. were called upon to participate in the Spring 1952 exercise. The tactical units included personnel from airborne, infantry, and armored divisions. In contrast to the previous exercise which utilized 2,500 soldiers as Camp Desert Rock administrative and support staff, Exercise Desert Rock IV assigned only 1,500 support personnel (Ponton and Maag 1982a:37). The reduced level of staffing created shortages in administrative and clerical personnel throughout the Tumbler-Snapper test series (Headquarters, Sixth U.S. Army 1952).

In the weeks preceding the various events, the units responsible for maintaining the camp focused on daily operations. The Adjutant General staff provided mail and messenger service as well as the clerical services. The Quartermaster was responsible for supplying the camp with all food, clothing and general supplies. Water, the most difficult to obtain commodity at Camp Desert Rock, was procured from wells at Indian Springs through a joint effort of the Engineer, Transportation, and Quartermaster Sections. Communications between the camp and the forward areas and the camp and the rest of the country were the responsibility of the Signal Corps Detachment. Counseling and religious services at the camp were provided by the Chaplain. Special Services operated a Post Exchange as well as organized entertainment and

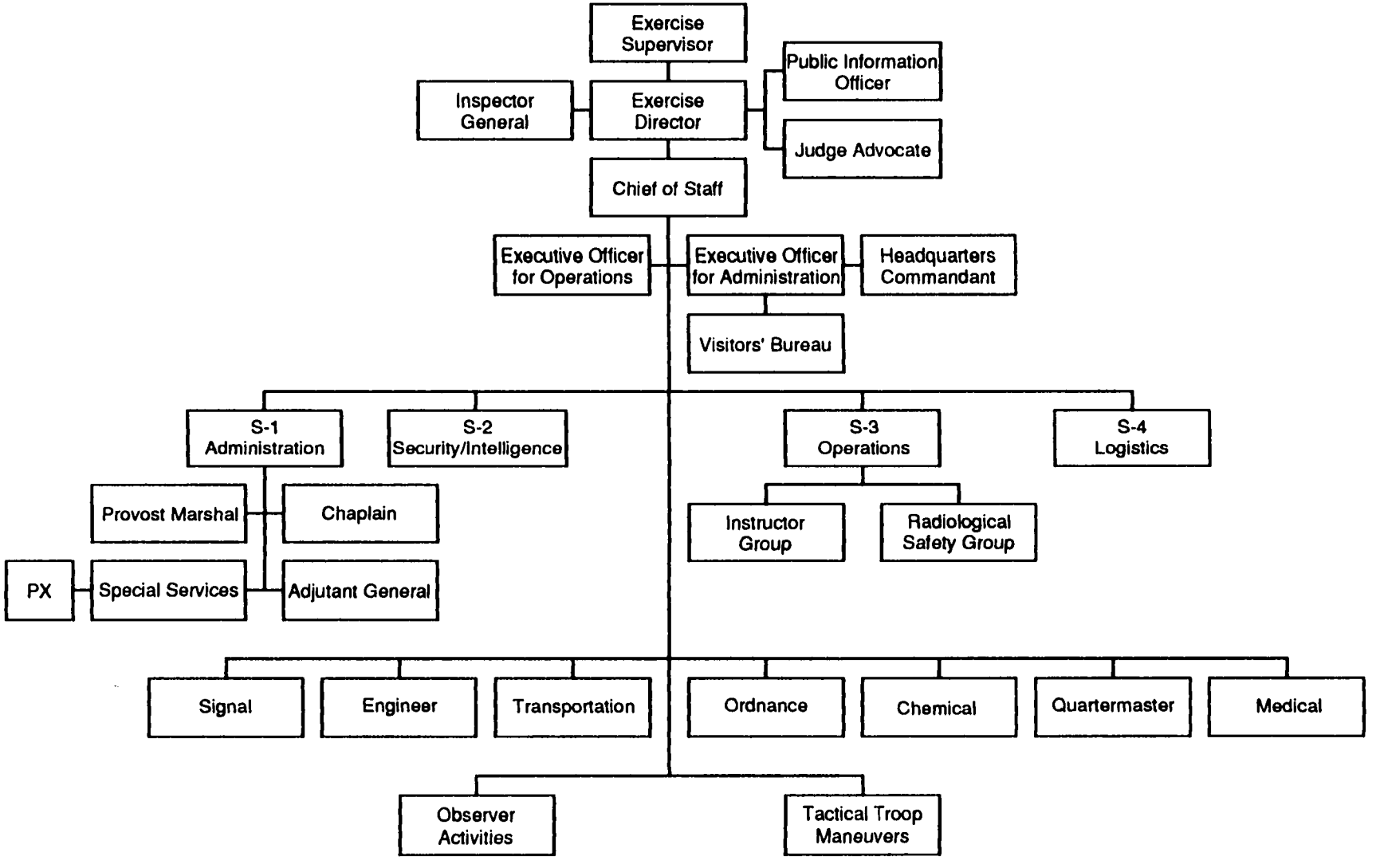

Figure 5. Camp Desert Rock Administrative Structure - typical exercise organization

recreation programs for Desert Rock participants. The Provost Marshall's Office provided traffic control and law enforcement and supervised the Military Police. The Military Police unit operated the camp's main gate, serviced as the camp police, and conducted patrols in downtown Las Vegas. The Security and Intelligence Section (S-2) was responsible for ensuring that all military personnel and visitors had appropriate security clearances. The S-2 Section also maintained security safeguards for all classified materials related to the military exercises. Atomic orientation and indoctrination training was the responsibility of the Instructor Group (U.S. Army 1952a).

As with the previous exercises, Desert Rock personnel provided logistical and operational support in the forward areas. They assisted with communications, transportation and construction activities setting up equipment display areas, laying communications and power lines, and transporting personnel and supplies between Camp Desert Rock or Camp Mercury and Yucca Flat. The Ordnance Section procured, maintained, and distributed all weapons and vehicles used for the exercise troops and equipment displays. The Chemical, Radiological Safety, and Medical Sections coordinated radiological safety operations and decontamination procedures during and after each of the nuclear detonations (Headquarters, Sixth U.S. Army 1952).

Officially, Exercise Desert Rock IV activities took place at four of the eight Tumbler-Snapper events - CHARLIE, DOG, FOX, and GEORGE (Ponton, Maag, Barrett et al. 1982:2-6). Formal observer programs, involving several briefings on the effects of nuclear weapons, observation of an atomic blast, and a

subsequent tour of military equipment display areas exposed to the blast, were only conducted at these events. However, it appears that some of the Camp Desert Rock support personnel witnessed the ABLE, BAKER and EASY events from the Control Point at Yucca Pass. Tactical maneuvers designed to train troops and evaluate battlefield tactics took place immediately after the CHARLIE, DOG, and GEORGE detonations. To determine the soldiers' reactions to witnessing a nuclear blast, psychological tests were conducted in conjunction with shots CHARLIE, FOX, and GEORGE.

Shot ABLE marked the beginning of the Tumbler-Snapper series. Detonated at 9:00 am on April 1, 1952, the airdropped device exploded over Frenchman Flat in Area 5 with a yield of 1 kt. The blast was originally intended to be an indoctrination shot for many of Camp Desert Rock's administrative and support personnel. However, the AEC Test Director decided to reduce the observer group allowing only 15 members of the Desert Rock Exercise Director's staff to witness the event (Banks 1953).

The BAKER event also had a yield of 1 kt. Detonated over Area 7 at the north end of Yucca Flat, the airdropped test occurred on April 15, 1952. As with the previous event, only a small number (10) of Camp Desert Rock support personnel witnessed the blast. Brigadier General Storke had asked that 300 troops be allowed to observe the shot, but the AEC Test Director refused the request (Banks 1953).

The first scheduled activities for Exercise Desert Rock IV took place on April 22 at shot CHARLIE. The device, airdropped over Area 7, had the largest

yield of the Tumbler-Snapper series at 31 kt. More than 2,200 soldiers participated in the troop observer program and tactical maneuver. Approximately 535 soldiers took part in the observer program. The simulated battlefield exercise was conducted by 1,300 Army personnel drawn from the 82nd Airborne Division, the 31st and 47th Infantry Divisions, the 11th Armored Cavalry Regiment, the 369th Engineer Amphibious Support Regiment, and the Sixth Army Medical Detachment. Three hundred seventy-five members of the Air Force 140th Fighter-Bomber Group provided air support for the tactical maneuver. The battlefield maneuver consisted of five activities including 1) observation of the event, 2) psychological testing, 3) advancement to tactical objective, 4) inspection of equipment display areas, and 5) airborne exercise (U.S Army 1952).

Military strategists expanded on the battlefield scenario first developed for Exercise Desert Rock I by adding airborne units to the maneuver. Plans for the CHARLIE event maneuvers called for paratroopers to drop behind enemy lines after the atomic detonation, sever enemy communications, and then link up with two infantry divisions advancing toward GZ from the southwest. Unfortunately, the exercise did not go as planned since a substantial number of the paratroopers landed well away from the drop zone (Ponton and Maag 1982a:96-102).

Shot DOG, another airdropped device, detonated above the same GZ as the BAKER and CHARLIE events. The May 1st test marked the first participation in atomic tactical maneuvers by U.S. Marines (Ponton and Maag 1982a:

144-150). Approximately 1,950 personnel from the Marine Corps Provisional Atomic Exercise Unit took part in the battlefield exercise. This special training unit consisted of two composite infantry battalions comprised of the First Provisional Marine Battalion from Camp Pendleton, California and the Second Provisional Marine Battalion of Camp LeJeune, North Carolina. Arriving a week before the scheduled exercise, the Marines bivouacked at Camp Desert Rock. The troops installed display area equipment in the forward areas and participated in orientation training and a full rehearsal of the tactical maneuver in the days preceding the test. The 350 Navy and Marine Corps personnel participating in the observer program also received several days of atomic indoctrination lectures and rehearsed their shot-day activities which included a preview of the equipment display areas.

The scenario developed for the Marine Corps exercise differed from the previous Army battlefield simulation. The objective of their exercise was to overwhelm a large enemy force that had invaded the island of Yucca (Yucca Flat) driving friendly forces into retreat. The aggressor had established control of the area by forming a line of strong defensive positions which friendly forces could not penetrate. Detonation of an atomic weapon (Shot DOG) would allow friendly forces to take the offensive. Landing on the southern end of Yucca Island, three Marine divisions would advance and penetrate the enemy lines after the blast thereby regaining control of the island (Ponton and Maag 1982a:150).

Shot DOG proved to be somewhat disappointing for the Marine Corps

Provisional Atomic Exercise Brigade. Because of high levels of radioactivity near the tactical objective, the battlefield exercise could not be completed. The Marines toured the two more distant equipment display areas and then returned to Camp Desert Rock. Within 24 hours, the Marine participants had departed for their home bases (U.S. Marine Corps 1952).

Shot EASY was a 300-foot tower shot detonated in the early morning hours of May 7, 1952. The device had a yield of 12 kilotons. Although not part of the Exercise Desert Rock IV program, 1,000 soldiers from the camp's support contingent observed the blast from the Control Point at Yucca Pass.

Weather-related delays began to seriously disrupt the spring testing schedule after the EASY event. FOX, the sixth shot in the series, was postponed 12 days due to unfavorable winds. Official Exercise Desert Rock IV activities finally resumed with the May 25th event. Approximately 1,450 soldiers participated in the troop observer program which included psychological testing before and after the event and a tour through the equipment display areas. Researchers from HumRRO administered a variety of psychological evaluation procedures including questionnaires, interpretation of pictures, "hand-sweat" tests, and rifle disassembly/assembly proficiency tests (HumRRO 1953; U.S. Army 1952a). The 950 men drawn from the 701st Armored Infantry Battalion, Fort Hood, Texas watched the 11 kt tower detonation from trenches 6,600 yards southeast of GZ. The remaining participants came from various units and service schools throughout the U.S. They viewed the event from the Yucca Pass Control Point.

The GEORGE event was the last test of the Tumbler-Snapper series to include participants from Exercise Desert Rock IV. Originally, the final Desert Rock IV activities had been scheduled in conjunction with Shot HOW (U.S. Army 1952a:9,36), but the weather problems led the Exercise Director, General Storke, to move the exercise forward to coincide with GEORGE. Even so, unfavorable weather conditions postponed the detonation for 10 days. Because most of the observer personnel had arrived in camp on the 18th and 19th of May, the delay allowed for extra atomic indoctrination training. The orientation program consisted of films of the previous Desert Rock exercises and atomic explosions. Training lectures focused on the characteristics of nuclear blasts and the proper procedures to follow before, during, and after a detonation. The observer troops also participated in a rehearsal of their shot-day activities including a pre-event inspection of the equipment display areas (Ponton and Maag 1982b:86). The maneuver troops scheduled for this event received similar indoctrination training, but approximately 30 of these personnel were also subjected to pre-shot psychological tests consisting of interviews, questionnaires, and polygraph tests (HumRRO 1953).

The tower-mounted device finally detonated with a yield of 15 kt at 3:55 am June 1, 1952. Both the 500 observer troops and the 1,300 maneuver troops observed the blast from trenches south of the tower (Ponton and Maag 1982b:83). Following the detonation, the observer personnel toured the display area while the tactical group launched a simulated assault of an objective south of GZ. With the exception of a tank platoon from the 1st Armored Division, Fort

Hood, Texas, the tactical troops for this exercise came from the Camp Desert Rock support units. Using the same battlefield scenario as the previous exercise, the infantry units supported by a tank platoon executed the maneuver. After the maneuver, the tactical units toured the display area and then returned to the camp with the observer troops. The soldiers who had taken the psychological tests prior to the GEORGE event repeated the same tests in post-shot follow-up exams (HumRRO 1953).

With the conclusion of the GEORGE event, the troops began dismantling the temporary facilities and tents at Camp Desert Rock. A few of the support units assisting with experiments in the forward areas might have witnessed the June 5th HOW event, but there is no official record of any Desert Rock observers. By the end of the month, all but a caretaker crew assigned to maintain the camp had returned to their home stations (Banks 1953).

Operation Upshot-Knothole

Operation Upshot-Knothole took place in the spring of 1953. Originally scheduled as separate testing programs, the decision was made to combine the Upshot and Knothole phases into a single operation (Ponton, Massie et al. 1982:31). Between March 17 and June 4, 1953, 11 nuclear test took place at the NPG (Table 6). Three were airdrops, seven were tower detonations and one was an atomic artillery projectile fired from a 280mm canon. The two major objectives of the Upshot-Knothole Series were to: 1) improve nuclear weapons employed in strategic delivery systems and those utilized for tactical battlefield

situations, and 2) establish new military doctrine for the effective battlefield use of atomic firepower (Ponton, Massie et al. 1982:33). This test series was the first to incorporate civil defense studies as well as weapons development and weapons effects experiments. Extensive military exercises (Exercise Desert Rock V) would also be held at many of the scheduled events.

Table 6. Summary of Operation Upshot-Knothole Events (adapted from Ponton, Massie et al. 1982:13).

SHOT	DATE	LOCAL TIME	LOCATION	TYPE OF DETONATION	YIELD	DESERT ROCK PARTICIPATION
ANNIE	03/17/53	0520	Area 3	Tower	16 kt	Yes
NANCY	03/24/53	0510	Area 4	Tower	24 kt	Yes
RUTH	03/31/53	0500	Area 7	Tower	0.2 kt	No
DIXIE	04/06/53	0730	Area 7	Airdrop	11 kt	Yes
RAY	04/11/53	0445	Area 4	Tower	0.2 kt	Yes
BADGER	04/18/53	0435	Area 2	Tower	23 kt	Yes
SIMON	04/25/53	0430	Area 1	Tower	43 kt	Yes
ENCORE	05/08/53	0830	Area 5	Airdrop	27 kt	Yes
HARRY	05/19/53	0505	Area 3	Tower	32 kt	Yes
GRABLE	05/25/53	0830	Area 5	Canon	15 kt	Yes
CLIMAX	06/04/53	0415	Area 7	Airdrop	61 kt	No

Exercise Desert Rock V

Initial planning for Exercise Desert Rock V began as early as December 1951, when the JCS approved a series of weapons effects experiments scheduled for spring 1953 (Ponton, Massie et al. 1982:32). However, operational and administrative strategies for the exercise were not formulated

until the summer of 1952 shortly after the conclusion of Operation Tumbler-Snapper. Held in conjunction with Operation Upshot-Knothole, the Exercise Desert Rock V fielded tactical troops at 6 of the events with observer personnel witnessing 9 detonations. Incorporating more than twice the personnel used in previous atomic combat training, 18,000 - 20,000 individuals from the Army, Air Force, Marine Corps, and Navy participated in Exercise Desert Rock V activities (Ponton, Massie et al. 1982:53; U.S. Army 1953a:3).

Because of the scope of the operations, military personnel began arriving to reactivate Camp Desert Rock in early January 1953. The organizational structure of the camp remained essentially the same as before with only the addition of a Comptroller, a Deputy Post Commander for Executive Administrations, and an Air Branch Section. The Medical Section added dental services (Ponton, Massie et al. 1982:53-58; U.S. Army 1953b). After the clerical and administrative staff shortages experienced during Exercise Desert Rock IV, the camp support staff contingent was increased from 1,500 to 2,500 for Desert Rock V. Unfortunately, the actual strength of these troops never reached the authorized level. The total number of camp support personnel remained between 1,700 and 1,800 for most of the exercise because many of the troops were to be released from military service in less than 30 days. There was a constant flow of individuals into and out of the camp as they returned to their home stations for discharge proceedings. Shortages in mechanics, carpenters and electricians were particularly severe (U.S. Army 1953b).

Lt. General Joseph M. Swing again served as the overall Exercise

Supervisor monitoring the operations from the U.S. Sixth Army Headquarters at the Presidio of San Francisco. Brigadier General William C. Bullock provided on-site control functioning as the Camp Commander and Exercise Director (U.S. Army 1953b:5). Support units were drawn primarily from military installations in the western states such as California and Arizona, but the maneuver troops came from bases across the country. Some of the tactical equipment was shipped in from as far away as Oklahoma and New York.

The stated goals of the military operation were to furnish soldiers with the tools and tactics necessary to "fight, survive, and win" on the atomic battlefield. The exercise was designed to provide training in nuclear ground combat tactics; to instruct individuals in essential physical protective procedures; to afford participants indoctrination training on the atomic weapons effects on animals, equipment, and field fortifications; to measure trained staff officers' ability to estimate target damage; and to observe the psychological effects of witnessing an atomic blast (U.S. Army 1953a:7). In general, the mission objectives of Exercise Desert Rock V were a continuation of those defined for the previous military exercises with one notable exception. The AEC restrictions placed on military participation in the past were removed with the Army assuming full responsibility for the radiological safety of the troops. This allowed the BCT to observe blasts and conduct maneuvers much closer to GZ creating more realistic training conditions (U.S. Army 1953a:7). There was also a limited attempt to decrease the size of the typical combat battalion and emphasize more flexibility and independence of action in executing military maneuvers

(Massie et al. 1982a:67).

The view that tactical nuclear weapons simply served to augment existing conventional weaponry and maneuver capabilities continued to dominate Army thinking into 1953:

> [Atomic] weapons prepare the way by creating casualties and confusion. The battle is won by maneuver. It is necessary that atomic weapons be regarded as a gigantic preparation, but only as a preparation, and that the exploitation by maneuver be regarded as the major element of the battle plan...(U.S. Army 1953c).

The emphasis was on the weapon's role as an offensive tool to be employed prior to battlefield maneuvers. Appropriate targets included enemy front-line positions, troop assembly and bivouac areas, and airfield and communications centers (Midgley 1986:16). These concepts are again exhibited in the tactical scenario employed during Exercise Desert Rock V.

The battlefield simulation developed for Exercise Desert Rock V operations assumed that "aggressor" airborne units, after an initially successful attack, had established a strong defensive position and were holding off a counterattack by friendly forces. The U.S. Command Headquarters concluded that use of artillery delivered atomic weapons would allow friendly troops to breakthrough the enemy defenses. In the simulation, ground zero was assumed to be 1,500 yards to the rear of enemy lines and the actual atomic tower or airdropped device would represent a barrage of 5 to 7 atomic artillery shells. Friendly units would advance through the enemy lines toward an objective near GZ shortly after the detonation (U.S. Army 1953a:8, 20).

The first opportunity to test the tactical scenario came on March 17, 1953. A tower detonation, Shot ANNIE, developed a yield of 16 kt. This test involved the observer program, a battlefield simulation and helicopter maneuvers. The observers numbered around 505 and included individuals from the Army, Navy, Air Force, and Marine Corps. The tactical maneuver was conducted by two Battalion Combat Teams comprised of approximately 1,200 soldiers drawn from the Camp Desert Rock support detachment. These individuals had received the standard orientation and indoctrination training and many had participated in the construction of the trenches used to view the blast (Figure 6). The Marine Corps Helicopter Atomic Test Unit performed the operational helicopter tests which involved transporting troops to and from the tactical objective after the atomic blast (Massie et al. 1982a:22). Observer and maneuver troops had the opportunity to view the equipment display areas and close-in field fortifications after the blast. Fortifications and equipment for this event included barbed wire obstacles, foxholes, trenches, bunkers, gun emplacements, a tracked landing vehicle, tanks, trucks, machine guns, rifles and carbines, mortars, howitzers, flame throwers and communications equipment (U.S. Army 1953a:85-96).

A great deal of public attention was given to the ANNIE event because of the Civil Defense Effects Test Program held in conjunction with the detonation. The shot was open to the print and broadcast media. Most journalists witnessed the blast from News Nob near the Control Point, but some observed the event from the trenches with the troops. Immediately following the detonation, numerous soldiers were airlifted, by helicopter transport, to News Nob where

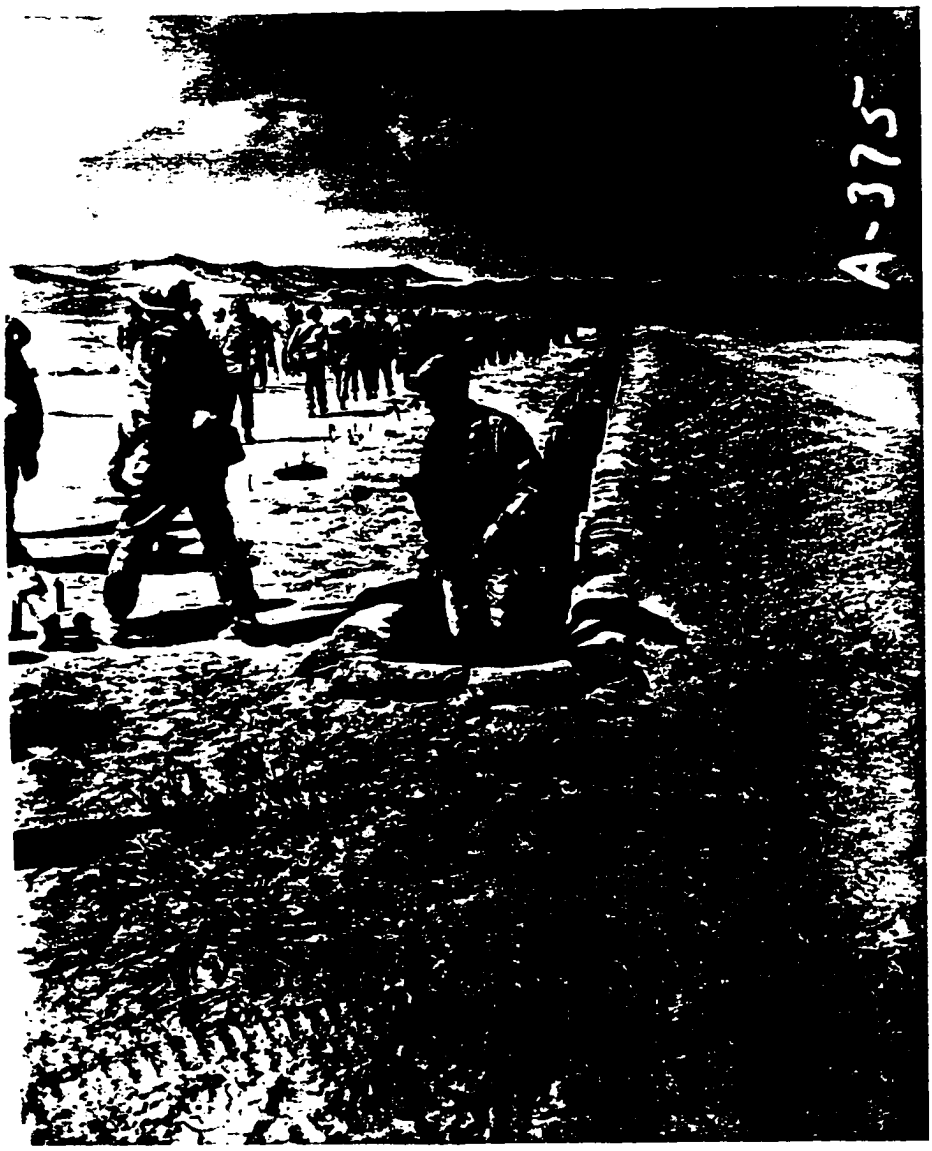

Figure 6. Exercise Desert Rock V troops rehearsing for Shot ANNIE, March 14, 1953 (*National Archives*).

they gave interviews to newspaper reporters and radio commentators (U.S.Army 1953a:82).

Exercise Desert Rock V personnel also took part in the NANCY event detonated on March 24, 1953. Approximately 2,860 military personnel participated in the exercise with most of them arriving in camp on March 19th and 20th (LVRJ 21 March 1953:1). This allowed time for the orientation lectures and films and a rehearsal on March 22 in the Yucca Flat area. Activities scheduled in conjunction with the NANCY test included observer indoctrination, tactical maneuvers, and helicopter tests essentially identical to those done at Shot ANNIE. A new feature of the Exercise Desert Rock program first appeared during this atmospheric test. The "Volunteer Officer Observer" program was designed to evaluate the ability of trained staff officers to estimate target damage and minimum safe distances for the observation of an atomic blast. Nine specially-trained officers representing the Army, Navy, and Air Force participated in this program at the NANCY detonation positioning themselves only 2,500 yards from GZ (U.S. Army 1953a:106). The on-site HumRRO researchers conducted interviews with the volunteers shortly after the blast.

There was no Exercise Desert Rock V participation in RUTH, the third shot in the Upshot-Knothole series. Planned as a small yield event, the Army did not expend any resources on a detonation which promised only a minimal visual impact (U.S. Army 1953a:8).

No formal Exercise Desert Rock programs had been scheduled for the DIXIE event on April 6, 1953. However, 75 Marine Corps officers slated to

participate in the upcoming RAY event took the opportunity to view an atomic blast as did 60 support troops from Camp Desert Rock. Standing at News Nob, the observers witnessed the airdropped device explode over Area 7 on Yucca Flat with a yield of 11 kt (U.S. Army 1953a:8).

Radioactive contamination from the NANCY detonation created scheduling problems for both the AEC and the Desert Rock program eventually leading to a postponement of the BADGER test and an advancement of the RAY test. Shot Ray took place on April 11. The tower-mounted device detonated yielding only 0.2 kt. Representing the Army, Navy, Air Force, and Marine Corps, 63 observers originally scheduled to view the BADGER test, witnessed the test. Limited operational helicopter tests also took place (Massie et al. 1982a:153-154).

Large-scale Exercise Desert Rock V operations resumed at the BADGER event. Observer troops, tactical units, volunteer officer observers, and 40 helicopter crews participated in the April 16th rehearsal and the April 18th test. Shot BADGER involved approximately 2,800 military personnel including the Second Marine Corps Provisional Atomic Exercise Brigade. The Brigade, composed of nearly 2,300 officers and enlisted men, conducted a battlefield simulation after the 23 kt tower detonation. Standard orientation and indoctrination training took place prior to the event and the atomic combat scenario was very similar to previous simulations with the exception of more extensive helicopter support. The weapon damage effects on military equipment displays were somewhat expanded during BADGER. In addition to

the standard equipment, they included cases of "C" rations, several mannequins dressed in various types of combat uniforms, and three dozen sheep (U.S. Army 1953a:148-170).

Because of the large numbers of Exercise Desert Rock V participants, it was important to expedite the departure of observer and tactical personnel once they witnessed their scheduled shot. Most departed the camp within 24-48 hours after completing the exercise. However, AEC changes in the testing schedule created overcrowding and supply problems in the camp. Occasionally, the scheduling difficulties resulted in some soldiers' departing without ever witnessing an atomic detonation (U.S. Army 1953a).

As the participants from BADGER returned to their home stations, the troops scheduled for the seventh test in the Upshot-Knothole series crowded into the camp. As with the preceding event, exercise activities for the SIMON event included a battlefield maneuver, the volunteer officer observer program, helicopter exercises, observer indoctrination, and psychological evaluations. Just over 3,000 observer and tactical troops began arriving in Camp Desert Rock on April 21, 1953 for the SIMON event. Orientation and indoctrination lectures and films were held over several days to accommodate the staggered arrivals of the observer personnel. There was also a full-scale exercise rehearsal two-days prior to the April 25th detonation. Fired from a 300-foot steel tower in Area 1 of Yucca Flat, the experimental device produced a yield much greater than anticipated. Instead of the predicted 35 kt yield, the blast produced 43 kt. A wind shift resulting in high levels of radioactive fallout cut short the

Army's tactical exercise and prevented post-shot viewing of much of the equipment display area. The 50th Chemical Service platoon, part of the camp's support contingent, handled decontamination procedures at the temporary decontamination facility set up north of the Control Point at Yucca Pass (Massie et al. 1982b).

Additional troop observer and tactical programs took place at the ENCORE event along with operational helicopter tests sponsored by the Marine Corps (Massie et al. 1982c:21). More than 3,000 troops participated in the 27 kt test detonated on May 8, 1953. Psychological research teams from HumRRO evaluated some members of the two Battalion Combat Teams involved in the battlefield maneuvers. Observer personnel representing the Army, Navy, Air Force and Marine Corps watched the blast from trenches located southeast of GZ. The Army BCTs supported by Air Force helicopter units executed a ground-air attack on two objectives, one near GZ. The observers and tactical troops viewed the display areas after the maneuver and then returned to Camp Desert Rock (Massie et al. 1982c: 24-31).

The HARRY event was originally set for May 3, but heavy fallout from the SIMON detonation led to its rescheduling. Fired on May 19,1957, the tower shot yielded 32 kt. The test included a typical mix of observer troops representing the 4 branches of the military. Each took part in pre-shot atomic orientation, security, and safety lectures and films. As with all the other tests incorporating exercise troops, Camp Desert Rock atomic training instructors accompanied the units into the forward areas to monitor safety procedures and provide additional

information during post-shot display area tours (Massie et al. 1982c:84; U.S. Army 1953a).

Exercise Desert Rock V participation in Operation Upshot-Knothole ended with the May 25 GRABLE event (Figure 7). Nearly 3,300 Army infantry troops along with about 100 individuals from the other three armed services took part in the observer and tactical drills. As usual, Camp Desert Rock units provided logistical support for the exercise including radiological safety, transportation, traffic control, communications, and medical services (U.S. Army 1953a).

Although the shot marked the first time an atomic artillery shell was fired and detonated from a field artillery piece, the Army had made the 280mm atomic cannon a centerpiece of their weapons development program. Already placed in production, Army strategists were gambling that the successful testing of the gun would "herald a revolution in the tactical doctrine of ground warfare." An Army spokesperson suggested that the new artillery piece would dramatically alter ground combat stating that, "A frontal assault, tempting as the most direct route to the enemy's vitals, but cast aside as a bloody insanity with conventional weapons, may now become the cheapest route after atomic weapons open the way" (LVRJ 25 March 1953:9).

In the two weeks prior to the event, the Artillery Test Unit from Fort Sill, Oklahoma test-fired the 280 mm canon using high explosives rounds. Rumors circulated that President Eisenhower planned on attending the GRABLE event to witness the weapon's first atomic field test (LVRJ 29 April 1953:1), but neither

Figure 7. The GRABLE event, May 25, 1953. The shot employed a 280 mm canon to fire a 15 kt atomic shell over Frenchman Flat (*Defense Nuclear Agency*).

the President nor his Secretary of State Dulles ever visited the NPG. However, several VIP's including the Secretary of Defense Charles Wilson, the Secretary of the Army Robert Stevens, the Army Chief of Staff General J. Lawton Collins and several congressional representatives witnessed the blast and military maneuvers on Frenchman Flat (Massie et al. 1982c:120; U.S. Army 1953a:332).

To the Army's great relief, the weapon fired successfully delivering a 15 kt blast over Frenchman Flat. The BCT completed their exercise and the observers took part in the post-shot weapons effects evaluations. Pleased with the gun's performance, Army leaders deemed the GRABLE event a success. However, subsequent atomic test series would never again utilize this method of delivery. The GRABLE event was both the first and last time a live atomic projectile was fired from an artillery piece.

With the end of the Upshot-Knothole series, Camp Desert Rock reverted to standby status. Most of the tent barracks were dismantled and a skeleton crew of no more than 100 individuals remained to perform minimal maintenance duties. Camp Desert Rock sat idle for almost two years. Although military leaders were pleased with the results of Desert Rock V, no military exercises took place at the NPG during 1954.

Instead, the nuclear testing program concentrated its efforts in the Pacific that year with Operation Castle. The series consisted of five very high yield nuclear and thermonuclear tests detonated between February and May 1954. The weapons tested during Operation Castle reflected a significant nuclear policy change initiated by the Eisenhower Administration (Hewlett and Holl

1989; Rhodes 1995). These changes would influence the character of future tactical nuclear doctrine.

In late 1953, President Eisenhower and his Secretary of State John Foster Dulles unveiled a policy statement signalling a fundamental shift in national defense strategy by advocating an "increasing reliance on nuclear weapons as guarantors of national security" (Midgley 1986:32). The Administration's commitment to a security strategy of "massive retaliation" was reflected in their defense budget which significantly increased spending for nuclear weapons development and the Air Force while deeply cutting the Army's authorized strength and funding for conventional military operations. The economic realities of the current defense budget required sweeping revisions in the Army's nuclear doctrine. This new orientation forced the Army to fundamentally modify its concepts and methods of ground combat and to envision a battlefield dominated by, rather than augmented by, atomic weapons (Midgley 1986:32). To cope with the policy changes General Matthew B. Ridgway, the Army Chief of Staff, launched a series of study projects that would eventually lead to a complete reorganization of the Army's divisional structure and a redefinition of ground troops tactical strategy.

Operation Teapot

Early 1955 brought another series of atmospheric weapons tests to the NPG, now renamed the Nevada Test Site (NTS). Operation Teapot occurred between February 18 and May 15, 1955 and consisted of 14 nuclear events

and one non-nuclear detonation (Table 7). The testing program included 4 airdropped devices, 10 tower tests, and 1 crater event. This series was intended to evaluate various nuclear devices for use in strategic bomber delivery and missile warheads, as well as assess weapons for tactical land combat situations. Other major objectives of the series were to improve military tactics, training and equipment, and to evaluate civil defense criteria (Ponton, Maag, Wilkinson, and Shepanek 1981:25-27). As in the past, the Army administered military training program would play a major role in the testing program with soldiers, sailors, marines and airmen participating in 11 events.

Exercise Desert Rock VI

Formal planning and organization for Exercise Desert Rock VI began in September 1954. The Sixth U.S. Army Headquarters out of the Presidio of San Francisco still provided overall supervision and staffing for the exercise, but the Exercise Desert Rock VI Headquarters was organized at Fort Lewis, Washington. Brigadier General F.W. Sladen, Jr. served as the Deputy Exercise Director and Camp Commander. This separation between the two headquarters created some planning difficulties (U.S. Army 1955a:iii-3).

Staffing efforts for Exercise Desert Rock VI focused on the need to stabilize the headquarters and permanent party personnel and maintain adequate logistical support (U.S. Army 1955a:ii). The 95th Engineer Battalion was charged with the responsibility of "rehabilitating" the camp prior to the arrival of General Sladen and his staff on January 5, 1955. Various support

Table 7. Summary of Operation Teapot Events (adapted from Ponton, Maag, Wilkinson, and Shepanek 1981:9).

SHOT	DATE	LOCAL TIME	LOCATION	TYPE OF DETONATION	YIELD	DESERT ROCK PARTICIPATION
WASP	02/18/55	1200	Area 7	Airdrop	1 kt	Yes
MOTH	02/22/55	0545	Area 3	Tower	2 kt	Yes
TESLA	03/01/55	0530	Area 9	Tower	7 kt	Yes
TURK	03/07/55	0520	Area 2	Tower	43 kt	Yes
HORNET	03/12/55	0520	Area 3	Tower	4 kt	Yes
BEE	03/22/55	0505	Area 7	Tower	8 kt	Yes
ESS	03/23/55	1230	Area 10	Shaft	1 kt	Yes
HADR	03/25/55	0900	Above Area 1	Airdrop	non-nuclear	No
APPLE 1	03/29/55	0455	Area 4	Tower	14 kt	Yes
WASP PRIME	03/29/55	1000	Area 7	Airdrop	3 kt	Yes
HA	04/06/55	1000	Above Area 1	Airdrop	3 kt	No
POST	04/09/55	0430	Area 9	Tower	2 kt	No
MET	04/15/55	1115	Area 5	Tower	22 kt	Yes
APPLE 2	05/05/55	0510	Area 1	Tower	29 kt	Yes
ZUCCHINI	05/15/55	0500	Area 7	Tower	28 kt	No

units including communications, transportation, supply, food service, munitions, medical, etc. were phased into the camp as the buildup progressed and the facilities were readied. A detachment of Marines from Camp Pendleton, California arrived early to begin setting up for the Marine Corps tactical maneuver scheduled for mid-March (U.S. Marine Corps 1955: Annex Baker,1-2).

James O'Connor, an 18-year old communications specialist with the

232nd Signal Company, Fort Huachuca, Arizona was a member of the Exercise Desert Rock VI permanent Army support detachment. He had six months remaining of his military service when his battalion was given a series of psychological tests. Of the 700 men tested only 120 were selected for duty at Camp Desert Rock. Arriving in Nevada in late December 1954, Corporal O'Connor's duties centered on preparing communications facilities in the forward testing areas prior to and during the Operation Teapot atomic test series (O'Connor 1996). His work detail, Wire Team B, laid miles of wire for the field telephone networks extending from observer trenches to portable field switchboards and the army command posts. The communications troops also erected the public address systems and constructed mock communications bunkers in the display areas. O'Connor recalls spending all his time on Yucca Flat rarely getting a hot meal. Before the Teapot series was over, O'Connor would witness six atomic blasts including the powerful 47 kt TURK detonation.

In addition to the Camp Desert Rock support personnel, officers and enlisted men from the Army's Infantry, Armored, and Artillery Schools took part in the spring 1955 exercise as did members of the Marine Corps, Navy, Air Force and a small contingent from the Canadian Army (U.S. Army 1955:iii). However, the number of military personnel participating in Exercise Desert Rock VI declined substantially from the levels reached during Operation Upshot-Knothole. Approximately 8,200 troops took part in Desert Rock VI compared with the 18,000 - 20,000 involved in Desert Rock V (U.S. Army 1955a:55). Part of this decrease may be attributed to a desire to avoid the logistical difficulties

experienced during the last continental testing series when shot postponements overtaxed Camp Desert Rock facilities. Another possible explanation involved funding. Exercise Desert Rock V occurred prior to the Eisenhower Administration's substantial cuts and realignment of the defense budget. In contrast, Exercise Desert Rock VI was the first atomic exercise conducted with the reduced manpower and material mandated by decreased funding.

When the observer and maneuver troops returned to Camp Desert Rock in early 1955, they faced a training and indoctrination program that essentially expanded on the organization of the previous atomic exercises. Although there was an increasingly heated debate over the need to reorganize the Army's divisional structure taking place among military planners, this had not yet filtered down to the operational level. The exercise's goal remained virtually unchanged. "[T]he mission of Exercise Desert Rock VI ... [is] to teach its soldiers to view nuclear weapons in their proper perspective ... that powerful though these weapons are, they can be controlled and harnessed ... and despite the weapon's destructiveness there are defenses against them on the atomic battlefield" (Nevada Test Organization 1955). Atomic indoctrination, "realistic" tactical maneuvers, and weapons effects data gathering projects continued to form the core of the Army's atomic training program (U.S. Army 1955a).

In order to ensure all observers an opportunity to witness at least one atomic blast, the Army worked on the testing schedule with the AFSWP and the AEC. To alleviate some of the difficulties created by shot postponements, the Army came up with a plan in which the atomic devices were scheduled so that

one high yield and one low yield test could be ready on the same day. This timetable was based on the assumption that the low yield device could be detonated with less exacting weather conditions. Unfortunately for Army planners, this schedule failed miserably and had to be discarded early in the series (U.S. Army 1955a:3)

Shot WASP was the first event of the Teapot series. Detonated on February 18, 1955, the low-yield airdrop shot was witnessed by about 1,000 troops (U.S. Army 1955a:55). Another 30 individuals participated in technical projects involving radiological monitoring and vehicle-design safety and radiation shielding. While the technical service projects slated for the event progressed smoothly, the planned indoctrination program required modification. The viewing trenches and equipment display areas prepared for the observer contingent proved unusable because of unfavorable winds. To avoid the predicted path for radioactive fallout, the soldiers watched the blast from News Nob and returned to Camp Desert Rock without completing the post-shot weapons effects tour (Maag, Ponton et al. 1981:22-23).

Exercise Desert Rock VI participation in Shot MOTH was limited to troop observer and technical programs involving approximately 260 individuals. This time the observers were able to watch the 2 kt tower detonation from the trench area. The February 22nd MOTH event would be the last shot of the Teapot series to fire on schedule. The next 13 tests would be delayed by weather or technical problems for as long as 3 weeks. The numerous postponements extended the end of the testing program from April 26 to May 15, 1955 (Ponton,

Maag, Wilkinson, and Shepanek 1981:9).

The next three shots,TESLA, TURK, and HORNET were all tower events detonated on March 1, 7 and 12, respectively. TESLA and HORNET were relatively low yield while TURK produced 47 kt of force, the largest yield of the 14 Teapot nuclear tests. Standard technical projects were performed during each blast. The TESLA and TURK tests were witnessed by more than 500 observers representing the four armed services. The trenches used for the TESLA observers were reused by the TURK participants (Maag, Ponton et al. 1981).

Marine Corps private Charles Neeld took part in Exercise Desert Rock VI (Neeld 1996). After enlisting in the Marine Corps in 1954, Neeld was stationed at Camp Pendleton as part of a maintenance company with the First Marine Division. Early in 1955, he volunteered for duty as part of the advance company headed for Camp Desert Rock. The unit was tasked with preparing facilities for the arrival of the Third Marine Corps Provisional Atomic Exercise Brigade scheduled for tactical maneuvers at Shot BEE.

Neeld's group flew into Indian Springs and boarded trucks for Camp Desert Rock. He recalls that the trucks stopped about a mile from the camp. Wanting to make an impression on the hundreds of Army troops already in residence, the 60-man Marine detachment marched the rest of the way into camp. Initially, the maintenance company spent their time erecting facilities for the soon-to-arrive tactical units. Neeld remembers setting up large canvas mess tents and tables with long legs. The Marines didn't sit down to eat. Instead, they

stood during meals placing their trays on the bar-height tables. When they first got to the camp the Marine detachment had to eat at the Army cafeteria. Housing for the Marines consisted of squad tents, cots and Marine-issue mummy-style sleeping bags.

Neeld pulled a lot of guard duty while at Camp Desert Rock. The Marines had a rotating duty shift of 4 hours on and 4 hours off. Once the Marine helicopters slated for the tactical exercise started arriving, Neeld recalls he got stuck on the graveyard guard shift. The early morning hours were cold and windy, and Neeld remembers tying down the helicopters because of the strong winds.

Private Neeld viewed at least one and possibly two shots before the Marine Corps tactical exercise. While he recalls witnessing a tower shot from News Nob, his most vivid memories are of the BEE event which he observed from trenches only 3,500 yards from ground zero.

Shot BEE, March 22, 1955, involved over 3,000 Exercise Desert Rock VI participants (Maag, Wilkinson, and Rohrer 1981). The armed services fielded the standard observer program, several technical projects, and one tactical troop maneuver during the event. The 299 officers and 1,972 enlisted men of the Third Marine Corps Provisional Atomic Exercise Brigade conducted the first battlefield simulation of the Teapot series. The unit was comprised of personnel from the 1st Marine Division and 3rd Marine Air Wing both stationed at Camp Pendleton, California. The Brigade's combat exercise included helicopter airlifts of assault troops, tactical air support, and air resupply efforts. The purpose of the

battlefield simulation was "to establish a new technique in the utilization of helicopters to air-lift a brigade from aircraft carriers to seize and hold an objective in conjunction with a friendly atomic detonation" (U.S. Army 1955a:25-26). The Marines rehearsed the maneuver several times both back at Camp Pendleton and while at Camp Desert Rock. On shot day, they executed the maneuver in good order seizing three objectives 9 miles west of GZ (U.S. Marine Corps 1955).

Charles Neeld (1996) recollects that the troops jumped up to watch the rising fireball swirling pink, purple and red. No one had warned Neeld about the shock wave. Once it hit the ionosphere, the pressure wave bounced back down to ground level knocking the Marines flat. The lower portion of the tower was still standing and he remembers the tower glowing first white and then red. Neeld watched the cloud for about a half hour until he was instructed to move away from the trench area onto a hill. From his elevated vantage point, Neeld spent the rest of the morning watching the brigade execute its tactical maneuver. Later that afternoon, his group marched through the Marine Corps display area near GZ and looked at all the damaged equipment. Neeld remembers the Marines were instructed to walk through the area with their hands in their pockets so they wouldn't be tempted to touch or pick up anything.

The next shot in the Teapot series was a subsurface test called ESS. The 271st Engineer Combat Battalion excavated the 67-foot shaft for the March 23, 1955 detonation. Observed by approximately 800 troops including technical project personnel, the blast yielded 1 kt (Ponton, Maag, Wilkinson and Rohrer

1981:24-31). While the ESS event did not entail any tactical maneuvers, it was probably the most important shot in the series in terms of battlefield nuclear weapons development. The DOD had requested LASL to create an atomic demolition "satchel" charge small enough to be carried by one person. Shot ESS may have been a test of the early prototype of this device which would eventually result in the Special Atomic Demolition Munition or "suitcase bomb" (Miller 1986:228).

Two shots, APPLE-1 and WASP PRIME, were scheduled for the morning of March 29, 1955. Exercise Desert Rock VI technical service projects including radiological defense training and atomic burst detection occurred at both events. Only the larger APPLE-1 blast involved observers. Approximately 600 military personnel watched the APPLE-1 tower detonation from trenches southwest of GZ. Most of the observers were from the camp's permanent support contingent.

After the non-exercise HA and POST events, the next shot with Desert Rock VI participation occurred on April 9, 1955. Shot MET (Military Effects Tests) involved multiple technical service projects ranging from measuring the effects of radiation on summer and winter uniforms of the Chinese, Soviet, and American military to determining the effects of a nuclear blast on shipping containers (U.S.Army 1955a). Another 160-plus Camp Desert Rock support troops took the opportunity to witness an atomic detonation (Ponton, Maag, Wilkinson and Rohrer 1981:163). Uncharacteristically, the tower shot fired at mid-morning. Although the daylight diminished the visual impact of the fireball,

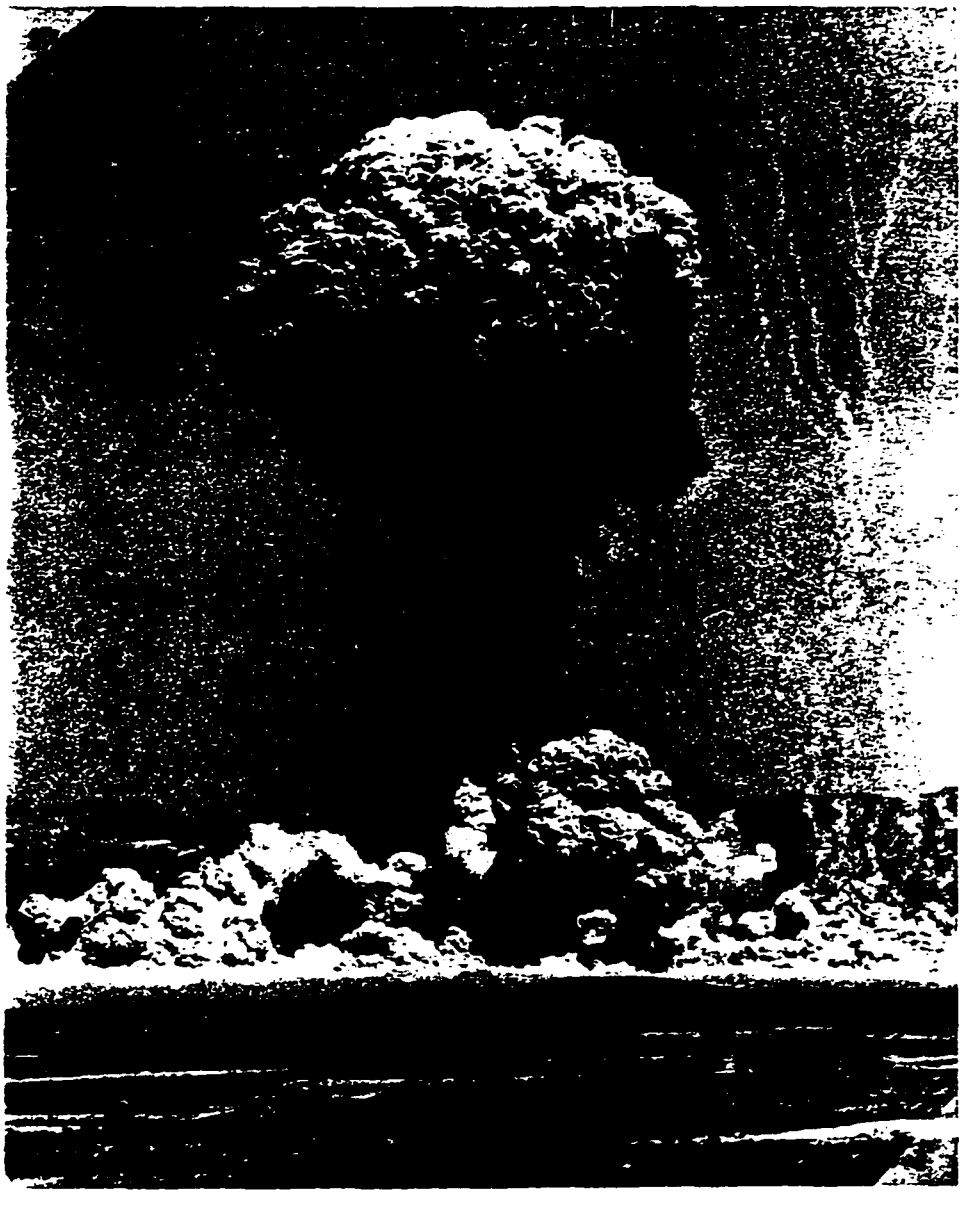

Figure 8. The mushroom cloud from Shot MET. April 15, 1955. Note the equipment display area in the foreground (*U.S. Air Force*).

the mushroom cloud provided an impressive sight (Figure 8).

A period of intense activity preceded the May 5th APPLE-2 shot. The tower detonation would be a major media event incorporating both a large-scale civil defense project and military operations. The FCDA constructed an extensive "Doom Town" complete with furnished two-story houses with kitchen appliances, paved streets, automobiles, and mannequin "residents." Remote cameras would film the town as the device exploded. Civil defense officials and reporters would observe the blast from trenches (Ponton, Wilkinson and Rohrer 1981; Uhl and Ensign 1980:77-78).

Military personnel would also view the detonation. The volunteer officer observer program initiated during Operation Upshot-Knothole was scaled back to only one event for Exercise Desert Rock VI. Originally scheduled in conjunction with Shot TURK, the project was re-scheduled for APPLE-2 because of weather-related delays. Another 750 troops took part in the regular observer/indoctrination program (Ponton, Wilkinson et al. 1981:20-22). A group of VIPs, U.S. and Canadian military personnel, and civilian officials also witnessed the blast. For the first time the presence of a female military observer,Lieutenant Colonel Francis Gunn, Chief Nurse of the Sixth U.S. Army was recorded (Miller 1986:233).

Shot APPLE-2 marked the Army's only tactical maneuver conducted during the 1955 series. The stated purpose of the troop combat test was "to determine the capability of a reinforced tank battalion to exploit immediately an atomic attack by capitalizing on the combined shock and casualty producing

action of the atomic explosion and attacking armor to seize an objective" (U.S. Army 1955a:22). The 1,000 Task Force Razor troops consisted of a tank battalion, units from armored infantry and artillery battalions, an armored engineering platoon and air support from a provisional aviation unit. The original concept for the maneuver required the task force to depart Camp Irwin and march straight through to Yucca Flat timing their arrival to coincide with the atomic detonation. Unfortunately, multiple shot postponements disrupted the timetable and Task Force Razor spent almost two weeks bivouacked in a staging area in Midvalley near the southwest edge of Yucca Flat (Uhl and Ensign 1980:75). Task Force Razor was finally able to execute their battle simulation the morning of May 5, while the VIP's and media observers watched from bleachers erected at a vantage point on Mine Mountain (U.S. Army 1955b).

The APPLE-2 event signalled the end of Desert Rock VI participation in Operation Teapot. Once the shot activities ended, support units began the standard camp closure procedures. Task Force Razor departed on an overland march back to Camp Irwin. The observer personnel returned to their home stations via Indian Springs and Las Vegas. Camp Desert Rock returned to standby status.

In spite of the serious scheduling delays and problems with radioactive fallout hazards, DOD planners were committed to continuing the Exercise Desert Rock atomic training and indoctrination program. Although the "Final Report of Operations" for each of the exercises mentioned a variety of

difficulties, the major problems were always attributed to factors beyond the military's control. The basic premise of the operation was never questioned and the recommendations for future exercises usually focused on the need for more "realism," administrative improvements, or expanded facilities.

Following the established pattern, the after-action report of Exercise Desert Rock VI made a series of recommendations for future atomic maneuvers at the NTS (U.S. Army 1955a:ii). The document authors advocated the construction of additional buildings at the camp for the 1957 exercises capable of housing a total of five thousand personnel. The need to find a more suitable water source to replace the inefficient water service from Indian Springs remained a priority. There was also a recommendation to designate Camp Desert Rock a sub-post of Camp Irwin in California which would allow the concentration of all pre-exercise planning and operations in one headquarters. These recommendations would be incorporated into the operational plan already in progress for the next continental testing series scheduled for 1957.

Operation Plumbbob

Operation Plumbbob was the most ambitious program of atmospheric testing ever held at the NTS (Table 8). Originally designated Operation Pilgrim, the series was slated to begin on March 15, 1957 (Harris et al. 1981a:32; U.S. Army 1958:2). Delays in the AEC planning program forced a rescheduling of the series start date for April 24, 1957. Renamed Operation Plumbbob, the 24 nuclear detonations and six safety experiments spanned more than six months

finally ending on October 7th. The series included extensive programs sponsored by the AEC, DOD and FCDA. Primary objectives of the operation were to determine the suitability of a variety of nuclear devices for inclusion in the defense arsenal, to evaluate and refine the military's atomic indoctrination and tactical training procedures, and to assess nuclear weapons effects on fortifications and service equipment. Concerned about the safety of the nuclear stockpile, AEC and DOD scientists also conducted a series of safety experiments designed to ensure that nuclear reactions would not occur if the high explosive components of a nuclear weapon were inadvertently detonated during storage or transport. Civil defense related projects included tests of civilian shelters, radioactive fallout studies and the biological effects investigations (Harris et al. 1981a:34).

During the Plumbbob series, the testing emphasis shifted from tower-mounted to balloon-suspended devices due in large part to increasing public and political pressure to limit the amount of radioactive fallout (Figure 10). Eliminating the tower structure and raising the height of the detonation reduced the amount of material (steel and soil) vaporized by the blast thereby decreasing radioactive particulate. The first tunnel detonation also took place during the Plumbbob operation. The PROJECT 57, COULOMB A and B, PASCAL A and B, and SATURN tests were all safety experiments that involved either no yield or low yield detonations. No Desert Rock participation is recorded for any of these tests (Harris et al. 1981a; U.S. Army 1958).

Table 8. Summary of Operation Plumbbob Events (adapted from Harris et al. 1981a:41-42).

SHOT	DATE	LOCAL TIME	LOCATION	TYPE OF DETONATION	YIELD	DESERT ROCK PARTICIPATION
PROJECT 57*	04/24/57	0627	Area 13	Surface	0 kt	No
BOLTZMANN	05/28/57	0455	Area 7	Tower	12 kt	Yes
FRANKLIN	06/02/57	0455	Area 3	Tower	140 tons	Yes
LASSEN	06/05/57	0455	Area 9	Balloon	0.5 tons	Yes
WILSON	06/18/57	0455	Area 9	Balloon	10 kt	Yes
PRISCILLA	06/24/57	0630	Area 5	Balloon	37 kt	Yes
COULOMB A*	07/01/57	1030	Area 3	Surface	0 kt	No
HOOD	07/05/57	0440	Area 9	Balloon	74 kt	Yes
DIABLO	07/15/57	0430	Area 2	Tower	17 kt	Yes
JOHN	07/19/57	0700	Above Area 10	Air to Air Missile	<2 kt	Yes
KEPLER	07/24/57	0450	Area 4	Tower	10 kt	Yes
OWENS	07/25/57	0630	Area 9	Balloon	9.7 kt	Yes
PASCAL A*	07/26/57	0100	Area 3	Shaft	slight	No
STOKES	08/07/57	0525	Area 7	Balloon	19 kt	Yes
SATURN*	08/09/57	1800	Area 12	Tunnel	0 kt	No
SHASTA	08/18/57	0500	Area 2	Tower	17 kt	Yes
DOPPLER	08/23/57	0530	Area 7	Balloon	11 kt	Yes
PASCAL B*	08/27/57	1535	Area 3	Shaft	0.3 kt	No
FRANKLIN PRIME	08/30/57	0540	Area 7	Balloon	4.7 kt	Yes
SMOKY	08/31/57	0530	Area 8	Tower	44 kt	Yes
GALILEO	09/02/57	0540	Area 1	Tower	11 kt	Yes
WHEELER	09/06/57	0545	Area 9	Balloon	197 tons	Yes
COULOMB B*	09/06/57	1305	Area 3	Surface	300 tons	No
LAPLACE	09/08/57	0600	Area 7	Balloon	1 kt	Yes
FIZEAU	09/14/57	0945	Area 3	Tower	11 kt	Yes
NEWTON	09/16/57	0550	Area 7	Balloon	12 kt	Yes
RAINIER	09/19/57	1000	Area 12	Tunnel	1.7 kt	No

WHITNEY	09/23/57	0530	Area 2	Tower	19 kt	Yes
CHARLESTON	09/28/57	0600	Area 9	Balloon	12 kt	Yes
MORGAN	10/07/57	0500	Area 9	Balloon	8 kt	No

* Safety Experiments

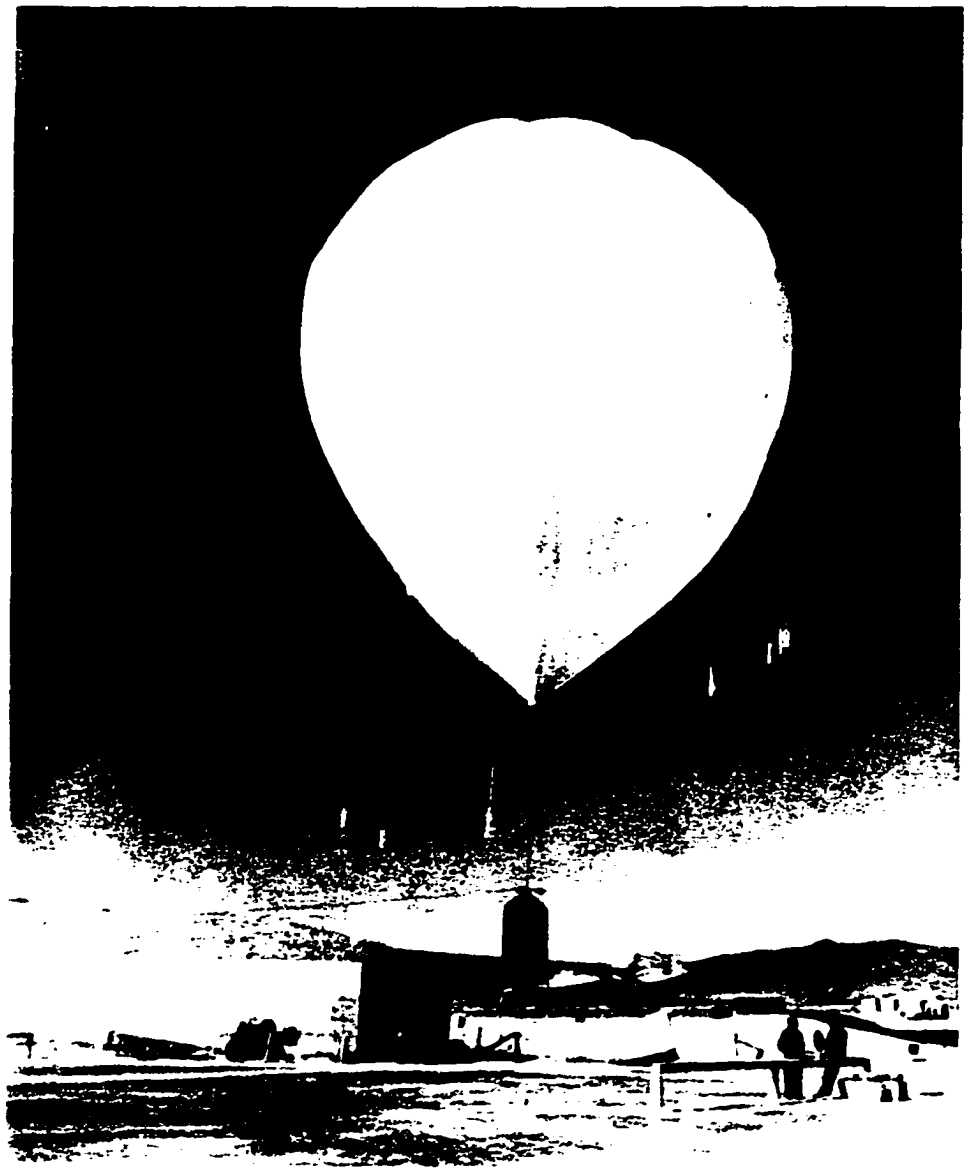

Figure 9. The LASSEN event, June 5, 1957 was the first use of a balloon test platform (*Reynolds Electrical and Engineering Company*).

Exercise Desert Rock VII and VIII

Advanced planning for Exercise Desert Rock VII and VIII began in July 1956 with reopening of Camp Desert Rock slated for January 2, 1957 (U.S. Army 1958:1-2). As in the past, the supervision of Exercise Desert Rock VII and VIII rested with the U.S. Sixth Army Headquarters at the Presidio of San Francisco. Lieutenant General Robert N. Young fulfilled the role of Exercise Director. Acting on recommendations based on the Exercise Desert Rock VI after-action report, primary responsibility for organizing the exercise and administering the camp fell to the Commanding General and staff of Camp Irwin, California. Brigadier General William A. Jensen (Figure 10) functioned as the onsite Deputy Exercise Director and Camp Commander (Nevada Test Organization 1957a:21).

Logistical and administrative difficulties noted at previous exercises continued to plague Exercise Desert Rock VII and VIII activities (U.S. Army 1958). The constant rotation of support service staff into and out of Camp Desert Rock proved increasingly unworkable and efforts to stabilize permanent party personnel continued as a priority for future operations planning. Lack of regular personnel with appropriate security clearance remained an ongoing problem with many support troops obtaining only limited clearance thereby curtailing their access to forward areas. Camp facilities-related difficulties continued to focus on the absence of a local source of well water, the lack of adequate maintenance shop facilities, the dependence for most electrical service on Camp Mercury, and the inadequate capacity of the sewage system. Because

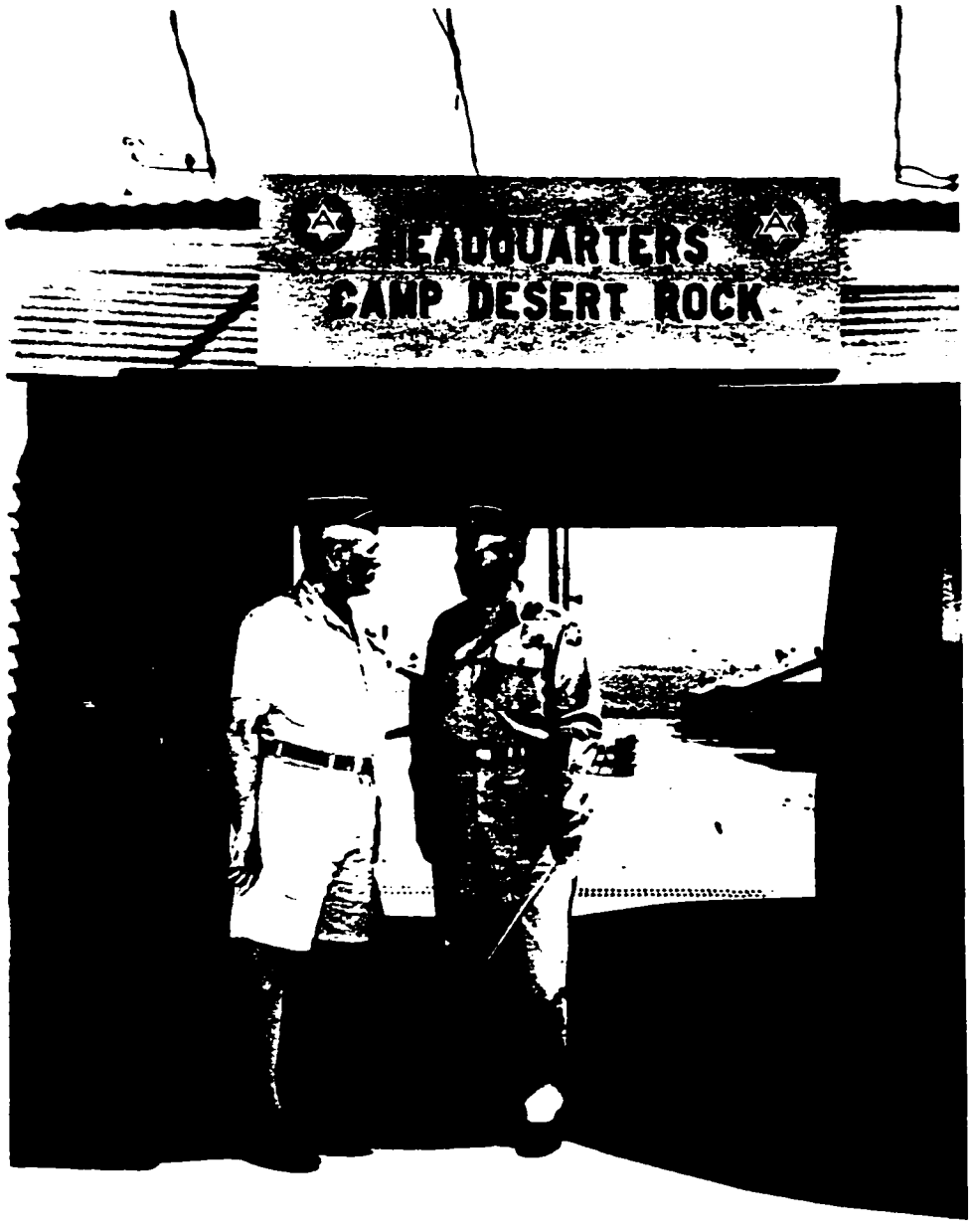

Figure 10. Brigadier General William A. Jensen (right), Deputy Director of Exercise Desert Rock VII and VIII, standing in front of the new camp headquarters building, June 29. 1957 (*U.S. Army*).

the Plumbbob series extended through the extremely hot summer months, refrigerated storage capacity became an issue for the first time (U.S. Army 1958:71-75).

Weather-related scheduling delays probably created the greatest difficulties for the Exercise Desert Rock VII and VIII administration. As with the Upshot-Knothole and Teapot operations, the 1957 exercises included large numbers of troops (13,000+) with some of the Exercise Desert Rock VII and VIII units slated to take part in two shots, one low yield and one high yield detonation. The Army developed a timetable to accommodate the two-shot training emphasis, but delays in the AEC controlled experiment program, unfavorable weather conditions and even one device misfire necessitated continual revisions in the exercise schedule with some shot delays extending nearly 3 weeks.

Exercise Desert Rock VII and VIII incorporated a variety of training and service-related projects including technical service projects, indoctrination programs, simulated combat maneuvers, troop tests, and operational training projects. Beginning with the 1955 testing program, the Desert Rock Exercise Director had been placed in charge of a series of DOD sponsored data gathering technical projects. These involved everything from the detection and tracking of radioactive clouds, to the evaluation of water decontamination methods and the assessment of protective shielding for heavy equipment and fortifications. Desert Rock VII and VIII personnel were involved with logistical support and monitoring of these technical projects at 22 of the 30 Operation

Plumbbob events (Harris et al. 1981a:81-96; Robotti 1957).

The observer orientation and indoctrination program for the Plumbbob series was similar to those held at the other Desert Rock exercises. The program emphasized the dissemination of the newly-learned information by the observer participants to non-participants upon returning to their home stations. Troops not previously schooled in special (nuclear) weapons were required to undergo this training. They then participated in detailed lectures and films on the shot program, special exercise procedures, security, and radiological safety, followed by pre-and post-shot tours of the forward area equipment displays. Personnel with previous atomic training received special instruction in advanced subjects. Observers scheduled for the Plumbbob series included Army, Navy, Air Force, and Marine personnel, members of the Canadian Army, and a special group of volunteer observers. Members of the camp's support staff were also required to witness at least one detonation during the series (U.S. Army 1958:15). Army sponsored equipment displays erected for the purpose of demonstrating the effects of an atomic blast on various types of field equipment were originally planned for four of the Plumbbob shots - PRISCILLA, SHASTA, SMOKY, and NEWTON. However, the Army fielded displays only at the PRISCILLA and SMOKY events because of the numerous delays and changes in the shot schedule. The Marines adapted their equipment display to Shot HOOD after the postponement of DIABLO (U.S. Army 1957:5, 1958:16).

The BOLTZMANN event marked the first Exercise Desert Rock VII and VIII participation in the 1957 testing program. Approximately 176 Camp Desert

Rock support troops as well as 134 Navy and Air Force personnel witnessed the 12 kt tower event detonated in Yucca Flat as part of the observer program. The army also fielded two technical service projects at this event along with radiological training activities (West et al. 1981:19-24).

The low-yield FRANKLIN shot, another tower event, involved only minimal participation by Desert Rock units. Army personnel conducted ordnance material tests and radioactive cloud tracking. Less than 30 soldiers took part in the June 2 event (U.S. Army 1958:91).

Shot LASSEN was the first balloon-suspended device ever fired as part of the atmospheric testing program. Yielding only 0.5 tons of force, the device exploded over Area 9 in the early morning hours of June 5, 1957. Just over 200 Camp Desert Rock support troops watched the blast from News Nob while another 30 soldiers conducted cloud-tracking and ordnance materials tests (West et al. 1981:65).

More than 850 Desert Rock exercise troops participated in the various programs and projects held in conjunction with the June 18th Shot WILSON. The balloon-suspended device yielded approximately 10 kt. Nearly 560 of the troops were involved in a technical service project to detect atomic burst and radioactive fallout. The remainder took part in a variety of other technical projects and radiological training and observer programs (West et al. 1981:83-89).

The PRISCILLA event consisted of the detonation of a type of device that was already part of the nuclear arsenal (Figure 11). The principal objective of

Figure 11. The June 24, 1957 PRISCILLA event was witnessed by more than 1,000 Exercise Desert Rock VII and VIII participants (*Department of Energy*).

the test was to correlate known yield and blast characteristics with their effects on military equipment, materials, fortifications, and ordnance. The AFSWP and DOD fielded 34 scientific projects for the PRISCILLA balloon-shot making it one of the largest military effects tests ever conducted (Viscuso et al. 1981:11). The event also included Exercise Desert Rock observer and operational training programs. More than 1,100 observers witnessed the 37 kt blast over Frenchman Flat the morning of June 24, 1957. Split into two groups, personnel either watched from an open area or trenches. Individuals representing the Army, Marine Corps, Navy, Air Force, and the Canadian Army saw the detonation along with 10 civilian observers. As with all other nuclear tests involving Desert Rock personnel, soldiers from the 50th Chemical Platoon served as radiological safety monitors. The observers participated in post-shot tours of the military equipment display area. The PRISCILLA equipment displays were also used to illustrate weapons effects damage to participants in later tests (U.S. Army 1957, 1958).

Marine Corps Second Lieutenant Thomas H. Saffer turned 23 years old just days after witnessing the PRISCILLA event (Saffer and Kelly 1982). Watching from the trench area, he described the blast as follows:

> At zero, I heard a loud click. Immediately, I felt an intense heat on the back of my neck. A brilliant flash accompanied the heat, and I was shocked when with my eyes tightly closed, I could see the bones in my forearm as though I were examining a red x-ray...a thunderous rumble like the sound of thousands of stampeding cattle passed directly over head... The earth began to gyrate violently... I was being showered with dust, dirt, rocks, and debris...After the shaking subsided ... We watched the multicolored fireball ascend rapidly. Nearly 20,000 feet high, it was red, white,

> gray, and beige and looked like a double tiered mushroom...As it rose, burning gases roared like a mammoth forest fire (1982:43-46).

PRISCILLA would be the smaller of the two events Lt. Saffer witnessed that summer. His regiment was part of the Fourth Marine Corps Provisional Atomic Exercise Brigade out of Camp Pendleton, California. The brigade was scheduled for combat maneuvers in an upcoming event.

The first tactical maneuvers held during Exercise Desert Rock VII and VIII occurred as part of the July 5th HOOD detonation. Originally, the combat exercise performed by the Marine Brigade was to have taken place with Shot DIABLO scheduled for June 25, 1957 (U.S. Marine Corps 1957). However, an electrical problem pre-empted the DIABLO detonation leading to a 2-3 week postponement. With expenses mounting and more troops slated to arrive at Camp Desert Rock, the decision was made to shift the Marine Corps operation to Shot HOOD. The HOOD event was the largest atmospheric test ever conducted at the NTS (Harris et al. 1981a). With an output of 74 kt, the experimental balloon-suspended device exceeded the maximum yield of previous tests by 13 kt and it was more than 30 kt greater than any of the other tests in which a battlefield maneuver was performed.

The Marine Corps combat exercise involved over 2,100 troops coordinated in an air-ground assault on an objective near GZ. After observing from trenches, the Marines engaged in an advance on the objective involving a helicopter airlift and a ground attack supported by artillery and tactical aircraft. The assault simulation and a post-shot tour of the Marine's equipment display

lasted into the afternoon hours. A number of Marines suffered from heat exhaustion during the activities (Maag, Wilkinson, Striegal et al. 1981:30- 44).

The next eight non-safety experiment tests in the Plumbbob Series took place between mid-July and the end of August 1957 and involved approximately 4,000 -5,000 Exercise Desert Rock VII and VIII personnel (U.S. Army 1958). All eight of these events - the rescheduled DIABLO, JOHN, KEPLER, OWENS, STOKES, SHASTA, DOPPLER, and FRANKLIN PRIME - consisted of observer indoctrination programs, typical technical data gathering projects, and radiological safety training. No troop maneuvers took place at any of these shots. However, many of the observers at the last four tests were members of Army Task Forces Warrior or Big Bang. These troops participated in the tactical maneuver and psychological field test at the SMOKY and GALILEO events (Maag and Ponton 1981).

The 12th Infantry First Battle Group from Fort Lewis, Washington arrived in Camp Desert Rock on July 20, 1957. Part of Task Force Warrior, the group represented the first "pentomic" unit to participate in an actual nuclear test. According to Donald Coe, a 24-year old private first-class, they billeted in the "tent city" adjacent to the permanent portion of the camp. Quarters consisted of dirt-floored, 11-man squad tents furnished with cots. Latrines were open trenches and shower facilities consisted of portable water bags held aloft on poles. While waiting for the SMOKY event exercises, Coe recalls practicing combat maneuvers on the flatland during the day and spending evenings playing cards. Because of multiple postponements, his unit also observed 4

other shots prior to the SMOKY event (Rosenberg 1980:90-91).

Arriving at Camp Desert Rock in mid-August 1957, Corporal Russell Jack Dann and about 160 other members of the 82nd Airborne Division would also take part in Shot SMOKY (Rosenberg 1980:5-19). A provisional company out of Fort Bragg, North Carolina, Dann's unit was part of Task Force Big Bang scheduled to conduct combat maneuvers designated Exercise Hill and Dale. The company flew into Indian Springs on August 12. Although Camp Desert Rock had an airfield, the runway was not long enough or sturdy enough for transport planes. The camp's airstrip was mainly used by small commuter planes carrying personnel between the NTS and the scientific laboratories.

The airborne troops expected to tackle the combat maneuvers within a few days of arrival, but nothing went as planned. Instead, Dann's group took part in a battery of pre-shot HumRRO tests (Rosenberg 1980:105-106). The examinations included interviews, questionnaires, and field agility tests. Prior to the SMOKY shot, Corporal Dann remembers that the HumRRO researchers had his group repeatedly practice disassembling and reassembling their rifles and running an infiltration/obstacle course.

As a 21-year old Army private with the 496th Quartermaster Company out of Fort Lee, Virginia, William H. Hodson also recalls participating in SMOKY (Freeman 1981:171-205). Members of his unit were assigned to form a composite Quartermaster Petroleum Supply Company charged with supplying the Task Force Warrior tactical troops. Even though he was with a supply unit, Hodson witnessed SMOKY from the trench area with several hundred other

observers. When his unit arrived at Camp Desert Rock the last week of August 1957, they were assigned to quarters in the "tent city." According to Hodson, this area was known as "Camp Murray" and housed most of the temporary personnel involved in maneuver or observer programs. He recalls the tent city contrasted markedly with the main camp, where barracks were a combination of tents, quonset huts, and other prefabricated buildings. Hodson noted that the barracks in the main cantonment had names like the "Oasis Hilton."

After nearly two weeks of technical and weather-related delays, the Army conducted its only tactical maneuver of the Plumbbob series at the SMOKY event, August 31, 1957. Over 450 observers and 1,200 tactical troops (Task Force "Warrior") participated in the 44 kt tower shot detonated in the hilly terrain of NTS Area 8. Another 580 military personnel took part in the technical service projects (Harris et al. 1981b). The HumRRO sponsored psychological tests were also slated for the SMOKY detonation, but high radioactivity levels in the test area required their postponement.

No specific information describing the simulated battlefield situation employed during the exercise has been located. However, it is probably safe to assume that is was not much different from the scenarios employed during previous exercises. These simulations centered on repelling a large aggressor force that had advanced to a position extending from central California across Nevada (U.S. Army 1951a, 1952a, 1953a).

Although the combat scenario may not have altered significantly, the Army's divisional organization had undergone major changes since the last

atomic exercises. The Desert Rock VII and VIII exercises were the first to incorporate the new tactical nuclear doctrine. Building on the U.S. Continental Army Command's directive "to depict atomic warfare as the typical and to treat non-atomic warfare as modification of the typical" in training and exercises, Army planners had finally settled on a reorganizational scheme in 1956 (Rose 1980:88-89). After nearly two years of debate, the strategists decided to convert from the traditional triangular infantry division structure with three regimental combat teams to a five battle group or "pentomic" composition. Each of the new battle groups would be self-contained units capable of independent operations (Rose 1980:90). The "Pentomic" division would retain dual capabilities in keeping with the Army's mission of fielding units able to fully exploit the effects of tactical nuclear firepower while maintaining (albeit somewhat reduced) conventional warfare readiness. Mobility and independence would be crucial for the unit's successful functioning.

The maneuvers held in conjunction with shot SMOKY provided the first opportunity to field the "Pentomic" division designed specifically to take advantage of atomic firepower. Task Force "Warrior" was composed of infantry and artillery units drawn from Fort Lewis, Washington along with helicopter units from Fort Benning, Georgia and Fort Bragg, North Carolina. The Task Force also included a small Canadian Army contingent consisting of an infantry unit (Harris et al. 1981b). These units were supported by the smaller task force of Army paratroopers. The airlifting of troops and air resupply were a key component of the Pentomic units emphasis on mobility (Harris et al. 1981b).

Curiously, the "Final Report of Operations" (U.S. Army 1958) only mentions the Army's structural reorganization once and never identifies the Pentomic division by name. The tactical maneuver is discussed only in the most general terms. However, a press release circulated after the exercise does extol the virtues of the Army's new Pentomic organization. Exercise Director, Brigadier General Jensen is quoted:

> The Army once again has participated in a Nevada test series and believe, has benefitted greatly by the experience. Employing for the first time the troops of the new Pentomic unit, we have shown that despite a nearby blast of a nuclear weapon, we can advance rapidly through the air to exploit that blast by seizing and holding forward positions from which to launch additional strikes into enemy territory. This, after all, is the pay-off in battle and we must be extremely adept at it. The series this year greatly helped our planning for these phases of atomic conflict (Nevada Test Organization 1957b:1-2).

In addition to typical observer and technical projects,Shot GALILEO was used for the psychological tests originally scheduled for SMOKY. After the 11 kt tower detonation, Task Force "Big Bang" took part in several tests designed to measure their psychological reactions to an atomic blast. Members of a provisional company of the 82nd Airborne Division, these troops performed rifle disassembly-assembly tests immediately after the event (Rosenberg 1980:127-129). The test subjects then moved to a specially prepared area approximately 3,200 meters from the SMOKY event GZ and negotiated a combat infiltration course consisting of barbed wire obstacles (Ponton, Wilkinson, Striegel et al. 1981:11-32). Unfortunately, the psychological value of these tests was minimal since the original premise and methodology had been compromised by the

rescheduling (U.S. Army 1958:40).

Six of the last eight weapons development tests of Operation Plumbbob (WHEELER, LAPLACE, FIZEAU, NEWTON, WHITNEY, and CHARLESTON) involved only minimal participation by Exercise Desert Rock personnel (Massie and Rohrer 1981; U.S. Army 1958). All of the tactical and observer troops departed the camp within a day or two of the GALILEO event. Less than 30 members of the Camp Desert Rock support staff witnessed each of these events. Only two of the technical projects - radioactive cloud tracking and atomic burst detection - were fielded for these shots (Robotti 1957).

Immediately after the August 31 GALILEO event, the support staff began close-out procedures at Camp Desert Rock (U.S. Army 1958). This included the dismantling of all the tents in both the visitor and main cantonment area. Vehicles and extra equipment and supplies were loaded onto trucks and transported to other active military installations either by road or by rail. Much of the material returned to Camp Irwin. As tasks were completed, the various support units returned to their home stations. Camp Desert Rock reverted to standby status on October 1, 1957 with only a small caretaker staff remaining on-site.

It is clear from the after-action reports that the military intended to continue atomic exercises at the NTS beyond 1957. The Army's "Final Report of Operations" for Exercise Desert Rock VII and VIII makes suggestions for future nuclear indoctrination and maneuver planning and, in a cover letter attached to the report, even mentions "Desert Rock IX" (U.S. Army 1958:ii). In many

respects, the conclusions section of this report echoed many of the concerns raised after previous exercises particularly in regard to support staff fluctuations, security clearance difficulties, an inefficient water supply system, inadequate maintenance facilities, delays in the shot schedule, and a need for increased "realism" in the tactical simulations. Recommendations based on these conclusions suggested that stabilization of the support contingent personnel and additional lead time prior to reactivation of the camp should be a priority for future operations planning. The report also included recommendations for new construction projects and substantial renovations of the older Camp Desert Rock facilities.

However, frustration with the repeated weather delays and the inhibiting but unavoidable restrictions imposed by the AEC lead the report authors to raise a new issue for consideration. The report advocated a study to explore the feasibility of conducting atomic training exercises on a military reservation rather than at the AEC controlled test site. The objective would be the "integration of atomic training into annual training programs on a regularly scheduled basis at an atomic training center" (U.S. Army 1958:71). The report went on to suggest that,

> Training and troop tests should involve the actual employment of low-yield atomic weapons delivered by tactical means under the control of and at the will of the commander. Toward this end, planning should commence without delay. A suitable area (or areas) should be developed where this type of training can be conducted on a regularly scheduled annual basis" (U.S. Army 1958:77).

However, none of these recommendations were ever acted upon. Desert

Rock VIII was the last in the Army's series of atomic military exercises held at the NTS. Growing national and international public pressure concerning radioactive fallout and the escalation of the nuclear arms race led the U.S. to propose a ban on nuclear testing (Hewlett and Holl 1989:XVII-1). Agreed to by the U.S., Soviet Union, United Kingdom, and France, the international nuclear testing moratorium went into effect October 31, 1958. Although the moratorium would eventually be broken in 1961, it effectively ended the military operations at Camp Desert Rock. When nuclear testing resumed at the NTS in 1962 with Operations Nougat and Storax, the focus was on underground detonations. Only a small number of atmospheric tests were conducted that summer before the permanent Limited Test Ban Treaty became effective in 1963 (U.S. DOE 1994:10-17). Tactical troops participated in one of those events, the July 14, 1962 SMALL BOY shot. Approximately 900 troops executed a battlefield maneuver on Frenchmen Flat after the detonation of a low yield tower-mounted device. Attorney General Robert Kennedy and General Maxwell Taylor observed the blast and battlefield exercise, the last U.S. nuclear test to involve tactical forces (Las Vegas Sun [LVS] 15 July 1962:1).

Even if atmospheric testing had not ended, the political climate of the 1960s was no longer receptive to an aggressive tactical nuclear doctrine. The Kennedy administration ushered in another series of significant nuclear policy changes reflecting a pronounced movement away from tactical nuclear operations. In May 1961, Kennedy instructed the army to alter its divisional organization to reflect a structure more suited to "flexible response" operations

emphasizing non-nuclear warfare (Van Cleave and Cohen 1978:6). Much of the tactical nuclear weapons program was replaced by a renewed emphasis on nuclear deterrence through upgrading and fortification of America's land- and sea-based strategic nuclear weapons systems and increased production of conventional weapons. Kennedy's "flexible response" policy caused the Army to redirect its focus to fighting and winning nonnuclear battles (Rose 1980:76). The mission that led to Camp Desert Rock's creation no longer existed.

Camp Desert Rock continued on caretaker status into the early 1960s, but eventually the facility was deactivated. It was used by the AEC at least once in 1962. During Operation Nougat, overcrowding in Mercury required the AEC to house contractor personnel at the camp (Defense Atomic Support Agency 1962:4). Although it is possible the troops involved in the 1962 SMALL BOY event bivouacked at Camp Desert Rock, there is no evidence indicating that the camp was reactivated for this exercise. In 1964, the Camp Desert Rock land was annexed for an NTS expansion. AEC sponsored upgrades and expansions of the Desert Rock airstrip eventually led to the camp's dismantling in the late 1960s (McKinnis 1996).

Life in the Camp

The historical context of Camp Desert Rock is not complete without a discussion of routine camp activities. Official documents provide only limited information about the day-to-day operation and physical makeup of Camp Desert Rock. Newspaper stories, magazine articles, photographs and

especially oral histories provide the best insight into daily life and the appearance of the camp.

Daily Activities

Like all Army garrisons, Camp Desert Rock adhered to the typical military regime. Each day a bugler sounded morning reveille over the camp public address system. The troops fell in for morning roll call as the flag was raised. Every evening during retreat formation, the colors were lowered accompanied by the firing of a 105-mm howitzer. Beginning with the 1952 exercises, at least one Army band unit was part of the regular support detachment (U.S. Army 1952a, 1952b). The band played during the retreat formation.

The support troops assigned duties in the forward areas usually moved out at dawn and spent the entire day away from the camp. However, the camp was still full of general administrative personnel and the maintenance and service troops such as the administrative aides, clerical staff, medics, mechanics, firefighters, quartermaster supply troops, switchboard operators, and food service personnel.

Activity increased for the Visitor's Bureau and atomic orientation instructors once the test series actually began and the observer, tactical, and VIP personnel started arriving in camp. The Visitor's Bureau was responsible for assigning quarters for the temporary troops and VIP guests as well as giving them a general camp orientation. Most temporary personnel received an "information guide" produced by the Visitor's Bureau for each of the Desert Rock

Exercises (U.S. Army 1951b, 1952b, 1955c). In it they found a brief history of the camp, a summary of the exercise objectives, the locations of various services and offices, specific security and safety regulations, and general information on appropriate clothing and typical desert hazards. By 1957, the Visitor's Bureau was also responsible for producing the "Information Activities and Daily Bulletin" and a camp newspaper (Anonymous 1957 Memo 1:3).

The Instructor Group provided newly arrived personnel with atomic weapons orientation and radiological safety lectures. Since troops rotated through the camp every few days, classes took place constantly. The assembly halls and both theater areas were used for the various classes (U.S. Army 1952a, 1953a).

For the tactical troops the daily routine was a little different, but just as mundane. Thomas Saffer recalls departing the Marine Corps Air Station, El Toro, California on June 18, 1957. Saffer recollects practicing the tactical exercise many times prior to departing for Camp Desert Rock. Before the Marines left California, each brigade member was photographed in front of an artificial desert scene. Over the summer, the public relations office released the pictures to the Marines' hometown newspapers along with a story on the atomic exercise. After flying into Indian Springs Air Force Base, the troops proceeded by truck to Camp Desert Rock and moved into waiting tent quarters set up by an advance party. Each Marine received a copy of a booklet entitled "Camp Desert Rock Information" (Saffer and Kelly 1982:20-29).

During Saffer's two and a half week stay in Nevada, the Marine Corps

Brigade filled the days with drills, battlefield rehearsals, indoctrination lectures, and general maintenance or guard duty. Saffer was in charge of a work detail responsible for refurbishing observation trenches in the forward areas (Saffer and Kelly 1982:54). Most of the troops spent their free time in the service clubs or recreational areas of the camp. Occasionally the soldiers were granted liberty.

Corporal Dann's time in Camp Desert Rock wasn't nearly as spartan or regimented as Saffer's. His airborne unit stayed in the main portion of Camp Desert Rock as did the helicopter battalions, the elite Army Pathfinder teams, and the Canadian Army units (Rosenberg 1980:94-104). There were housed in quonset huts that slept 20 men. The airborne unit attempted to maintain a regular routine while waiting for the shot. The paratroopers performed an early morning physical training regime that was neither appreciated nor emulated by the regular support troops. Airborne units didn't have any specific maintenance duties, so once they had squared away the barracks they were able to spend a lot of time in the camp's service clubs. On Saturdays, the airborne troops had their weekly inspection by the company commander.

Shot days broke up the regular camp routine. The camp had a special signal when a test was eminent. If the warning light on top of the Camp Desert Rock headquarters flagpole turned to green, the conditions for the shot were a "go" (Rosenberg 1980:113; Saffer and Kelly 1982:40). Because some of the key scientific experiments required darkness, many of the atomic tests were scheduled for the hour just before sunrise. Wind conditions were also the best

before dawn. Exercise Desert Rock participants remember leaving for the exercises between midnight and 2:00am. After a hurried breakfast, the soldiers assembled for a special roll call where film badges would be issued to those required to wear them. The troops then boarded large flatbed trucks with slatted sides for the one-and-a-half to two hour ride (Rosenberg 1979:115). After arriving in the forward areas, they would be given another pre-shot briefing on the required safety procedures. After the shot, the troops would spend much of the morning and sometimes the afternoon in the forward areas touring the equipment displays or conducting the battlefield exercises. Those personnel involved in the technical projects might spend the entire shot day in the test area before returning to Camp Desert Rock (U.S. Army 1951c, 1951d, 1952a, 1953a, 1955a, 1958).

In the early operations, tests were occasionally scheduled for Sundays. Public relations concerns led AEC officials to end this practice. Sunday was usually a quiet day in camp with only minimal official duties and regularly scheduled religious services.

Military chaplains met most of the religious needs of the troops. The Army chaplains held at least one Catholic mass and one Protestant service on Sunday mornings. During the 1951 exercises, services for the Latter Day Saints took place on Wednesday evenings and Jewish soldiers could board a bus into Las Vegas to attend Friday night services at one of the local synagogues (Army 1951b). Occasionally, visiting priests or ministers would perform services on-site. When the Marine Corps exercise units were in camp, the brigade chaplain

conducted additional services (Saffer and Kelly 1982:35).

Recreation

The isolation of Camp Desert Rock made recreational facilities a priority. The camp had three services clubs - an officer's club, a NCO club, and an enlisted men's beer hall. The clubs could get a bit rowdy, especially the beer hall with its constantly blaring jukebox (Rosenberg 1980:111). Members from all services mingled in the clubs and occasionally fights broke out. Over the years, softball fields and a volleyball court were added to the camp. The open-air theater showed nightly movies weather permitting. The indoor assembly hall/theater also screened movies whenever scheduling allowed. Occasionally, the theater was used for more risque pursuits. George Younkin (1996) remembers being ordered to the assembly hall one evening for what he thought was a special training film. Instead, he and his fellow officers watched a "smoker" - a pornographic movie - someone had rented from Las Vegas.

The stage of the outdoor theater was also the site of talent shows featuring soldiers from the various camp units. For many of the atomic soldiers, an evening or 24-hour pass was the only relief from boredom. Daily bus service was provided between the camp and some of the surrounding towns. The two favorite destinations were the brothels in Beatty and the casinos in Las Vegas. Occasionally, some of the Las Vegas hotels treated selected Camp Desert Rock soldiers to all expense paid evenings in town (LVMRJ 26 September 1951:3). Other resorts put on special shows for the troops. In July 1957, comedian

George Gobel gave an exclusive performance for Camp Desert Rock troops at the Riviera Hotel. Once bleachers were erected at the Las Vegas racetrack and the GIs were bussed in for a variety show that included comedians, dancers, singers, specialty acts and, of course, scantily clad showgirls (LVRJ 19 August 1957:1; Rosenberg 1980:101).

Sometimes live entertainment actually came to the camp. Troops of entertainers sponsored by the Variety Club "Tent 39" program arrived from Las Vegas and Hollywood. Over the years many well-know and not so well-known performers entertained a receptive Camp Desert Rock audience. In 1951, singers Patti Power and Kay Armen entertained the troops (LVRJ 16 October 1951:2; 27 November 1951:3). The Jimmy Durante show came to Camp Desert Rock during the Upshot-Knothole series. Patti Page sang at the camp just before the 1955 "Doom Town" APPLE-2 shot (Figure 12). During the summer of 1957, the soldiers were treated to on-site performances by singer Kay Brown, dancer Buddy Robinson, comedian Peter Lind Hayes, and the "China Doll Revue".

The Las Vegas Chamber of Congress was very supportive of the activities at the NPG and, in conjunction with the United Service Organization (USO), set up a schedule of entertainment activities for the visiting GIs. Saturday night dances, Sunday morning breakfasts, access to a roller skating rink, and use of resort hotel pools were all available for soldiers on leave from the desert war games (LVMRJ 26 September 1951:1). The Las Vegas branch of the Salvation Army operated the "Drop Inn" center for the USO. Located on

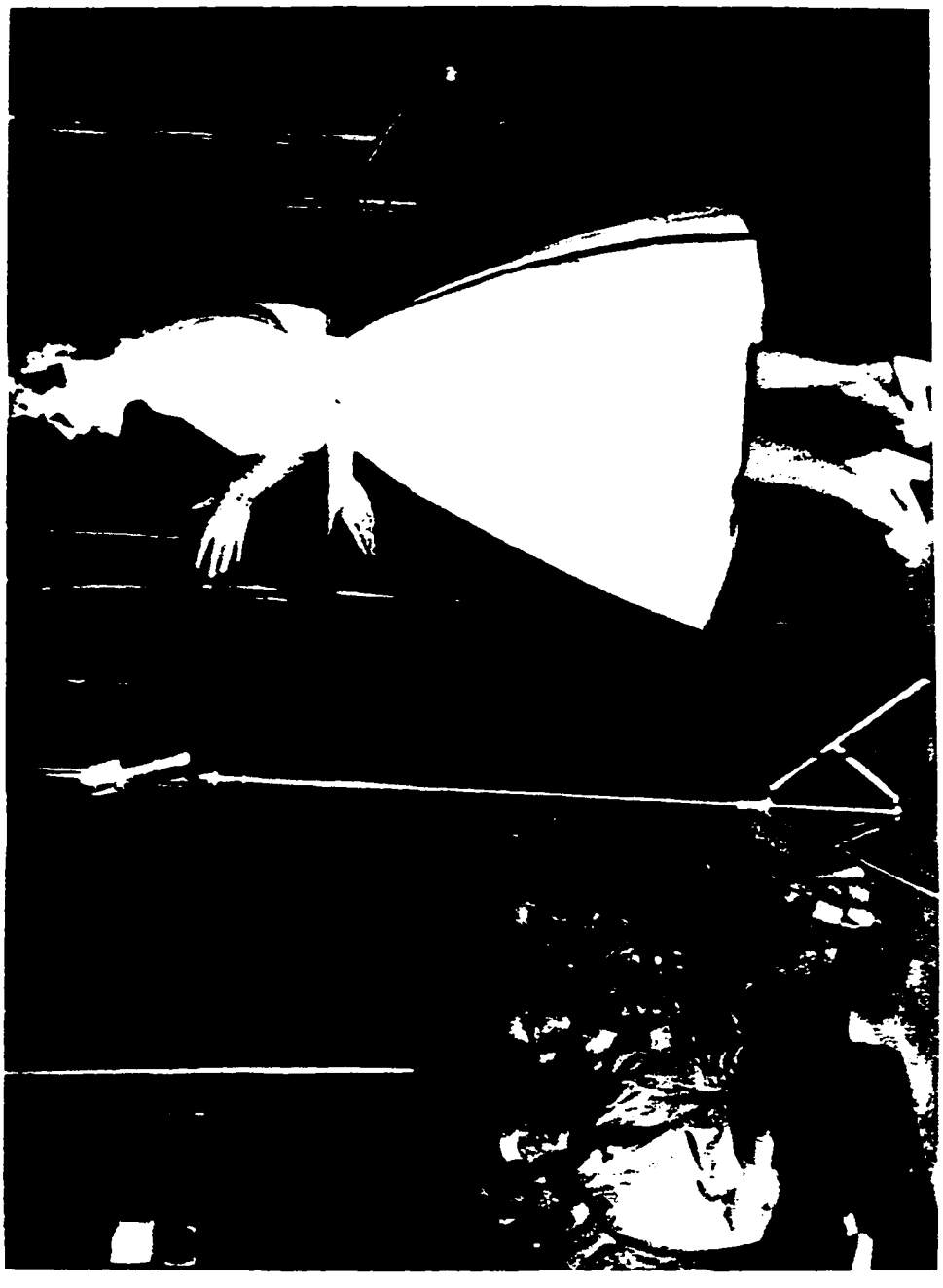

Figure 12. Patti Page performs for the soldiers at Camp Desert Rock - April 18 1955 (*U.S Army*).

North Third Street, the center served as a place were the soldiers could relax (LVRJ 4 November 1951:10). By March 1952, the Las Vegas USO facilities became permanent (LVRJ 5 March 1952:3).

The American Red Cross also became involved with the Camp Desert Rock personnel. The Las Vegas Red Cross chapter organized blood drives and successfully urged local residents to donate books, playing cards, games and magazines for the soldiers at Camp Desert Rock (LVMRJ 13 October 1951:1). Throughout the 1950s, the local chapter continued to provide assistance for the troops stationed at Camp Desert Rock and some of their families (LVRJ 15 March 1953:17). Beginning with the 1953 exercises, the Red Cross had a tent office and lounge located at the camp. It was furnished with tables and chairs and stocked with a supply of reading materials, games, and playing cards available for camp personnel. On numerous occasions, the Red Cross also helped find temporary housing for families of Camp Desert Rock support personnel.

Leave or liberty policies seem to have varied according to rank and service branch. During Exercise Desert Rock I-III, George Younkin (1996) recalls that unless a test was scheduled, the officers could come and go as they pleased after duty hours. Enlisted personnel were limited to occasional passes. Younkin spent at least two or three evenings a week in town with his wife, Nancy. When Younkin received his duty orders for Camp Desert Rock, they had driven their house trailer to Nevada and rented a space in a North Las Vegas trailer park. Nancy stayed in town while George performed his duties at the

camp. The Younkins did most of their shopping at the nearby Nellis Air Force Base post exchange and the commissary. Entertainment in Las Vegas was a real bargain, so they spent quite a few evenings in town enjoying dinner and watching the hotel lounge acts. Nancy always knew when a test was eminent because George wouldn't come into town (N. Younkin 1996).

Marine Charles Neeld (1996) remembers getting liberty once while he was stationed at Camp Desert Rock. He trudged out to the highway intending to hitch a ride into town. The first car to stop was an AEC vehicle with 3-4 men, all engineers and physicists from one of the scientific laboratories. Mistaking Neeld for one of the helicopter pilots, they took him into Las Vegas and treated him to an evening on the town. Ironically, Neeld returned to the NTS 4 years later as an employee of Lawrence Livermore National Laboratory. He would spend more than 30 years working for Livermore participating in the nuclear testing program as a senior technician.

Those without a pass or without transportation remained in Camp Desert Rock. Sundays were usually the worst day to be stranded in camp because all the service clubs were usually closed (Rosenberg 1980:101). The men entertained themselves with card games, softball, and reading. Like most military garrisons, gambling of all sorts, especially poker, was a favorite pastime (Rosenberg 1980:90; Uhl and Ensign 1980:10). Exploring the area around the camp was forbidden because of security restrictions. George Younkin (1996) recalls that the troops weren't allowed in Camp Mercury and usually had no interaction with the AEC scientists or technicians. The soldiers were limited to

the Camp Desert Rock area only unless on a work detail or going to watch a test. Those that did venture outside the camp boundaries and onto NTS property found themselves confronted with the MPs or private AEC security forces (Rosenberg 1980:100).

While security and safety regulation were tight, they apparently did not preclude keeping pets. Even at this remote location, the GIs managed to acquire various pets. George Younkin (1996) recalls having a dog with him while working in the forward areas during the 1951 test series. Photographs from the 1955 Desert Rock Exercises indicate the 505th Military Police had a pet dog as the company mascot. The animal was outfitted with special boots to protect its feet from the rocky desert ground. Dogs were not the only creatures that garnered the affection of the soldiers. Some kept lizards and mice as pets (Uhl and Ensign 1980:10). The 232nd Signal Company even adopted a desert tortoise as its mascot.

Weather

The harsh desert conditions are a reoccurring theme in many of the interviews with atomic veterans. William Bires, a 22-year old Army private, arrived in Camp Desert Rock in October 1951 (Wasserman and Solomon 1982:68). A member of Company "A," 231st Combat Engineer Battalion, he recalls very cold nights sleeping on the hard desert ground in "lousy" sleeping bags. "We froze our asses off." George Younkin (1996) remembers the biting cold and primitive field conditions too. They stayed in tents which had a pot-

bellied stove for heat. At night it was "colder than the devil." They sometimes foraged in nearby trash areas scavenging boards and old wooden boxes. The soldiers used the wood to board up the sides of the tents in an attempt to keep out the frigid wind.

James O'Connor (1996) and Charles Neeld (1996), both veterans of the 1955 Teapot series, recollect the cold and windy conditions. While on guard duty, Neeld remembers having to tie down the helicopters because of high winds. He also recalls climbing inside one of the Marine helicopters to stay warm.

The unrelenting desert winds caused many difficulties for the Exercise Desert Rock administration. Not only did the winds create numerous delays in the testing schedule and disrupt troop tests, they occasionally damaged portions of the camp. A 1955 photograph of Camp Desert Rock shows an expanse of collapsed tents. A wind storm on April 25, completely flattened the temporary barracks portion of the camp. The persistent winds were one of the reasons the tents had to be dismantled at the close of each exercise.

The troops faced somewhat different weather conditions during the Plumbbob series. Remembering the incredible heat and constant wind, Marine Thomas Saffer found Camp Desert Rock very inhospitable during his stay in the summer of 1957 (Saffer and Kelly 1982:30). He recalls that the tent flaps were never lowered and temperatures inside the canvas shelters often reached 120 degrees. The Marines awoke every day covered in a layer of dust. The desert sand permeated everything, even their food. Several dust storms reduced

visibility to less than 25 feet.

The summer 1957 exercises gave the military a myriad of weather-related problems. A flash flood swept through the area in August leaving low-lying portions of the camp inundated with mud and water (Figure 13). The intense heat contributed to numerous cases of heat exhaustion. Refrigeration storage facilities were insufficient at the camp and there were problems with food spoilage. Troops had to switch to C-rations instead of sack lunches when working away from the main camp. Winds damaged portions of the canvas tent decontamination facilities in the forward area at Yucca Pass (U.S. Army 1958).

Serving at Camp Desert Rock might have appealed to some of the GIs because of its proximity to Las Vegas. However, given the camp's isolation, the harsh living conditions, and the extremes of the desert climate, many were disappointed once they arrived. Most of the soldiers were relieved when their temporary duty assignments ended and they could return to their home stations (Neeld 1996; O'Connor 1996; G. Younkin 1996).

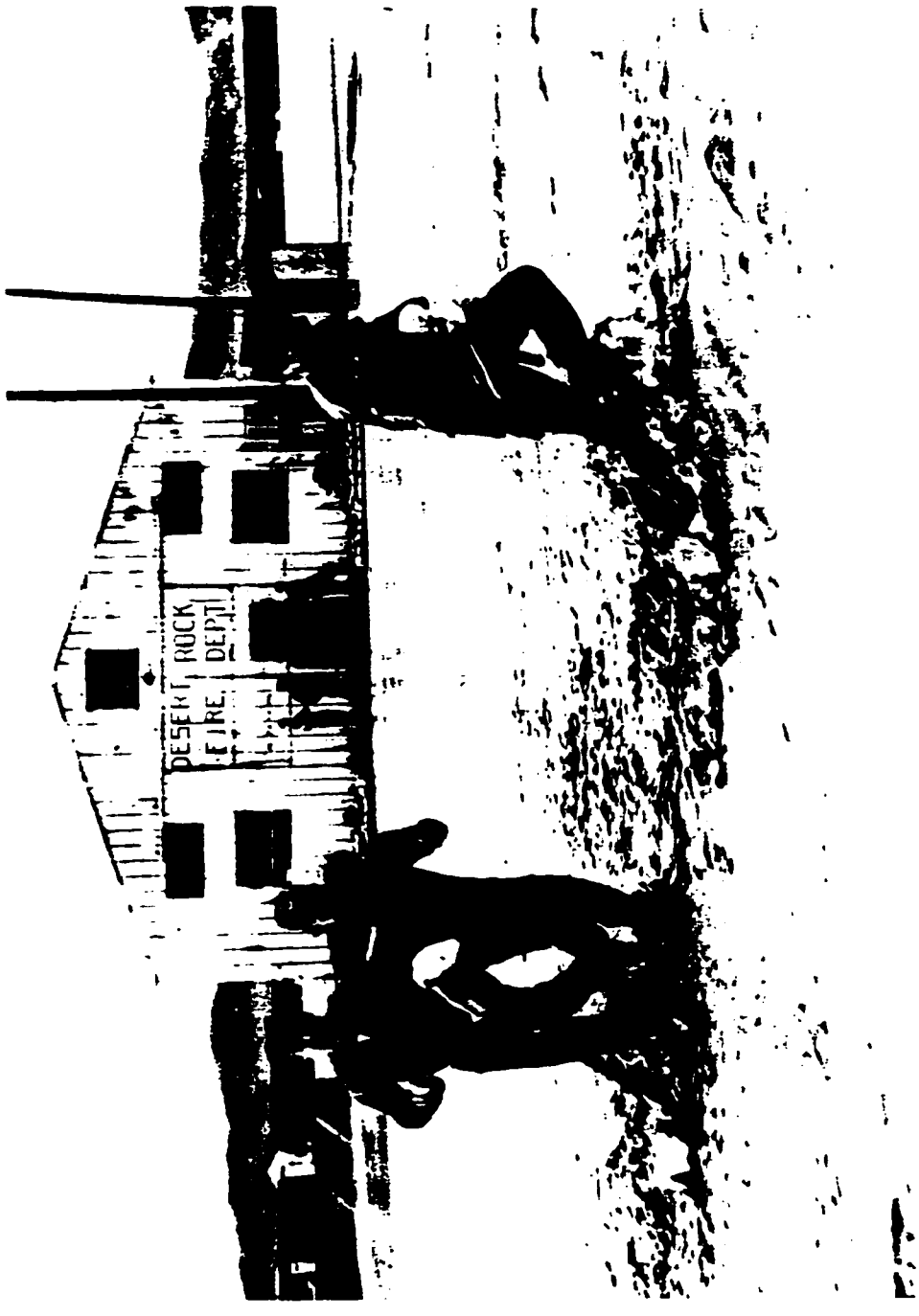

Figure 13. A flash flood inundated part of Camp Desert Rock, August 1957 (*U.S. Army*).

CHAPTER 4

ARCHAEOLOGICAL CONTEXT

The archaeological context for the evaluation and interpretation of a site can be developed from a variety of sources. It is not simply dependent on artifacts, features, and structures, but should incorporate specific information concerning material culture derived from documents, photos, maps, and oral narrative. The physical description of the camp offers a reconstruction based on the documentary record and oral history data. The description of the archaeological remains characterizes the current condition of the site based on the cultural resource reconnaissance.

Physical Description of the Camp

Personnel from the Sixth U.S. Army III Corps Headquarters arrived at the NPG September 12, 1951. Their first task was selecting a site for the establishment of a temporary installation to house the expected 5,000 - 6,000 troops participating in the upcoming atomic training exercises. Army staff chose an area just outside the boundary of the NPG approximately 2 miles southwest of the AEC Camp Mercury. The camp site sat on gently sloping terrain in the

center of Mercury Valley bordered by the Spring Mountains on the south, the Spotted Range on the north and east, and the Specter Range on the west (Figure 14.). The 231st Engineering Battalion broke ground for Camp Desert Rock on September 14, 1951. Within three weeks a "canvas city" spread across the landscape (Figure 15). George Younkin (1996) remembers arriving in the camp in mid-October. He described the camp as a typical field camp "just like the one's overseas." He recalls that the camp consisted of "a lot of tents and a lot of desert." Housing for both the support personnel and exercise troops consisted of large canvas "squad" tents with dirt floors and room for about 12 cots. At this time, the camp had no running water or sewer system. Drinking water was stored in "lister bags" that hung from posts scattered about the camp. Open-air "wash racks" or sink stations were set up near the showers and food preparation areas. Canvas tents housed portable showers suspended from poles and according to one account they were "Camp Desert Rock's most popular spot..." (LVMRJ 21 September 1951:1). Latrines were the open-trench type.

The main road leading into the camp, Desert Rock Drive (also known as the Main Cantonment Road), was constructed along the old grade of the Las Vegas & Tonopah Railroad. The railroad operated for a little over a decade in the early part of the 20th century before it was abandoned and eventually dismantled in 1919 (Myrick 1991:455-503). The camp had a second major east-west road approximately 800 ft. south of Desert Rock Drive named Engineer Road. A series of north-south streets linked Desert Rock Drive and Engineer

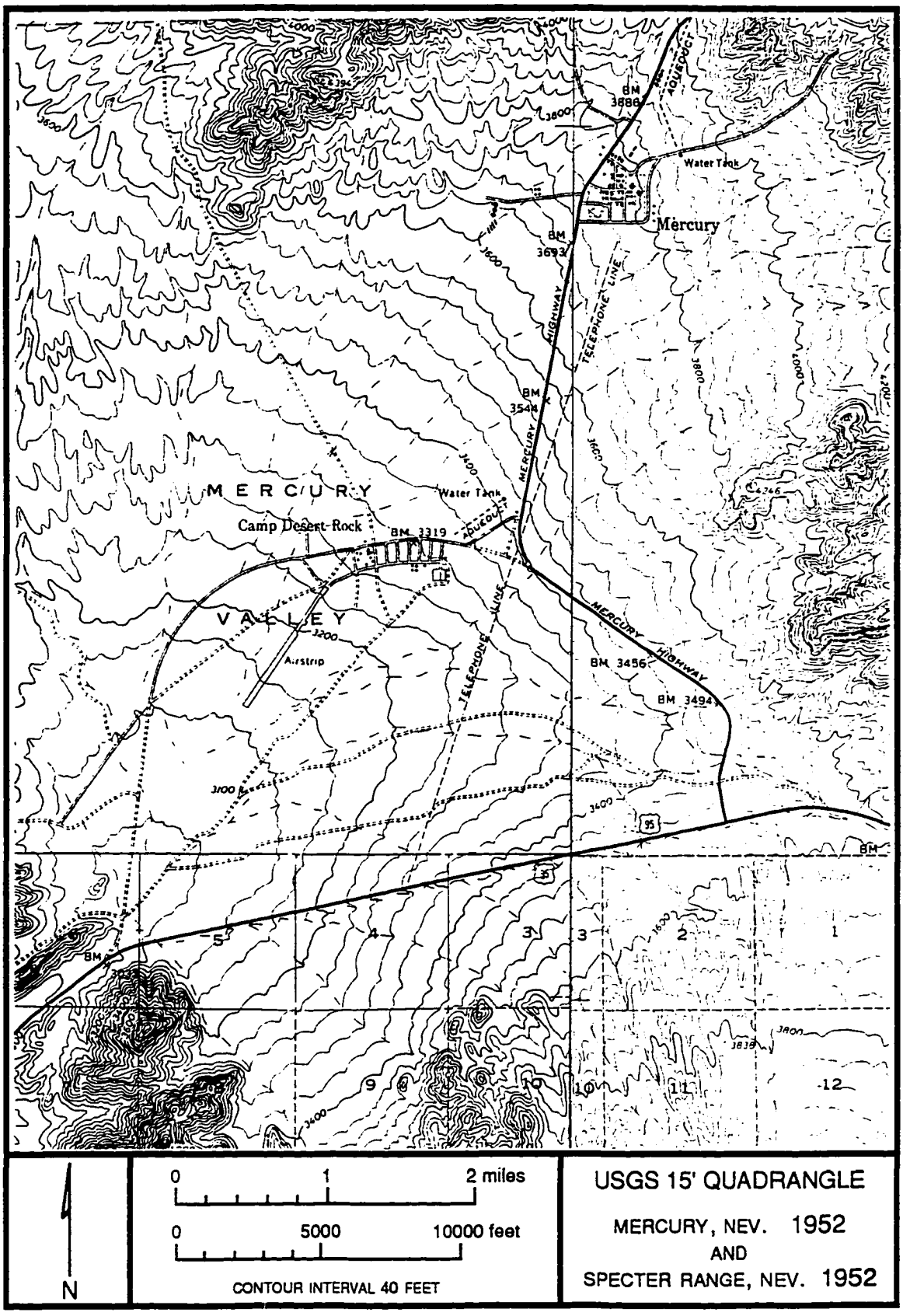

Figure 14. Location of Camp Desert Rock.

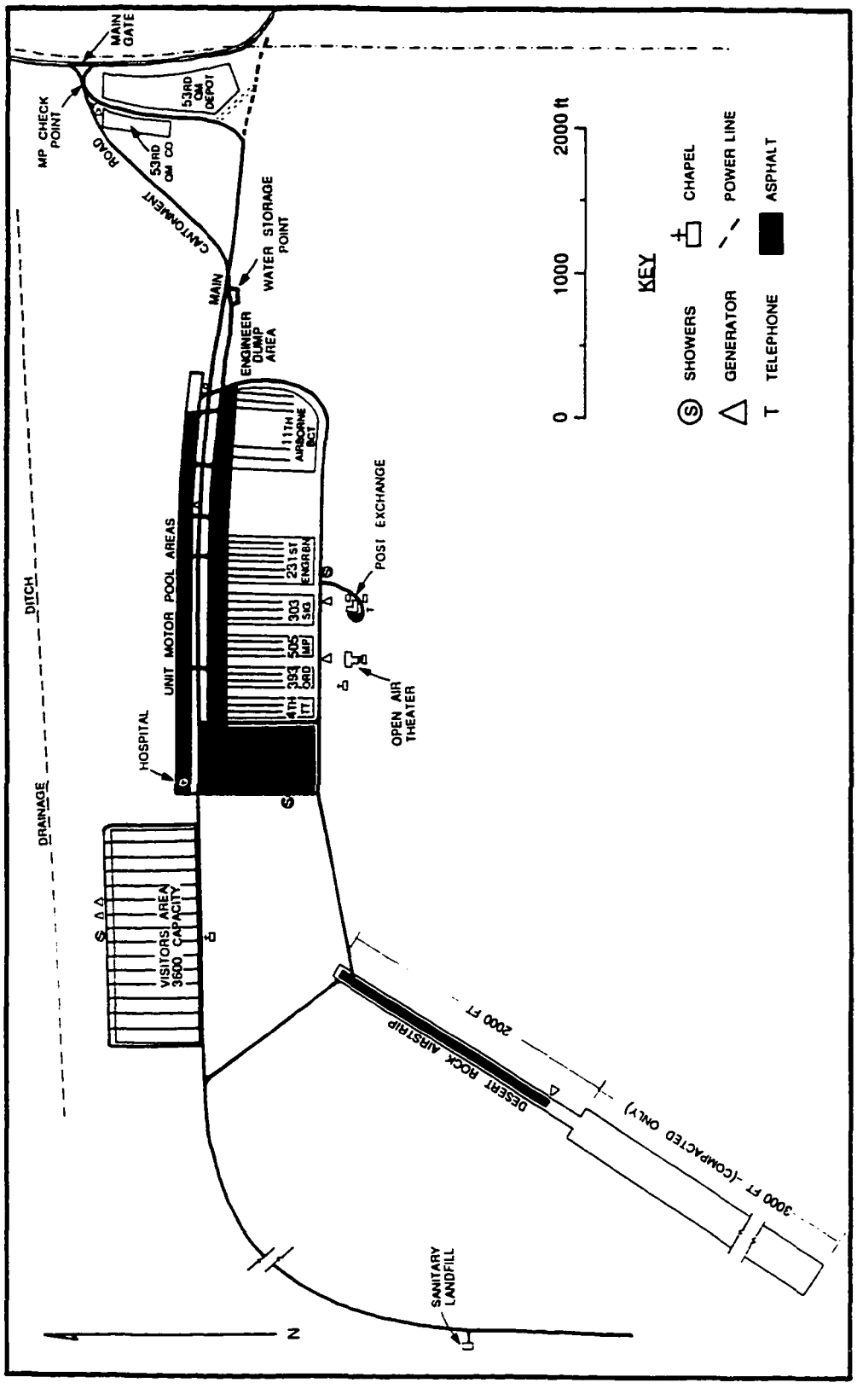

Figure 15. Camp Desert Rock layout during Exercise Desert Rock I, II, and III - 1951.

Road beginning with First Street on the west and ending with Eighth Street on the east. These streets marked the boundary of the main cantonment. During the 1951 exercises, only Desert Rock Drive, Engineer Road, and Second and Eighth Streets were paved. A few other sections of the camp including the motor pool, the administrative headquarters and officers housing, a parking strip, and a portion of the airstrip were asphalt stabilized.

The entrance to the camp was located at the intersection of the highway leading into Camp Mercury and Desert Rock Drive approximately 1/2-mile to the east of the main cantonment. Two guard stations were located at the intersection. The AEC guard station controlled access to the NPG, while the MP check point regulated admittance to Camp Desert Rock (Figure 16). The Quartermaster supply storage depot and the Quartermaster Battalion barracks area were located due south of the guard shack.

The main administration and operational headquarters portion of the camp was situated just south of Desert Rock Drive between First and Second Streets. It would remain in this location throughout the camp's existence. This area housed the headquarters tents and camp flagpole, communication center, post office, visitor's bureau, and two large mess tents. Officer and VIP quarters were located to the south of the administrative and operational tents. Showers, wash racks, and latrine facilities for the officers were situated on the west side of First Street.

Housing for the enlisted support personnel extended from Second Street to Sixth Street. Each operational section (e.g., Transportation, Signal Corps,

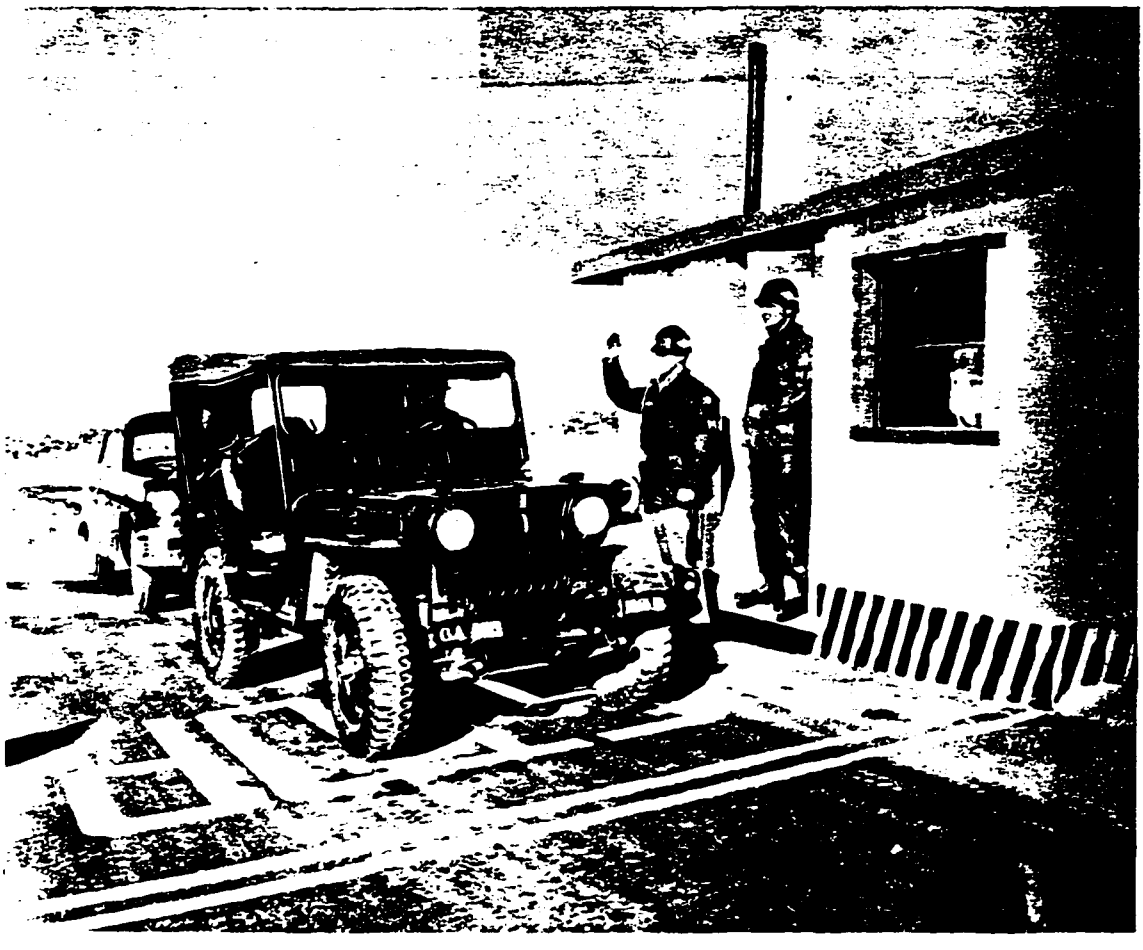

Figure 16. Camp Desert Rock Military Police Check Point (Bldg. T-1101) (*National Archives*).

Engineer, etc.) had its own barracks area. The tents were arranged in rows running north-south. The long axis of each tent ran east-west with the entrance on either the east or west side. The enlisted men's showers and latrines were located south of the barracks on the opposite side of Engineer Road. Tent quarters for Exercise Desert Rock I tactical troops (11th Airborne BCT) spanned a large area west of Eighth Street. Their shower area was on the northeast corner of the intersection of Desert Rock Drive and Eighth Street. The Engineer Dump occupied the area east of Eighth Street and south of Desert Rock Drive.

The camp's water storage point was approximately 300 feet east of the Engineer Dump on the south side of the main road. The water storage area consisted of multiple surface tanks with a combined capacity of 120,000 gallons (U.S. Army 1951c:23). From the very beginning, supplying water to the camp was a problem. Attempts to drill producing water wells near the camp proved futile and water had to be trucked in from Indian Springs. Water usage at the camp was around 135,000 gallons a day during Exercise Desert Rock I (LVMRJ 21 September 1951:1).

The camp motor pool consisted of a long, narrow paved area located on the north side of Desert Rock Drive extending all the way from Eighth Street to First Street. A small medical dispensary, capable of treating minor injuries and dental problems, was situated adjacent to the western edge of the motor pool. The Visiting Troop area was located about 400 ft. west of the medical tent and 200 ft. northwest of the main cantonment. This 700 x 1,600 ft. area was designed to house several thousand temporary personnel. It had shower and

latrine facilities along its northern edge. The area also had a post exchange annex and its own chapel.

Most of the community and training facilities were located south of Engineer Road. The main post exchange, barber shop, and beer tent were situated approximately 200 ft. south of the intersection of Engineer Road and Fourth Street. Three hundred feet to the west sat an open-air theater consisting of an elevated stage and wooden bleachers (Figure 17). A general purpose classroom tent was south of the stage. One of the camp chapels was 200 ft. west of the bleachers. Only the theater would remain in its 1951 location. The other structures would all be relocated during future camp expansions.

The Desert Rock airstrip was located about 1,200 ft. southwest of the main cantonment. Engineer Road terminated at the north end of the runway. A 1951 map indicates the runway was approximately 5,000 ft. long, but only the northern half was asphalt stabilized (U.S. Army 1951c:22).

The camp had its own telephone system dubbed the "Camp Desert Rock Telephone Company" (LVMRJ 21 September 1951:1). At this early stage in the camp's development the service was only rudimentary and would require substantial improvements during subsequent exercises. The same was true for the electrical system. Although a powerline supplied electrical service to the AEC facilities, Camp Desert Rock relied on portable generators positioned throughout the camp. The sanitary landfill was located well away from the camp situated approximately 1.25 miles to the southwest.

Originally, the military had planned to completely dismantle the camp. As

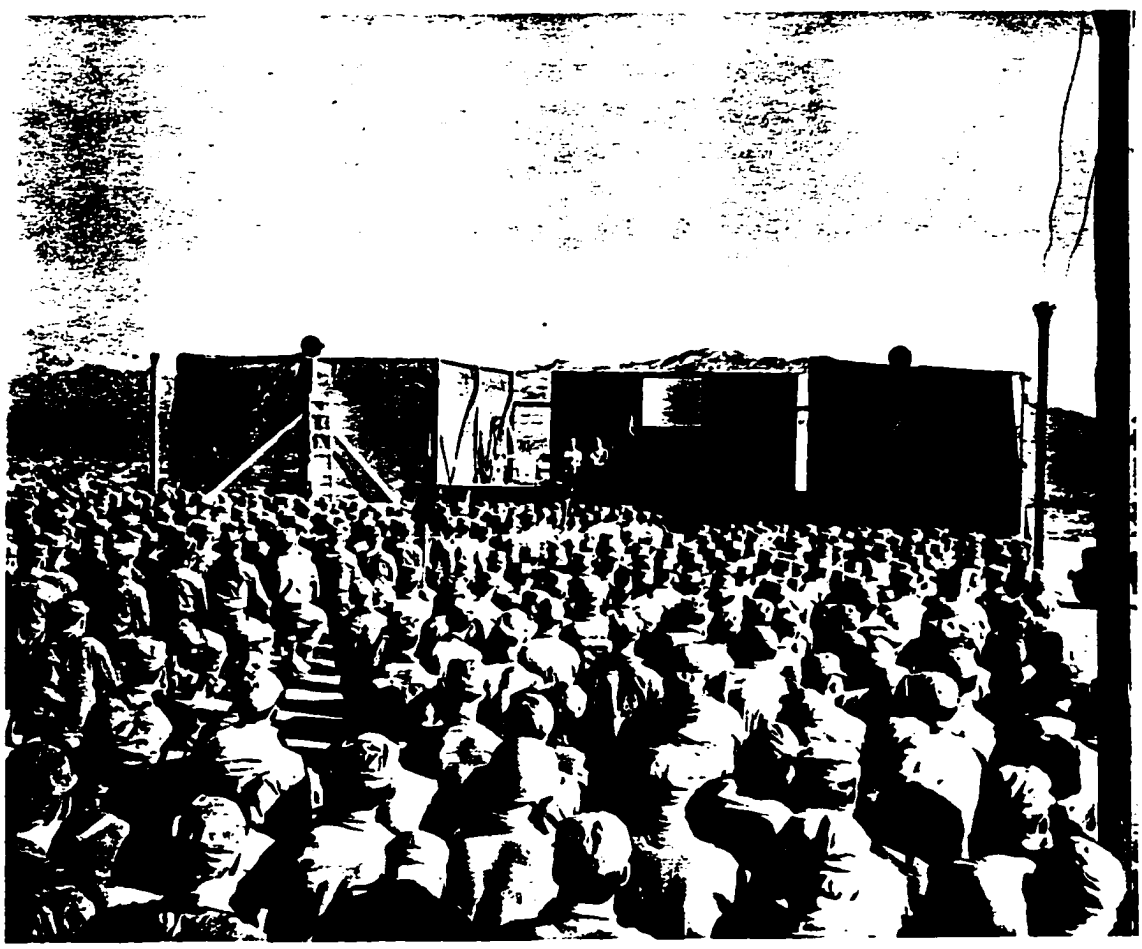

Figure 17. Camp Desert Rock's open-air theater, ca. 1951 (*National Archives*).

late as November 3, 1951, an army spokesman stated that "[t]he only thing we will leave will be tent stakes" (LVMRJ 3 November 1951:1). However, the army command had a change of heart announcing in mid-November that Camp Desert Rock would become a permanent army installation. Brigadier General Burdette Fitch, the commanding officer for Exercise Desert Rock II and III, stated that consolidating the tent camp and upgrading the facilities, would be a priority once the current exercises were completed (LVRJ 14 November 1951:1).

After the completion of Exercise Desert Rock III and prior to the beginning of the 1952 exercise, substantial construction activities to upgrade the camp facilities took place. The camp layout for the 1951 exercises set the pattern for future construction, but there were a number of subsequent modifications to the functions of specific areas. According to the "Camp Desert Rock Information and Guide" (U.S. Army 1952b:1), much of this construction was completed by the Shore Battalion of the 369th Engineer Regiment with Lt. Colonel William H. Fairchild serving as Camp Commander. Camp infrastructure was a priority for the 1952 expansion. The engineering units relocated the water storage area and installed a water system for the camp consisting of a pipe delivery system connected to a 100,000-gallon water tank located northwest of the camp guard gate. A sewage system with an "Imhoff" disposal tank was installed throughout the permanent portion of the camp. The troops also extended electrical service from the AEC Camp Mercury to all parts of the camp. Nationwide links for telephone, telegraph, and TWX (teletype) services were established.

Structural improvements focused on the sanitation, food service,

administration, and training facilities. This included the construction of nine permanent concrete-floored latrines with fuel-oil heated water. The latrines had changing areas, showers, flush toilets, and sinks. These facilities replaced the open-trench toilets and portable wash racks and showers used during the first exercises. Officer and VIP latrines were housed in metal buildings while the enlisted men's latrines consisted of framed tents.

Photographs dating to the period show a few small quonset huts and several larger "Butler" buildings surrounded by rows of canvas tents (Figure 18). Quonset huts were the prefabricated knock-down huts developed for the military by George A. Fuller & Company during World War II (Young 1996:7-8). The huts typically consisted of prefabricated semi-circular steel ribs sheathed with precut panels of galvanized, corrugated iron. Insulation could be fitted between the supports and the interior covered with hardboard (masonite) paneling. The huts came in over 80 different sizes and configurations. One common variation of the quonset consisted of a straight-sided version with an arched roof. With a large post-war surplus of quonsets, the military continued to use the structures for temporary facilities during the 1950s and 1960s. However, quonset huts were gradually replaced by more conventional-looking Butler buildings (Reynolds 1991). These vertical-walled prefabricated structures also had their birth during the wars years. Built of segmented steel supports and vertical-channeled galvanized panels, Butler buildings sported gabled roofs. They gained popularity over the quonset because the vertical walls allowed easier installation of interior partitions and shelving systems and were more conducive

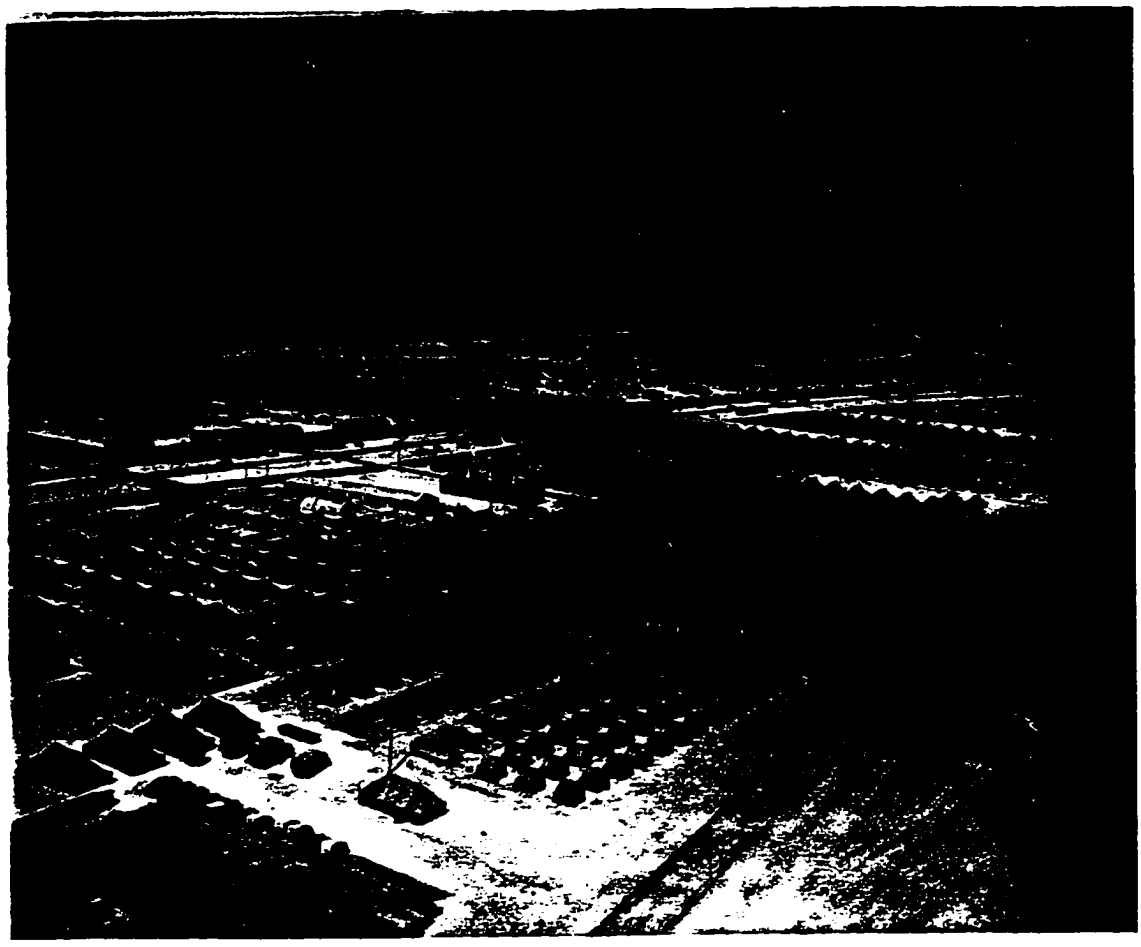

Figure 18. Overview of Camp Desert Rock looking northeast, 1952 (*National Archives*).

to the installation of windows and doors (Garner 1993).

Camp Desert Rock's largest Butler buildings were located between First and Second streets. They served as the camp mess halls each with a 500 person seating capacity. The mess hall to the west of the flagpole was the Officers' Mess and the one to the east was the Enlisted Men's Consolidated Mess. The VIP mess was to the south adjacent to the bachelor officer quarters. Another Butler building replaced the canvas tent used for the main assembly hall and training auditorium. It sat on the west side of Second Street, east of the Enlisted Men's Mess. A couple of small quonset huts were erected in the administration area. One quonset was located to the west of Enlisted Men's Mess Hall and housed the camp telephone exchange. The other was located south of the main assembly hall and was probably utilized as classroom space. A large double-doored Butler building was erected in the motor pool area opposite the flagpole to accommodate the Desert Rock Fire Department. The dispensary relocated to a site west of the Officers' Mess and south of Desert Rock Drive. The post exchange complex including a retail store, barber shop, and beer tent moved to row "F" - an area along the south side of Desert Rock Drive between Sixth and Seventh streets. The chapel tent and open air theater south of Engineer Road remained unchanged (U.S. Army 1952b:4-5).

Most of the administrative and operational structures and some of the community facilities were assigned building numbers at this time. The designations consisted of the letter "T" followed by a two, three, or four digit number (i.e.,. T-09, T-192, T-1001, etc.). The "T" apparently stood for

"temporary." Some of the building numbers remained constant for the duration of the camp's occupation. Others changed multiple times and occasionally more than one structure would carry the same numeric designation.

Modifications to the barracks centered on winterizing the tents by installing oil-burning stoves and wooden floors. Newspaper photographs indicate that these tasks were underway by mid-December 1951. In addition, 25 trailers and 40 small, 4-person tents were brought in to serve as bachelor officer's quarters. These were placed along the north side of Engineer Road between First and Second streets. In contrast to the squad tent barracks, the trailers and small tents were arranged in east-west rows with the long axes oriented north-south.

The Quartermaster barracks and depot areas were moved into the main portion of the camp. Special storage yards for the Engineer, Signal Corps, and Quartermaster units were set up south of Engineer Road and west of its intersection with Seventh Street. The Engineer Dump, renamed the Petroleum, Oil, and Lubricants Dump, was moved due south of the intersection of Eighth Street and Engineer Road. Ordnance took over the area east of Eighth Street.

There is very little documentation concerning the physical composition of the camp during the 1953 Upshot-Knothole series and the associated military exercises. The Army's (1953a:3-7) after-action report indicates two engineering units were assigned to the camp support contingent for Exercise Desert Rock V - the 360th Engineering Utilities Detachment and the 412th Engineer Construction Battalion. The extent of the 1953 camp upgrades is unknown, but it

appears that at least a dozen or more semi-permanent structures were added. A poor-quality 1953 photograph of Camp Desert Rock shows several new quonset huts and Butler buildings south of Engineer Road in the open storage yards for the Engineer and Quartermaster sections. A warehouse appeared in the Ordnance compound. A pair of straight-sided quonsets were added to the east side of the administrative headquarters area. A third large mess hall was erected along the west side of Fourth Street (Figure 19). The barracks areas still consisted of framed canvas tents arranged in north-south rows.

The only other improvement during 1953 may have involved the grading of a helicopter landing area adjacent to the airstrip. The Exercise Desert Rock V Marine Corps tactical maneuver included helicopter air support. The Marines would have needed an area for storing, maintaining, and refueling the helicopters prior to the battlefield simulation. Use of a helicopter landing area is mentioned for the 1955 exercises, but its date of construction is unknown.

In late 1954, a new round of construction began in preparation for Exercise Desert Rock VI (Figure 20). By the time the exercise started the camp had grown to 133 temporary buildings and more than 500 framed squad tents (U.S. Army 1955c:6). The 95th Engineering Construction Battalion was charged with most of the camp upgrades.

The engineering units replaced the remaining tents in the administrative headquarters area with straight-sided quonsets. These troops also undertook the replacement of many of the tent barracks in the main cantonment. Photographs show that the officers' and VIP tents south of the administrative

Figure 19. One of Camp Desert Rock's mess halls (*U.S. Army*).

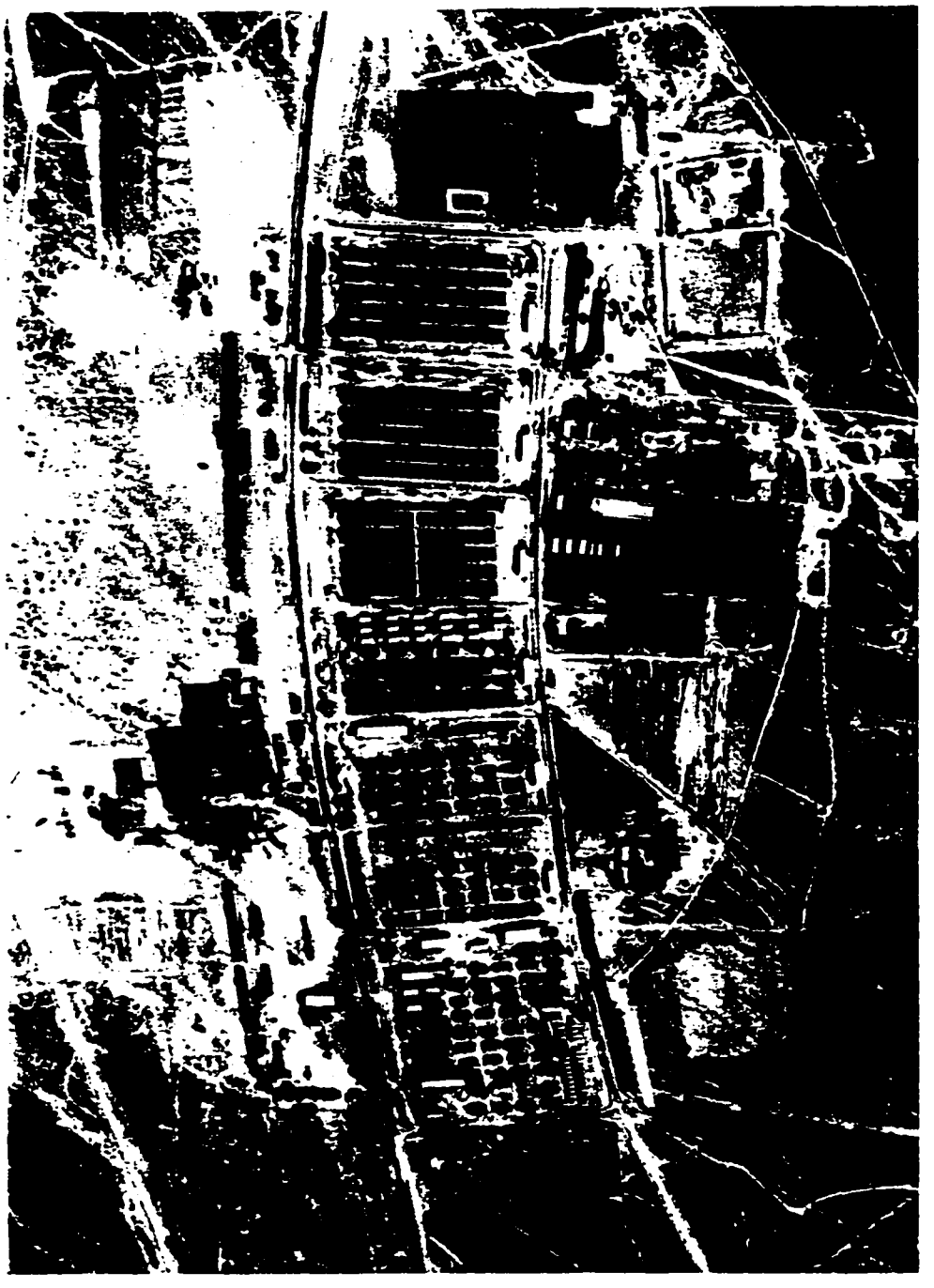

Figure 20. Aerial view of Camp Desert Rock, 1955 (*U.S. Army*).

headquarters were replaced with wooden gable-roofed huts. Between 1952 and 1955, the tent housing the dispensary was replaced with a Butler building. After the 1954-1955 construction projects, all of the structures in the area between First and Second streets were oriented with the long axis running north-south.

Prefabricated wooden huts for operational facilities and barracks were constructed in other parts of the camp as well. Six rows of four huts each were located along the east side of Second Street. Framed tents filled in the area between the huts and the western edge of Third Street. This same pattern was repeated in the area between Third and Fourth streets. The tract bounded by Fourth and Fifth streets consisted of six rows of wooden huts on the west half and six rows of quonset huts on the east. Tent barracks still occupied the acreage between Fifth and Eighth streets. With the exception of the enlisted men's latrines and a few structures south of Engineer Road, all the semi-permanent buildings were positioned with the long axis running north-south.

Additional prefabricated metal buildings also went up around the camp. The canvas tents utilized for the enlisted men's latrines were replaced with Butler buildings ventilated with huge roof turbines. Large prefabricated buildings were erected in the area south of Engineer Road to serve as Quartermaster and Signal Corps warehouses. A pair of prefabricated storage buildings were added to the Ordnance Yard.

A map in the 1955 "Camp Desert Rock Information Booklet" (U.S. Army 1955c:10-11) provides specific information on the function and building

numbers of about 22 of the camp's structures. The dispensary remained near the corner of Desert Rock Drive and First Street. The Officers' Mess was redesignated the Observer's Mess. An Officers' Club was housed in a tent southwest of the Observer's Mess. The officer's latrine sat due south of the Officers' Club. The Camp Commandant's quarters were east of the headquarter's flagpole. The Visitor's Bureau was east of the Commandant's quarters with the Telephone Exchange due south. Formerly identified as the main assembly hall, the large Butler building along Second Street had been reassigned as the camp indoor theater. A new building to serve as the Orientation/Lecture Hall was constructed to the south of the theater. This building also functioned as the camp's main chapel replacing the tent south of Engineer Road. The barber shop was moved from the post exchange complex and relocated to the northeast corner of Engineer Road and Second Street. The Provost Marshall's Office was located on the southeast corner of Desert Rock Drive and Second Street. A quonset hut on the land formerly occupied by the tent chapel accommodated the NCO club.

The only mention of a 1955 infrastructure improvement concerns the construction of a power station 100 ft. northwest of the Camp Desert Rock guard gate. The 95th Engineer Battalion installed a 500 kilowatt generator at this location (U.S. Army 1955a:iii). No modifications were made to the camp's water system although efforts to find a local source of water continued. The camp remained dependent on 24-hour a day water truck deliveries.

The rock alignments (Figure 21) commonly associated with military

Figure 21. Overview of Camp Desert Rock looking east-southeast, ca. 1955 (*U.S. Army*).

camps make their first appearance in 1955 photographs of Camp Desert Rock. Usually painted white, the rocks marked pathways, parking zones, and planter areas. The most extensive use of rock borders appears around the dispensary and administrative headquarters.

Operation Plumbbob ushered in another building rush. Adapted from U.S. Army maps produced by the Camp Irwin Engineering Section, Figures 22-26, illustrate the extent of the Camp Desert Rock facilites utilized during Exercise Desert Rock VII and VIII. By summer 1957, Camp Desert Rock consisted of more than 150 permanent buildings including a library, an expanded field hospital, a full service post office, the three service clubs, a barber shop and PX. There was dry cleaning and laundry service. Linens, cots, and mattresses were distributed from a supply building south of the beer hall. Outdoor recreational facilities included a volleyball court and two softball fields (Rosenberg 1980:92). Permanent barracks were either quonset huts or prefabricated wooden or metal buildings. The quonset barracks were a new addition to the camp. Located in two areas, one east of Fifth Street and the other east of Sixth Street, the huts slept 20 men on cots arranged to form double-tiered bunks. Unlike the wooden hut barracks, the quonset quarters had concrete floors.

The engineering units made several major additions to the administrative area and the surrounding buildings. The III Corps headquarters moved into a pair of new quonset huts joined by an open-sided vestibule (Figure 27). Two "ward" buildings, T-190 and T-191, were added to the hospital. These were both

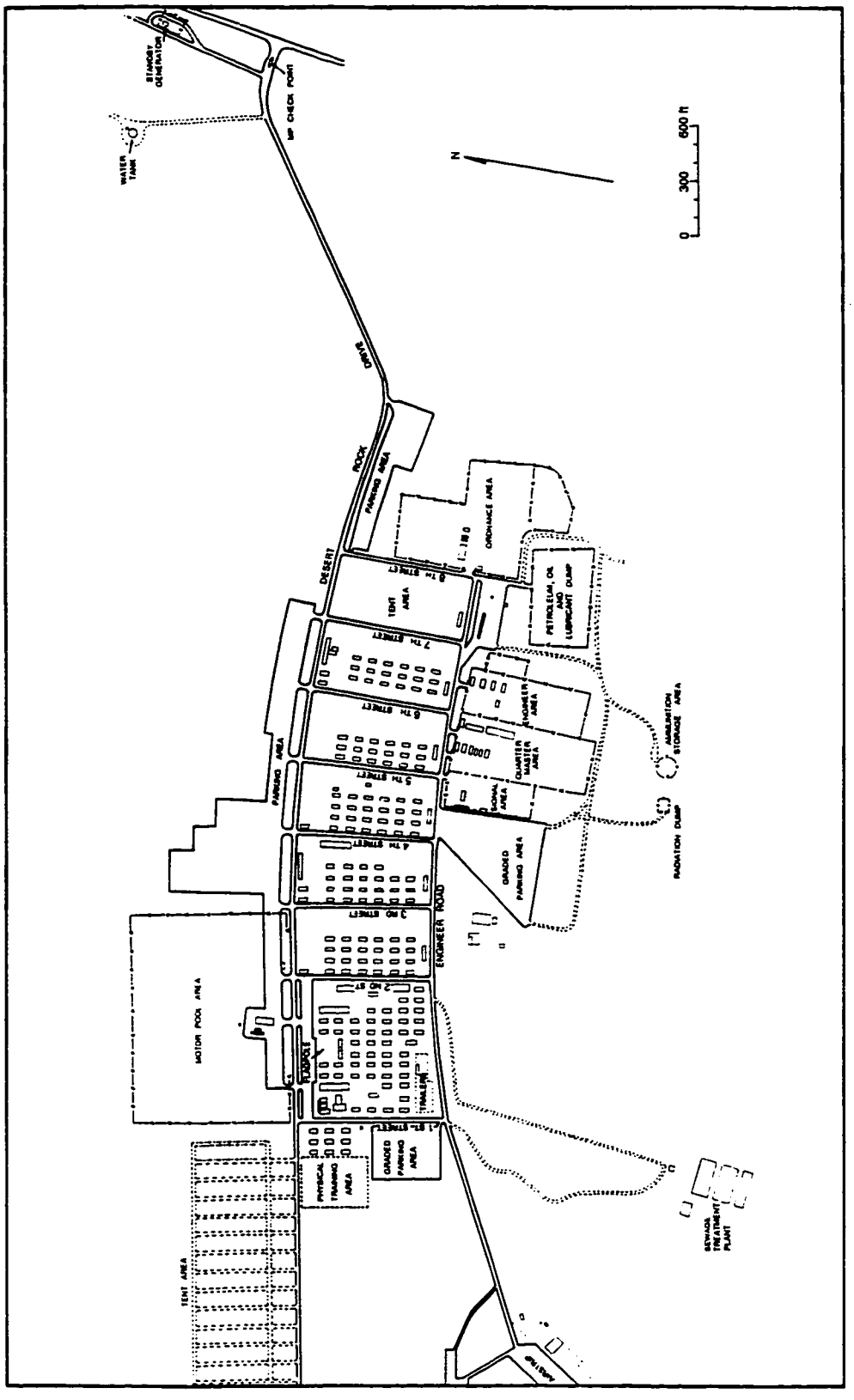

Figure 22. Overview map of Camp Desert Rock, 1957.

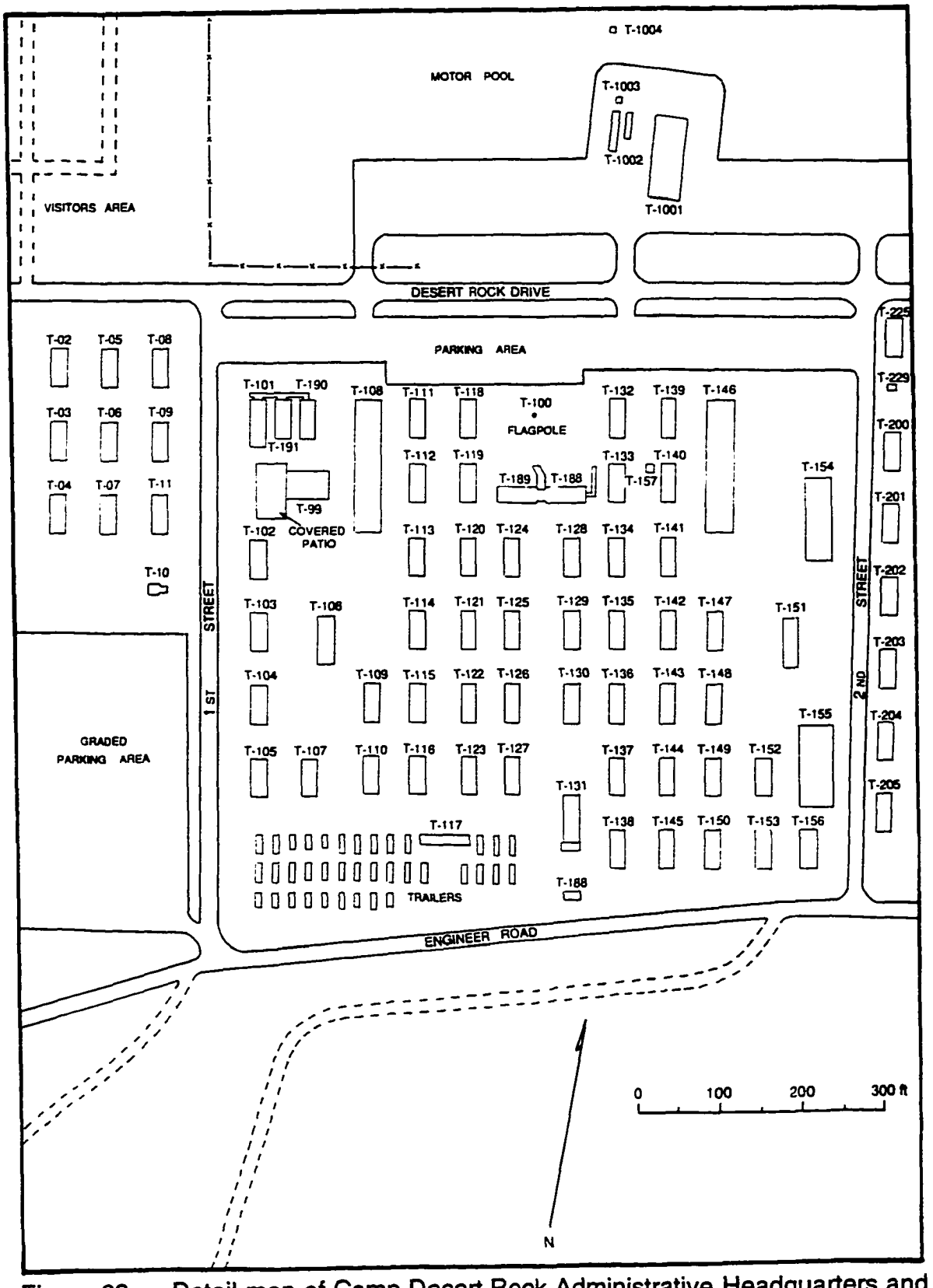

Figure 23. Detail map of Camp Desert Rock Administrative Headquarters and Officers' and VIP barracks areas, ca. 1957.

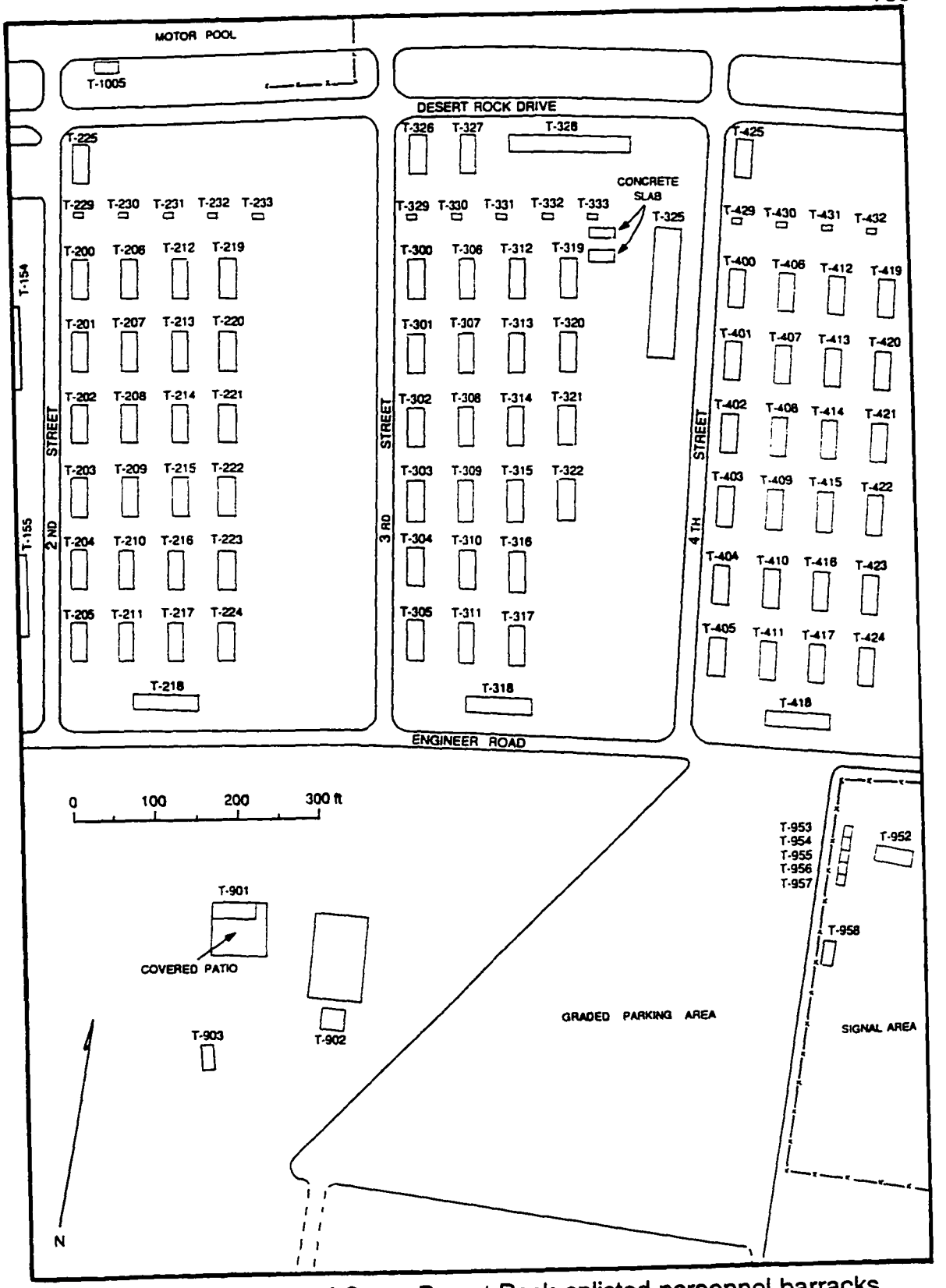

Figure 24. Detail map of Camp Desert Rock enlisted personnel barracks areas, ca. 1957.

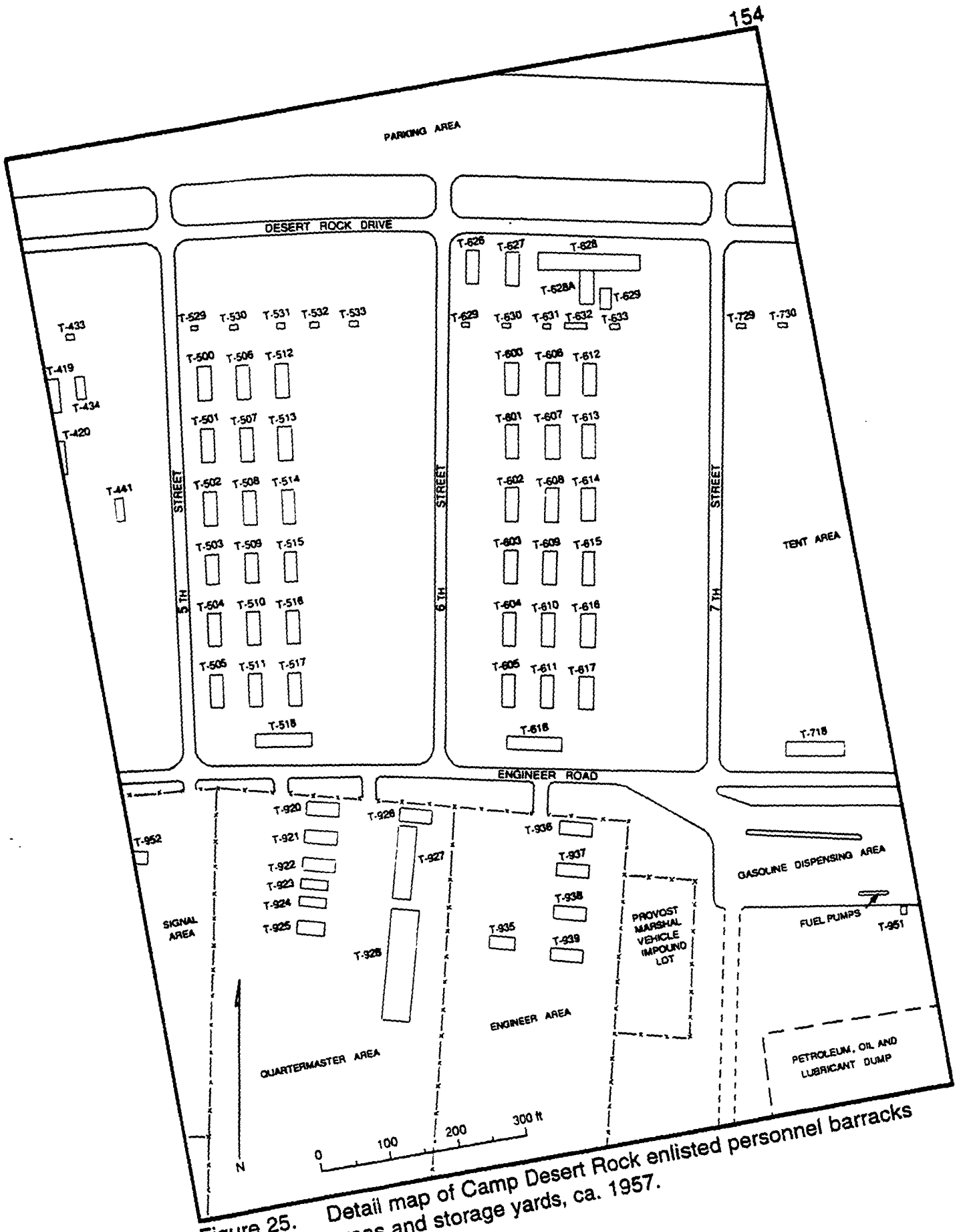

Figure 25. Detail map of Camp Desert Rock enlisted personnel barracks areas and storage yards, ca. 1957.

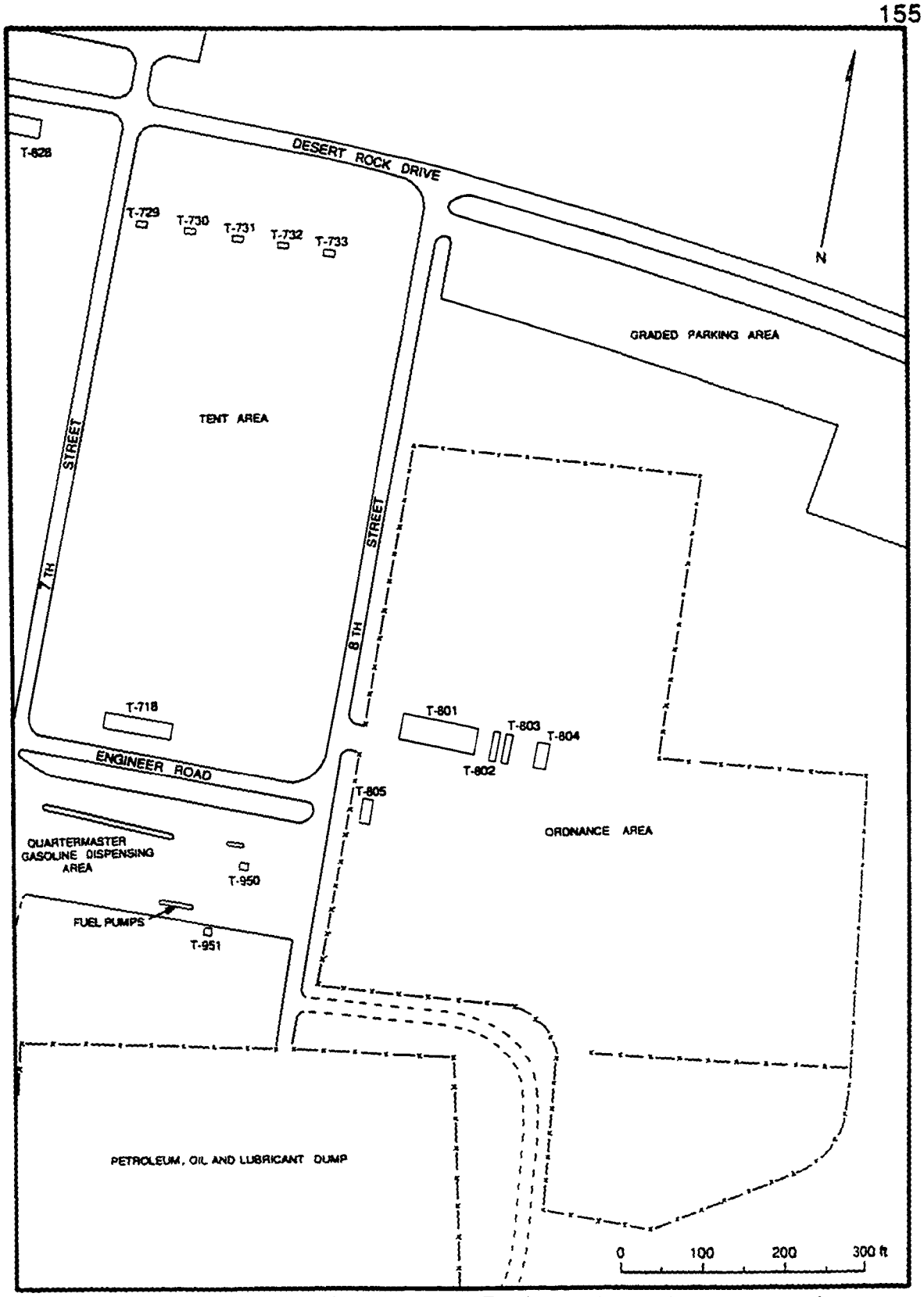

Figure 26. Detail map of Camp Desert Rock tent barracks area, service facilities, and Ordnance storage area, ca. 1957.

quonset huts linked to the main dispensary building by an enclosed walkway (Figure 28). The ward buildings had propane heating units situated in the center of the floor.and held two rows of collapsible metal-frame beds - one along either side of the hut (Figure 29). The single tent housing the officers' club was replaced with a multi-structure complex during this period. Located south of the hospital, it consisted of a large low-roofed prefabricated metal building with an extensive covered patio area adjacent to its west elevation. To the west of the patio was a cinder-surface area extending all the way to the edge of First Street. Bachelor officers were still assigned to a trailer area south of the hospital and the officers' club.

To the west of First Street, a new semi-permanent barracks area was established. Earlier photos and maps show this as a tent area, but nine cement-floored quonset huts were erected in 1957. A recreational facility, probably the volleyball court, was positioned along the south edge of the huts.

An Army memorandum (Anonymous 1957 Memo 10:2,5) identifies several of the buildings in the camp. Building T-112 housed the Radiological Safety Office. Radiac instruments and dosimeters were issued and turned in at Building T-434, while film badges were distributed from and returned to Building T-512. This differs from a 1955 description which indicated Building T-206 housed photodosimetry (film badge and dosimetry) facilities (U.S. Army 1955c:10).

Some 1957 construction projects occurred in response to the intense summer heat. The soldiers erected a new awning to cover the cinder-surfaced

Figure 27. Overview of camp administration area looking south, 1957 (*U.S. Army*).

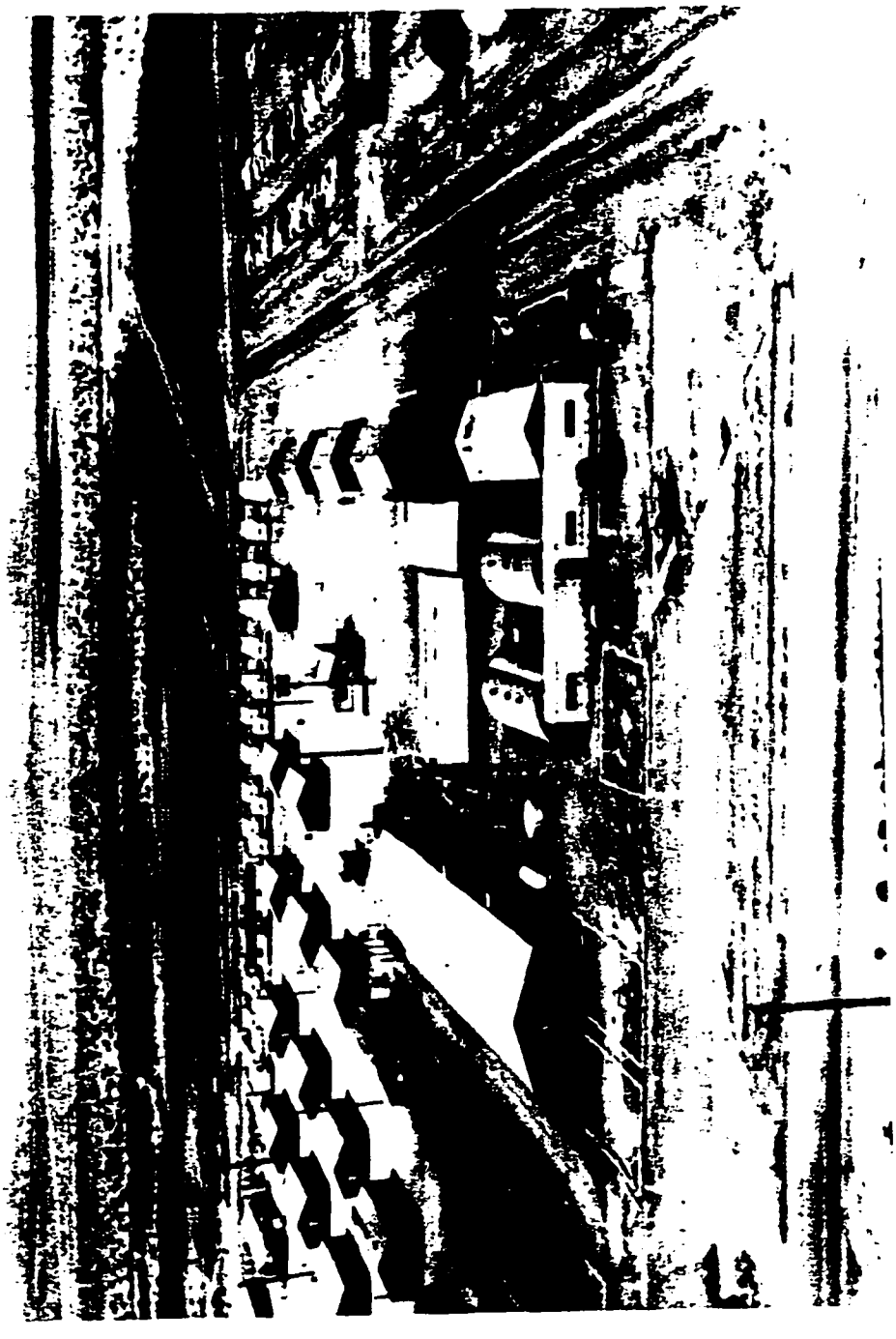

Figure 28. Overview of camp dispensary and hospital hospital wards and the Officers' Club, 1957. (*U.S. Army*).

Figure 29. Interior view of hospital ward quonset hut. 1957 (*U.S. Army*).

patio on the south side of the NCO club. Portions of the main cantonment housing were equipped with swamp coolers. The officer's barracks on the west end of the camp and the wooden hut housing occupied by the HumRRO researchers had the coolers (Rosenberg 1980:97). The mess halls, orientation building and hospital also utilized swamp coolers for the summer 1957 exercises.

The only noticeable modifications to the visiting troop bivouac area came during the 1957 exercise when a surface of red-cinder was spread across the east half (Figure 30). From the beginning, the tent city was used to house the many tactical maneuver troops and overflow observer personnel. The stated capacity of this area was 3,600, but may have held more on occasion especially during the extensive exercises held in conjunction with the Upshot-Knothole series. Quarters in this part of the camp remained fairly primitive consisting of dirt-floored, 11-man squad tents arranged in rows divided by wide footpaths. The soldiers slept on cots and used trench latrines and portable shower facilities located at the north end of the tent rows. Mess tents, supply tents, and possibly officers' quarters were located south of the enlisted men's tents. The tents had pot-bellied stoves for heat, but these probably were not used much during the 1957 exercises.

There are very few descriptions of the camp's outdoor common areas. Photographs and oral histories (Rosenberg 1980; Uhl and Ensign 1980) indicate that the camp never had any street lights. The only exterior lights were attached over the entrances to several of the larger community and

Figure 30. Aerial view of the visitor's tent area looking east-northeast. 1957 (*U.S. Army*).

Figure 31. Camp Desert Rock tent barracks (*U.S. Army*).

administrative buildings. Camp streets were marked with signs consisting of wooden posts and placards with the street names stenciled in black letters on a white background. Building numbers were posted on small placards located near the main entrances. Although rock alignments and some landscaping with native plants are visible in 1955 photographs, the major landscaping efforts in the administration area did not take place until 1957. Photographs from this period indicate that more than 30 small Joshua trees were planted in front of the new headquarters building (Figure 27). Another 100-plus Joshua trees were planted on the north side of Engineer Road beginning at Second Street and extending west towards the airstrip.

The 1957 maps of Desert Rock indicate that the camp had an animal shelter located near the sanitary landfill. Radiation and ammunition dumps located 600 ft. south of the Quartermaster storage area are also shown. A review of the 1955 photographs indicates that the radiation and ammunition dumps were in place by at least 1955. The animal shelter is not visible in the photographs, so its appearance and date of construction are unknown.

The close of the 1957 exercises marked the end of military construction at Camp Desert Rock and the beginning of a decade of decline. All of the canvas storage and barracks tents were dismantled by the end of 1957. Although the camp was reused by the AEC in the early 1960s as overflow housing, there was no additional construction. In 1963, the Desert Rock airstrip underwent the first of a series of AEC upgrades. That year the airstrip was finally paved. Storage buildings, lights, and refueling facilities were added (Las

Vegas Sun [LVS] 2 April 1963:1).

After the Camp Desert Rock land was incorporated into the NTS in 1964, a piecemeal process of dismantling began. Some of the prefabricated buildings were moved into Mercury to serve as storage and recreational facilities. Others ended up in NTS staging areas on Yucca Flat (Beck et al. 1996). The remaining camp buildings were removed prior to a major expansion of the airstrip facilities and lengthening of the runway in 1969. Only the camp's paved roads and concrete foundations remained. In 1975, a National Weather Service-operated weather station was built in the camp's Quartermaster storage yard south of Engineer Road. This facility utilized portions of the existing roads and the concrete slab once used as the Quartermaster supply warehouse.

Archaeological Remains

The main objective of the archaeological survey was to identify the types and locations of all structures, features, and artifacts associated with Camp Desert Rock and compare these data with the documentary and oral history information. The following descriptions reflect the current conditions observed at the site. Speculation concerning the function or construction dates of specific structures is based on a synthesis of the documentary, oral history, and archaeological records.

The reconnaissance covered a rectangular area approximately 7,500 ft. x 2,600 ft. or 448 acres. The Mercury Highway marked the eastern edge of the survey area, while the western boundary corresponded to the west edge of the

Visitor's Tent Area located northwest of the main cantonment. The northern boundary roughly followed an arbitrary line approximately 600 ft. north of Desert Rock Drive. The southern boundary was approximately 2,000 ft. south of Desert Rock Drive.

Cultural material associated with Camp Desert Rock and later NTS activities appears throughout the project area. There is a very diffuse background scatter of artifacts ranging from small items such as nails, wire, miscellaneous metal, various types of beverage cans and bottles to large sections of corrugated metal, automobile parts, and lumber. Layers of asphalt and gravel (also called bituminous hardstand) and red cinder were used in many areas of the camp to stabilize the ground surface and minimize dust. Over the years, these surfaces have weathered into a patchwork that appears as dark blotches on recent aerial photos (Figure 32). All of the buildings and surface structures in the camp have been dismantled and moved out of the area with the exception of the concrete foundations.

Service Facilities/Storage Yards

No trace of the Camp Desert Rock guard station (Bldg. T-1101) exists. The structure originally sat on a small island in the center of Desert Rock Drive just west of the Mercury Highway intersection. The area was paved over during one of the resurfacings of Desert Rock Drive.

Most of the supply and service facilities were located east of Eighth Street and south of Engineer Road (Figure 22). The Ordnance Storage Area

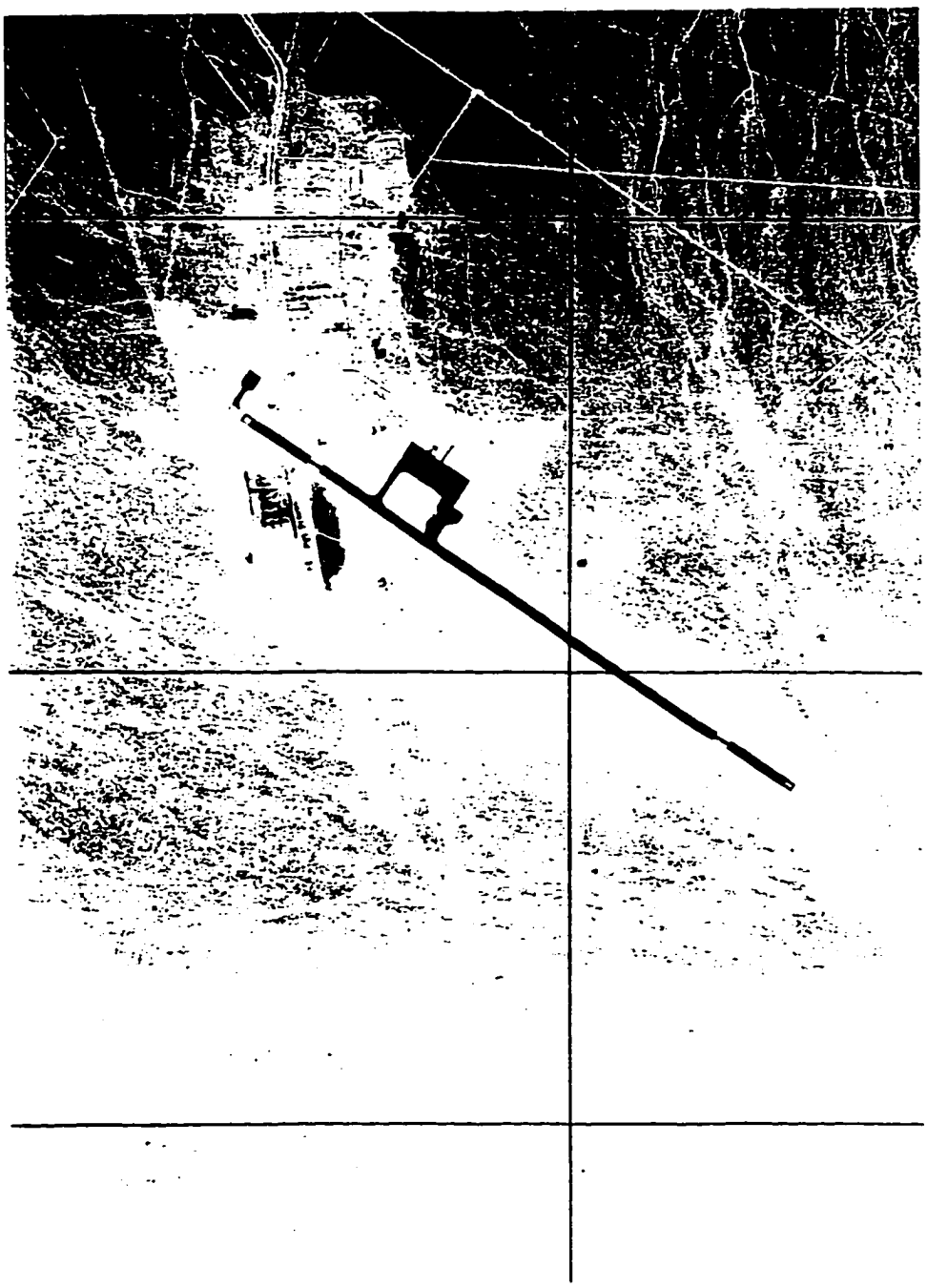

Figure 32. Aerial photograph of Camp Desert Rock, 1992 (*Department of Energy*).

marks the eastern boundary of the main camp facilities (Figure 26). Situated on the east side of Eighth Street, this irregularly shaped area abuts the Petroleum, Oil, and Lubricant Dump to the southwest. At one time, the compound was surrounded by a fence, but this has been removed with the exception of a portion along the northeast side. Here the boundary is marked by an arrangement of 4 ft. lengths of utility poles set directly on the ground and anchored by metal stakes. This may have formed the base for a razor wire barricade. The remaining perimeter of the compound appears to have been enclosed by conventional barbed-wire fencing. Access to the Ordnance Storage Area was through a single entrance located on Eighth Street. A shallow drainage ditch extends along the western margin of the compound. Although not shown on the maps, a dirt road ran along the eastern side of the compound.

Several buildings foundations or floor outlines are located in the Ordnance compound. Building T-801 flanks the north side of the compound entrance. Identified as an operational and/or administrative facility on the 1957 map, this structure probably consisted of a large Butler building with a wooden flooring system and a covered porch on its west end. It may have functioned as the Ordnance yard warehouse and maintenance facility. The porch consists of a 29 ft. x 11 ft., 9 in. concrete slab. The outline of the building is marked by a slight mounding of earth along the perimeter. The entire structure covered a 98 ft. by 29 ft. area. Broken window glass is scattered along the perimeter walls and miscellaneous construction debris (nails, screws, metal sleeves, wire,

insulators, metal strapping, tar paper, asphalt roofing, lumber, hinges, bolts, washers, etc.) occurs on both the interior and exterior of the structure. Three concentrations of charcoal and ash inside the structure appear to be the result of post abandonment trash-burning. A 5 ft. wide by 20 ft. long x 5 ft. deep pit has been excavated in the middle of the structure and it is filled with components from at least two vehicles and the metal frame and utility conduit from a Butler building. Materials in the pit include a wheel rim, 2 vehicle exhaust systems, several vehicle air filters, an engine block and valve cover, sheet metal, window screen, metal window frames, electrical conduit, industrial light fixtures, a metal ladder, chicken wire, guy wire anchors, metal braces and strapping, braided wire cable, rebar, metal pipes, tent stakes, and several 1-gallon paint cans and spray cans.

The three structures located 30 ft. east of Building T-801 and identified as T-802, T-803, and T-804 are gone. A shallow depression remains in the former location of T-804. Structures T-802 and T-803 have been bladed. A trash pit was excavated in their former location and then subsequently filled-in. The bladed area measures approximately 50 ft. x 50 ft. and debris including lumber, wire cables, tent stakes, miscellaneous metal, glass, and utility poles is embedded in the fill. A pile of 10 badly weathered utility poles sits along the northeast edge margin of the bladed area.

Building T-805 was located approximately 30 ft. south of the compound entrance. The structure was probably a small quonset hut that rested on a asphalt stabilized pad and measured approximately 15 ft. x 30 ft. All that

remains of the structure is a faint impression in the ground and architectural debris consisting of nails, hinges, lumber fragments, burnt wood, hardware cloth, an electrical breaker box, a metal "U" channel stake, wire, corrugated sheet metal, ceramic insulators, and window glass. Additional material surrounding the structure includes clear and amber bottle glass, gas or smoke canisters, motor oil cans, chain link fencing, fuses, beverage cans, and several paint cans. Two trash burning areas are situated about 100 ft. and 140 ft. south of this structure. The first covers a 15 ft. diameter area and consists of reddened soil and rocks intermixed with burnt wood, nails, glass, metal fragments, and ash. The second burned debris concentration consists of a 20 ft. diameter area containing 40-50 artillery shell collars, 200-250 smoke canisters, 250-300 ammunition box hinges, 500+ metal corner brads, 1000+ nails, 300+ screws, burnt lumber, and hundreds of miscellaneous metal fragments.

There is evidence of several other structure in the Ordnance yard that do not appear on the maps. Wooden tent stakes indicate that a row of two or three tents was located approximately 30 ft. north of Building T-801. Architectural debris including lumber, nails, window glass, wire, and metal tent stakes is also concentrated in a 15 x 50 ft. area approximately 200 ft. east of Building T-801. The function of these structures is unknown.

The Ordnance yard contained several other features and debris scatters. One feature consisted of a 200 ft. x 60 ft. area of "oiled" gravel located in the southeast portion of the compound. The gravel surface is very uneven and only loosely compacted. A wooden box is embedded in the ground along the north

edge of the gravel surface. Wires run from the box toward the main Ordnance buildings approximately 350 ft. to the northwest. The box may have held a field telephone. Debris suggests that this area may have served as a repair and storage area. Partially used welding rods, large diameter bolts and miscellaneous metal fragments are scattered across the ground. Lids from several unusually-shaped cans are also concentrated in this area (Figure 33). The lids are the external friction type and are either diamond-shaped or round with a pair of shallow indentations. The function of these cans is unknown.

Several debris concentrations sit to the east of the gravel feature. One is about 60 ft. to the southwest and consists of vehicle parts including the bench seats from a truck. The trigger portion of a bazooka was also located in this area. The other material concentration is located at the southeast corner of the Ordnance compound and includes lumber fragments, miscellaneous metal items and the lid from a "C -ration" can (Figure 34).

The Petroleum, Oil, and Lubricants Dump is situated southwest of the Ordnance storage yard (Figures 20 and 24). The map shows this area as a single compound enclosed by a wire fence. Field examination revealed that the fencing has been removed although lengths of twisted barbed-wire are scattered near the compound's perimeter. It appears that the entire dump was surrounded by a 3-4 ft. high earthen berm at one time and the fence was just outside the berm. The dump is actually divided into two sections by a north-south running berm. The easternmost section is almost completely surround by an intact berm. Although it does not appear on the 1957 map, a tent or quonset

Figure 33. Cans lids found in Ordnance Storage Area.

Figure 34. "C"-ration can lid.

structure was located at the entrance to this portion of the dump. It covered an area approximately 30 ft. x 15 ft. A debris scatter including rebar stakes, burned lumber, a wooden palette, nails, wire staples, barbed-wire, beverage cans, bolts, a "Coca Cola" bottle, clear glass and miscellaneous metal fragments, defines the perimeter of the structure. Approximately 110 ft. south of this structure is a concentration of six 5-gallon oil cans and a tangle of braided cable. The concentration has been tagged for future environmental cleanup activities which will include removal of the cans and any contaminated soil. The western section of the petroleum dump is only partially enclosed by the earthen berm at this time. Much of the berm along the northern and southern edges has been washed away. The dirt roads that ran along the west, east and south sides of the dump are still visible although native vegetation has begun to encroach on them. The eastern portion of the dump has also been slated for environmental restoration.

The Quartermaster Gasoline Dispensing Area was located south of Engineer Road between Seventh and Eighth Streets (Figure 26). The paved area measured approximately 200 ft. x 370 ft. and once contained at least two structures and several fuel pumps. Only the foundation of T-951 and the fuel pump island remain. Located off the southeastern edge of the paved service area, Building T-951 appears to have been a storage and/or pump control facility. The "L" shaped foundation is below ground level and consists of 4-in. thick reinforced concrete walls with a concrete floor. Four steps lead down into the structure which measures 16 ft. x 12 ft., 2 in. Fuel supply lines and electrical

conduit are located along the north wall. The upper structure appears to have been constructed of wood and burned and collapsed at some point. The second step leading into the facility bears the name of the unit that built the structure. The words "B CO. 95th ENGR." are etched into the concrete. Debris inside the foundation consists of metal hinges, conduit, nails, metal fasteners, wire, burned lumber, bolts, a 5-gallon oil drum with bullet holes, key-strip opened gas or smoke canisters, transmission fluid cans, motor oil cans, metal shavings, and rubber bushings. A foundation that held a pair of fuel pumps is situated 30 ft. northwest of T-951. The reinforced concrete pad measures 45 ft. x 4 ft., 9 in. Metal pump brackets and fuel supply pipes and electrical conduit are located at either end. Threaded metal pipes are embedded in the slab and may have been used to anchor supports for some type of canopy. The words "B Co. 95th Engineer" appear in the concrete under the easternmost pump (Figure 35). Both the fuel pumps and building T-951 have been slated for environmental restoration. The only evidence of another structure in the Gasoline Dispensing Area is a shallow depression with some conduit fragments, nails, and rebar. The depression is located approximately 75 ft. northeast of T-951 and the map identifies this as a storage building T-950. General debris in the area includes rubber hoses, electrical cable, ceramic insulators, gas or smoke canisters, hardware cloth, pull-tab beverage cans, church-key opened "Lucky X" beer cans, "Hamm's" beer pull-tab cans, lumber fragments, braided wire cable, bottle glass, crown caps, key-opened meat tins, barbed-wire, cone-top beer cans, and coffee cans. The gasoline dispensing area was probably a part of the camp

Figure 35. Inscription on fuel pump island in the Quartermaster Gasoline Dispensing Area.

since 1952. However, the concrete fuel pump island and the pump house were not built until 1955 when the 95th Engineer Construction Battalion was part of camp support detachment.

The Provost Marshal's Vehicle Impound Lot is located to the west of the Petroleum, Oil, and Lubricant Dump (Figure 25). No structures are shown in this area on the historic maps and no evidence of any structures was noted during the survey. The impound area was originally enclosed by a barbed wire fence. Only debris from the dismantled fence, miscellaneous vehicle parts and other general debris remain. The debris scatter extends from the southern end of the impound yard approximately 300 ft. to the south. The entire area has been bladed. Parts of a dismantled 4x4 truck or jeep are concentrated in the bulldozer berms near the Petroleum, Oil and Lubricants Dump. A little farther south and west there is additional debris from various machinery and a variety of 1940s and 1950s vintage automobiles including both utility and passenger vehicles. The debris consists of vehicle door handles, hubcaps, window glass, tail lights, chrome trim, engine valve covers and gaskets, hoses, belts, gears, shock absorbers, wire, nuts and bolts, hinges, horn buttons, metal rods, a portion of an engine block, and wheel rims.

The Engineer Open Storage Area (Figures 20 and 23) was situated to the west of the vehicle impound yard. Like the other storage areas, it had been surrounded by a fence at one time. The fence has been dismantled. Only sections of barbed wire and a few displaced fence posts remain. The 1957 map identifies five structures in this area, all of which served either administrative or

operational functions. Arranged in an "L," these buildings separated the northern portion of the compound from the open storage yard. Buildings T-935 and T-936 were either quonset huts or framed tents. Both lacked concrete foundations. Faint impressions, architectural debris, and ash dumps marked the former locations of these two structures. Buildings T-937, T-938, and T-939 were identical in size consisting of reinforced concrete slabs measuring 48 ft. x 20 ft. These simple slab foundations probably supported quonset huts. The foundations used for Butler buildings usually consisted of a concrete footing and sill or stem wall combined with a reinforced concrete floor slab. Entrances to the buildings were along the west side. Each had a concrete step at the doorway. Construction adhesive residue on foundation T-938 indicates that a series of nine 5 ft., 4 in. x 4 ft. storage bays were located along the north wall with a larger 7 ft., 6 in. x 16 ft., 3 in. storage bay in the northeast corner. Several inscriptions in the concrete of foundation T-939 provide information on the date of construction. The words "360th E.U.D. July 17th '53" appear on the southwest corner of the slab. Additional inscriptions in the concrete, " Holland," Darrell C. Ludlow Oakley, Kansas," and "Larry L. Ewing Chicago, July 1953," are probably the names of the Engineer Utilities Detachment personnel responsible for the construction of these buildings. The open areas between the foundations are covered with debris scatters consisting of architectural materials and ash/charcoal dumps that probably represent the contents of pot-bellied stoves. One notable artifact located between T-937 and T-938 was a six-pointed star made of plywood (Figure 36). The symbol of the Camp Desert Rock "Atomic

Figure 36. A six-pointed star was the symbol of the "Atomic Army."

Army" was the letter "A" inside a six-pointed star surrounded by a circle. The plywood star was probably part of a sign attached to one of the engineer storage buildings.

There is a considerable amount of debris particularly vehicle related debris at the south end of the Engineer compound. Most of the miscellaneous car parts appear to be from sedans rather than trucks or jeeps and include door handles, tail lights, chrome trim strips, wheel rims, muffler and exhausts parts, and window glass. Remnants of barbed wire fencing and structural debris such as nails, screws, lumber, hinges, window screen, etc. are scattered for several hundred feet.

The Quartermaster Storage compound was located to the west of the Engineer storage area between Fifth and Sixth streets (Figures 22 and 25). The 1957 map indicated that there were at least nine buildings in the compound which was surrounded by fencing. This area has been heavily impacted by the construction of the National Weather Service facility and the establishment of a vegetation study plot. A new paved road leading south from Engineer Road to the weather station has obliterated the eastern edge of a row of six structures, T-920 through T-925. None of these structures appear to have had concrete foundations. At least one of these structures, T-922, was used to store food service supplies as evidenced by a concentration of coffee spoons and the metal tops to sugar dispensers mixed in with typical building debris including lumber, nails, screws, metal strapping, conduit, etc. The outline impression of Building T-926 sits just to the east of the paved road leading to the weather

station. Identified as an administrative office on the camp map, the structure probably consisted of a quonset hut with a plywood floor. Debris scattered around this structure includes an ash/charcoal dump, burned lumber, bottle glass, nails, asphalt roofing, hinges, a door knob and lock assembly, metal strapping, and window screen. Immediately to the south of T-926 was a locker storage area, T-927. This structure (Figure 37) exhibits a unique floor plan consisting of 15 low concrete partitions measuring approximately 14 ft.-long x 1 ft.-thick. Spaced at 6 ft. intervals, the walls are embedded in the earth and lack a foundation slab. Square or rectangular piers are located approximately 3 ft. from either end of each partition. Two types of metal locker doors are represented in the debris associated with this building. Additional material found in the area includes numerous pad locks, wire, hinges, metal strapping, lumber, bolts, washers, and ceramic insulators. The main Quartermaster supply warehouse (Building T-928) was situated due south of the locker storage facility. All that remains of the facility is a 160 ft., 6 in. x 40 ft.,1 in. reinforced concrete foundation. Expansion joints span the slab at 7 ft. intervals. The slab has been incorporated into the weather station facilities. A domed weather instrument building sits at the northeast edge of the T-928 foundation with the main weather facility office building located approximately 60 ft. to the west. Electrical junction boxes are mounted along the western edge of the foundation. Beyond the weather station at the southern end of the Quartermaster Area is a large expanse of red cinder surfacing. It covers a 300 ft. x 400 ft. area and is clearly visible in the 1992 aerial photograph as a dark patch (Figure 32). This

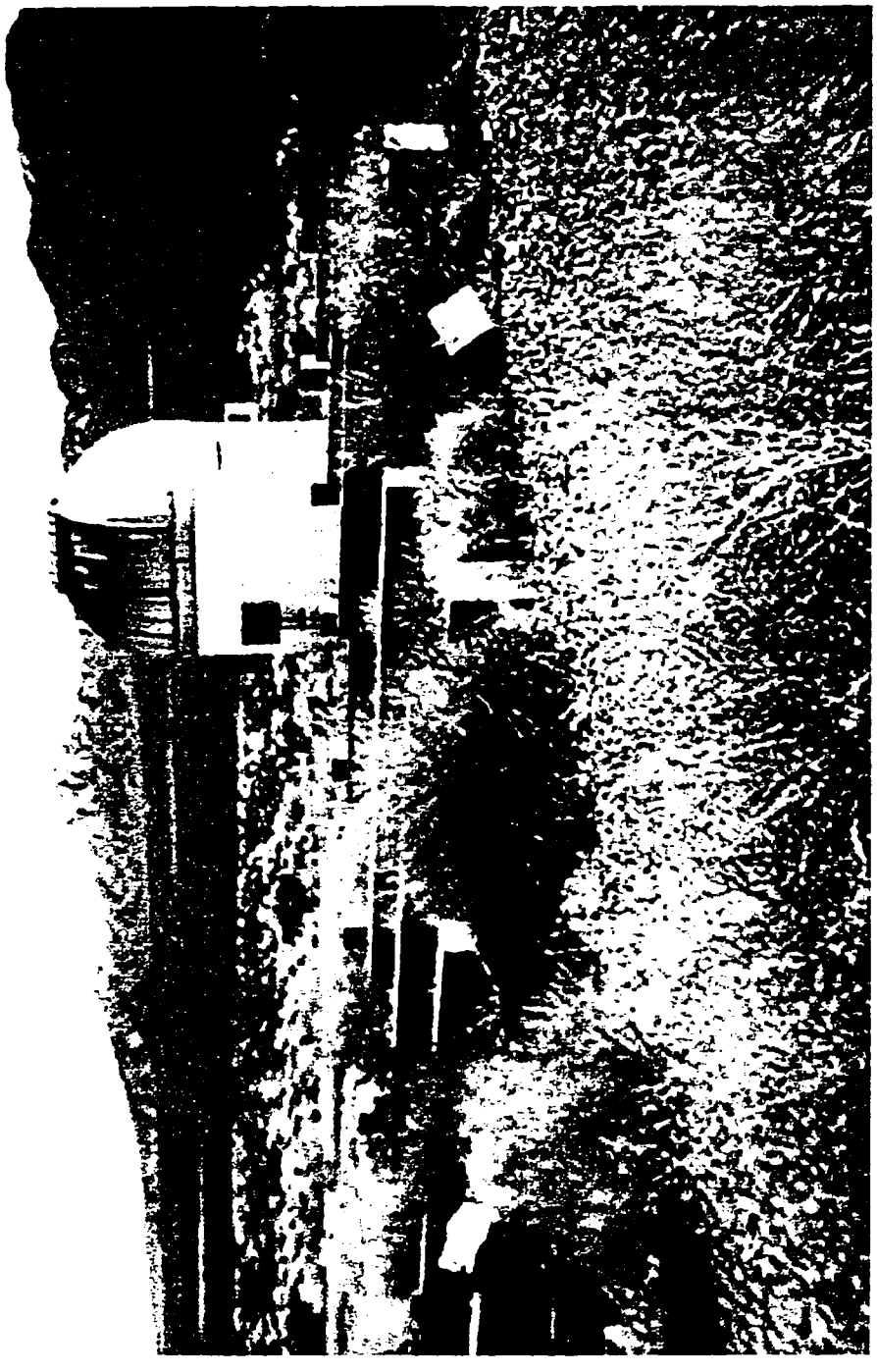

Figure 37. Quartermaster storage facility Building T-927.

area was probably used as open storage for crated supplies and oversized materials that would not readily fit in the warehouse. The fence that surrounded the area is no longer in place.

A triangular-shaped graded parking area sits just below the southern end of Fourth Street. The Signal Corps open storage area is located between the parking area and the Quartermaster compound (Figures 22 and 24). Only the outline impressions of a row of approximately 5 small contiguous storage structures (Bldg. T-953 through T-957) and two larger structures (Bldg.T-952 and T-958) remain. A light debris scatter surrounds the structures. Materials include lumber fragments, nails, asphalt shingles, nuts, bolts, metal strapping, hinges, wire spools and lengths of communications wire. There are sections of barbed wire fencing and several displaced fence posts in the compound area. According to the 1957 maps, this area had once been enclosed by some type of fencing. The southern portion of the compound is now occupied by a vegetation study plot and was not accessible for survey.

South of the Quartermaster and Signal Corps compounds there is a network of dirt roads and two smaller storage areas. These are identified on the 1957 maps as an ammunition storage area and a "radiation dump" (Figure 22). The ammunition dump is the easternmost of the two facilities and consists of a circular, barbed wire enclosure approximately 120 ft. in diameter. A 10 ft. diameter pit is located in the center of the enclosure. The pit is surrounded by a low mound of badly weathered sandbags. No materials are visible in the pit.

The radiation dump is approximately 150 ft. west of the ammunition

storage area. It consists of an 80 ft. x 100 ft. barbed wire enclosure. A 10 ft. diameter pit is also located in the center of this facility. The pit is surrounded by sandbags and wooden tent stakes forming a rectangular pattern. The stakes suggest that the pit may have been enclosed by a tent or at least covered with a tarp. The radiation dump has been marked for environmental restoration activities.

Motor Pool

Maps indicate that a vehicle parking area was located along the north side of Desert Rock Drive extending from Seventh Street to First Street. The Motor Pool maintenance and vehicle storage compound encompassed the western half of the parking area. Field examination shows that the parking area is separated from Desert Rock Drive by one of the camp's major east-west drainage channels and a narrow powerline corridor. Portions of the parking area are still covered with a stabilized asphalt surface but much of it has eroded. Although not shown on the map, several small structures may have been located in the parking area approximately 400-500 ft. northwest of the intersection of Third Street and Desert Rock Drive. There are lumber fragments, wire, and nails concentrated in this area.

The main Motor Pool compound covered an 800 ft. x 1,200 ft. area north of the camp headquarters/administration complex (Figures 20 and 21). Much of this area has been destroyed by the airport runway extension and heliport construction. Only the foundation of the Fire Department/Transportation Office

Building (T-1001) and two associated service areas (T-1002, T-1003) remain intact. Building T-1001 consisted of a large Butler building resting on a 40 ft. x 100 ft. reinforced concrete foundation. The bolt pattems in the slab indicate that the south third of the building was partitioned into 5 separate rooms including a bathroom with a sink and shower. The northern two-thirds of the building was open space and probably sheltered the camp's fire truck. Concrete support stands for a fuel oil or propane tank are located along the east side of the foundation. Red cinder covers the area outside the north and south building entrances. Two service areas (T-1002, T-1003) sit approximately 35 ft. west of the Fire Station. They are approximately 15 ft. long and consist of a low mound covered with red cinder. Water or fuel lines and electrical conduit are located along side. A 1957 photo depicts wooden vehicle ramps sitting on top of the mounded soil indicating these facilities were utilized in vehicle maintenance (Figure 13).

Visitor's Tent Area

Located west of the motor pool and north of Desert Rock Drive, the Visitor's Tent Area extends 1,600 ft. east-west and 700 ft. north-south (Figure 22). Airport construction has impacted approximately 400-500 ft. of the southwestern corner of the tent area. A wooden storage building is located in this area, but it appears to be related to 1960s airport activities rather than Camp Desert Rock occupation. Field inspection of the Visitor's Area supports the documentary and informant descriptions of these facilities. The eastern half

is covered by red cinder surfacing. The patterns formed by the remaining tent stakes and wooden corner posts indicate the tents were ordered in north-south rows with the long axis oriented east-west. The rows were arranged in pairs. Each pair of rows was separated by an avenue wide enough to accommodate vehicles. A series of shallow linear depressions north of the tent area are probably the remains of the open trench latrines. Debris in the area is minimal and consists primarily of lumber fragments, wooden tent stakes, wire, nails, and miscellaneous metal fragments.

Physical Training Area/Officers Barracks

The entire physical training area and much of the barracks area west of First Street and south of Desert Rock Drive has been heavily impacted by the runway expansion (Figure 22). The physical training area, which consisted of a graded area, now sits under the runway tarmac. The rest of the parcel has been bladed. According to the 1957 map, this area held 9 structures (T-02 through T-09, T-11) identified as bachelor officer's quarters. Photographs indicate these were cement-floored quonset huts. The only remnants of the structures consist of chunks of concrete, miscellaneous metal fragments, and window glass. A slight depression south of the barracks area was probably the location of Building T-10. Identified as a recreational structure, the building is surrounded by red cinder surfacing. This may have been the location of the volleyball court.

Headquarters/Administration/Officer's and VIP Barracks

The camp headquarters and administrative center was located in the area south of Desert Rock Drive between First and Second Street (Figure 23). The material remains in this portion of the camp exhibited the greatest degree of functional and technological variability. The structures in this area included administrative, operational, and medical facilities, training, communal, and recreational buildings, and residential and sanitation facilities. Construction techniques ranged from wood-framed tents to prefabricated metal and wood buildings to mobile trailers. The 1957 maps indicated that there were a total of 99 buildings and trailers in this area. Fifteen concrete foundations remain intact.

Directly south of Desert Rock Drive there is a large, hard-surfaced parking area outlined in white-painted rocks. A pair of metal posts sheared off at ground level and several guy wire anchors are situated at the north edge of the parking area. This is probably the location of the Camp Desert Rock Headquarters sign as photographs suggest. The camp flagpole (T-100) was located 120 ft. south of the sign and was surrounded by a "keyhole" shaped rock alignment. The flagpole is gone. The flagpole sat in the middle of a 150 ft. x 100 ft. plaza area. White painted rocks outline the entire plaza. Eight of the 30-plus Joshua trees planted along the plaza edge during 1957 are still alive. There are two debris piles located in the plaza. Both consist of several dozen broken ceramic insulators and wire fragments. The concrete foundation of the camp headquarters stretches along the south edge of the plaza. The foundation is approximately 106 ft. x 20 ft. and held two quonset huts (Bldg.T-188 and T-

189) joined by an open-sided vestibule. The slab has numerous bolts embedded along its perimeter, but there is no evidence of interior partitions. An angled cement walkway leads from the vestibule to the edge of the plaza. Another sidewalk leads from the east end of Building T-188 to the plaza indicating this quonset had two doors. Debris associated with the headquarters building includes typical architectural materials as well as paper clips and metal folder fasteners.

Directly east of the plaza and 40 ft. south of the parking area are two raised gravel pads that accommodated wood-floored quonset huts (Bldg.T-132 and T-139). According to written accounts, Building T-132 served as the Camp Commandant's quarters and Building T-139 contained the Visitor's Bureau. The remains of Building T-140 are approximately 30 ft. south of the easternmost gravel pad. This building housed the camp's telephone exchange and was built on a uniquely constructed foundation. The foundation system consisted of a grid-like framework of "I" channel metal struts spaced 2 ft. on center. Concrete was poured into the frame and then troweled smooth. The building's structural framing was bolted to the metal struts. No other structure in camp had this type of concrete and metal foundation. An 11 ft. x 11 ft. concrete pad is 7 ft. west of the telephone exchange building. Identified as T-157, this structure was probably associated with the camp's communications system too, but its specific function is unknown.

The foundation of one of the camp's 3 large capacity mess halls, Building T-146, is located approximately 37 ft. east of the Visitor's Bureau and

Telephone Exchange. A second of the large mess halls (Bldg. T-108) is situated about 124 ft. west of the plaza. The messes each had a seating capacity of 500-600 people. The buildings' foundations are nearly identical mirror images. Both measure 32 ft. wide by 161 ft. long not including the loading dock on the south end. Because of their length and location, the structures rest on elevated concrete footings to accommodate the sloping terrain. The north elevations of these buildings are at ground level, but the southern elevations sit 2.5 ft. to 3.5 ft. above grade and require 3 or 4 steps. General personnel entrances are located in the north, east, and west elevations. The food service staff entrance is at the rear of the building through the loading dock. A grease pit sits adjacent to the loading dock. The southern quarter of the building apparently held all the food storage, preparation, cooking, and dishwashing facilities. Wooden sills, floor bolt patterns and utility conduits indicate that the kitchen was partitioned into at least 3 separate areas. Floor drains are located across the length of the slab and the floor slopes toward the drains. The serving area was adjacent to the kitchen. There are utility conduits in this area for the connection of steam tables. The mess seating area occupies the northern three-quarters of the building. Fuel-oil tank stands are located adjacent to each mess hall.

The camp hospital/dispensary complex is also located in this area. It sits approximately 44 ft. west of Mess Hall T-108 near the corner of First Street and Desert Rock Drive. Maps show that the hospital had grown to 3 buildings by 1957 (T-101, T-190, and T-191). Runway construction demolished the main dispensary foundation (T-101) and damaged the concrete walkway that

connected it with the two "ward" building foundations. These foundations are 20 ft., 9 in. x 48 ft., 3 in. Entrances were located on the north elevations. Each structure had a small bathroom consisting of a toilet and sink located in either the southeast or southwest corner. Debris surrounding the ward buildings consists of typical architectural material (i.e., nails, nuts and bolts, wire, metal strapping, conduit, window screen, glass, etc.). Nothing indicative of medical services was found.

An extensive recreational complex is located 30 ft. south of the hospital foundations. Building T-99 is identified as the Officer's Club. The remaining foundation reflects an unusual construction technique. Wooden 2x4s and 2x6s were used to form a 4 x 4 ft. grid. Concrete was then poured into the grid. Remnants of a linoleum tile floor laid over the concrete slab are still visible. The interior walls of the club building may have been paneled. Fragments of a thin cement board or "Transite," an asbestos board, are scattered across the concrete slab. Both types of paneling were popular in the 1950s and early 1960s. There were two entrances to the club, one on the east elevation and one on the west. The entrance on the west abuts an elevated pad covered with red cinder. Several Joshua trees are planted along the edge of the pad. Documents identify this area as a covered patio. A couple of wooden steps along the patio's west edge lead down to another "open-air" patio covered in cinder.

The area south of the Officer's Club and west of the T-106 latrine building has been bladed. Architectural debris protrudes from several of the blading berms. It does not appear that any concrete foundations were in the bladed

area.

The area south of the headquarters and administrative buildings contains the foundations of three latrine buildings, T-106, T-151, and T-117. The foundations of T-106 and T-151, identified as officer's latrines, are nearly identical. The 60 ft., 6 in. x 20 ft. reinforced concrete slabs are partitioned into 6 separate rooms - a toilet area, a sink area, a locker area, two shower rooms, and a mechanical room. Access to the building was through a doorway leading into the toilet area or an entrance into the sink area. The mechanical room had a separate entrance. Floor drains were located in the mechanical room, the toilet area, and both shower rooms. A fuel oil tank stand is located outside Building T-106. The stand is missing from Building. T-151. The presence of cement board or transite board surrounding the latrine areas suggests that these buildings were panelled perhaps to combat moisture problems.

Building T-117 is located south of the officer's and VIP barracks approximately 100 ft north of Engineer Road. Documents identify this building as the VIP latrine. It is different from the other permanent latrines. The foundation is 13 ft. x 50 ft., 10 in. and consists of a simple reinforced concrete slab with no footing or concrete sill. It was built in three sections. The central portion is the earliest component, while the east and west segments are clearly later additions. The center section includes two shower stalls, three toilets, and a sink area. Gas and water pipes in the northeast corner of this section were for a water heater. There is no separate mechanical room. The western addition included six more toilets and sinks. The eastern section added 4 more shower

stalls and a changing/locker area. The showers in this latrine offer a level of privacy not found in either the enlisted or officer's latrines. Debris surrounding the latrine indicates that it was also paneled in cement board or transite.

The Indoor Theater (Bldg. T-154) is located along Second Street to the east cf Mess Hall T-146. The thick reinforced concrete foundation is 32 ft. x 100 ft., 6 in. It has 3 ft. high x 8 in. thick stem walls along the perimeter. Bolts are embedded in the stem wall for the attachment of the structural supports and vertical walls. There was a double door entrance on the north elevation and two single door entrances on the west and east elevations. The most unusual feature of the building is a 2 ft., 6 in. deep pit at the south end of the structure. Four steps lead down onto the dirt floor of the pit. A wooden header is attached to the interior of the south wall suggesting that a wood platform may have covered this area. Two individuals involved in the construction of this building inscribed their names in the concrete slab near the edge of the pit. The inscriptions read "Gayler Jensen, Brownsdale, Minnesota" and "Pete Hoffman." Neither the military unit nor the year of their Desert Rock participation is known. A rock alignment extends along a portion of the east elevation.

A second community building, the Orientation Hall, was located south of the theater (Figure 38). The reinforced concrete foundation of this structure is 40 ft. x 100 ft., 6 in. It has 8-in. thick stem walls with interior pilasters spaced at 20 ft. Intervals (Figure 39). Like Building T-154, there was a double door entrance on the north elevation and two single door entrances of the east and west elevations. To facilitate viewing of the lecture area, the floor slopes gently

Figure 38. Camp Desert Rock Orientation Hall, 1955 (*U.S. Army*).

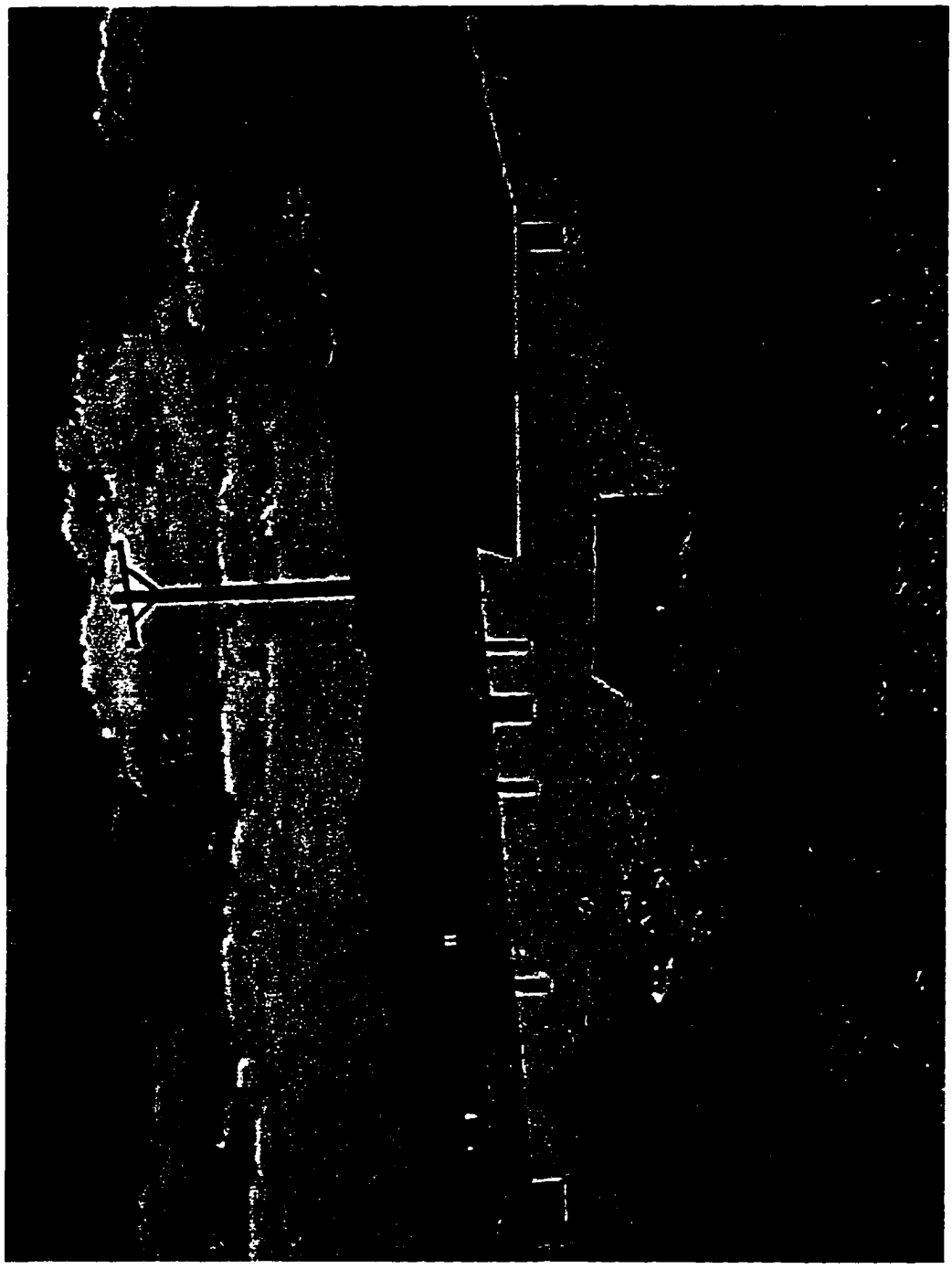

Figure 39. The camp's Orientation Hall today, 1997.

ending up 2 ft. lower at south end of the building.

The structure identified as the camp Post Office and Barber Shop originally sat 40 ft. south of the Orientation Hall. However, the 1975 realignment of Second Street has obliterated the remains of this building.

The foundation of a building identified as the VIP Mess Hall (Bldg.T-131) is located 250 ft. west of the Orientation Hall and 100 ft. north of Engineer Road. At one time, NCO barracks filled the space between the two structures, but a 25 ft. wide dirt road has been graded through this area. The road is probably related to the 1969 airport expansion activities. The T-131 foundation consists of footed, reinforced concrete slab with a 6-in. thick sill along the perimeter. A concrete dock is located at the building's south end. The foundation is 20 ft., 1 in. wide by 60 ft., 6 in. long. Entrances are situated in the north, east, and south elevations. The kitchen and serving areas occupied the south one-third of the building. The fuel oil tank stand is located at the northwest corner of the structure. The entire foundation is surrounded by rock alignments. A pair of yuccas flank the north entrance and another is located at the southeast corner of the building. An inscription in the concrete sill near the northwest corner of the foundation indicates the building was erected on February 13, 1952 by members of the 369th Engineer Company.

Approximately 30 ft. south sits another reinforced concrete foundation. It is 10 ft. x 20 ft. and has a 6-in. thick sill. A 6-in. diameter floor drain is located in the center of the slab. The area surrounding the foundation is covered with red cinder surfacing that extends to the loading dock on the south side of Bldg. T-

131. Identified as a food supply facility on the 1957 map, the structure was probably associated with the VIP Mess. The cinder-covered area might as served as an open-air patio.

The remaining structures in the area bounded by Desert Rock Drive, Engineer Road, and First and Second Streets were all barracks or general purpose operational buildings. They were either wooden-floored huts or trailers. The only material remaining from these buildings is a light debris scatter consisting of wire, asphalt roofing, nails, door hinges, wood fragments, window screen and glass, a few beverage cans and bottle glass. Several of the barracks structures had concrete steps, but most of these have been moved out of their original locations. No rock alignments or landscaping is associated with any of these structures.

Outdoor Theater/Recreational Area

The area south of Engineer Road extending from First Street to Third Street was the site of several of the camp's recreational facilities and the Outdoor Theater (Figures 20 and 21). Identified as Building T-902, the theater was located about 200 ft. south of the intersection of Engineer Road and Third Street. It consisted of a wooden bench seating area and an elevated wooden stage to the south. Combined, the stage and seating covered a 75 ft. x 150 ft. area. Both the bench and stage areas have been dismantled. A shallow depression is located along the east edge of the seating area. It is filled with burnt lumber, chicken wire, nails, metal struts, conduit, cans, sheet metal, a

large domed glass window (helicopter or airplane cockpit window?), barbed wire, and fence posts. Numerous wooden tent stakes are still embedded in the ground to the south and southwest of the stage. The stake alignments represent at least four separate tents. A 1951 map indicates a classroom tent was in this location and later newspaper accounts suggest there were multiple tents in this area for visiting performers.

The structural remains of the NCO club (T-901) are located 75 ft. west of the theater seating area. This building was a quonset hut. The architectural debris includes pieces of corrugated metal and scalloped rubber gaskets. The 20 ft. x 40 ft. foundation remains in place. It has the same "I" channel foundation framing as the Telephone Exchange Building (T-140), but no concrete was used. Instead, plywood panels were bolted to metal crossmembers. The foundation is covered with lumber fragments, wooden shelving, a stair stringer, wire, conduit, a metal louvered window, window screening, beverage and food cans, bottle glass, nails, screws, metal strapping, hinges, and a padlock. Several 4 in. x 4 in. wooden posts are situated along the south edge of the foundation suggesting a covered patio area. The ground surface surrounding the foundation is covered with red cinder.

There are three additional concentrations of architectural debris in this area. One is 150 ft. south of the NCO club in the approximate location of a structure identified as T-903. Materials include lumber, utility poles, wire, and nails. The type and function of this building is unknown. A second small concentration of lumber, nails and conduit is 40 ft. northwest of the NCO club.

This structure is not identified on the maps. The last concentration of structural debris is approximately 400 ft. southwest of the NCO club. Debris is this area includes lumber, conduit, and beverage cans. The debris in adjacent to the "home plate" of a baseball diamond. The baseball diamond is not shown on the 1957 maps, but it is visible in a 1955 aerial photograph of the camp.

Enlisted Men's Barracks Area

Quarters for the camp's enlisted support staff were located south of Desert Rock Drive and north of Engineer Road between Second and Eighth Street (Figures 20, 22-24). Third through Seventh Streets dissect the area into six roughly equal parcels all approximately 400 ft. x 700 ft. A latrine building foundation is located at the south end of each of the parcels. The latrines (T-218, T-318, T-418, T-518, T-618, and T-718) exhibit identical floor plans, orientation, and construction techniques. Made of reinforced concrete, the latrine foundations are 80 ft., 6 in. long by 20 ft. wide. The floor slab is surrounded by a 6-in. thick concrete sill with embedded lag bolts. The structure was divided roughly in half by an interior partition. The west half contained the sink and toilet areas. The east half contained a large shower area, a changing alcove, and a mechanical room. There are two doors on the north elevation, one on the west, and another on the east side that leads into the mechanical room. A fuel oil tank stand is located 15 ft. to the east of the latrine building. All the latrines are surrounded by dense debris scatters. Most of the material is architectural and includes 1/8-in. thick cement board or transite panels, sheet

metal, wood fragments, toilet seats, water pipes, electrical conduit, metal strapping, broken porcelain fixtures, electrical conduit, asphalt roofing, nails, screws, bolts, window screen, and glass. Personal items found around the latrine areas include toothpaste tubes, razor blades, plastic combs, wire hangers, and assorted beverage cans and bottles.

Another common feature of the enlisted personnel barracks area was an east-west row of five concrete foundations extending across the north end of each parcel. Located approximately 117 ft. south of Desert Rock Drive, the 8 ft. x 12 ft. foundations consist of reinforced concrete slabs with a 4-in. sill running along the perimeter. A 6-in. diameter drain is located in the floor. Several of the foundations are associated with fairly elaborate rock alignments and native landscaping. Metal tent stakes, wooden posts and wires adjacent to the foundations suggest that they may have been enclosed by a tent or covered by an awning. The 1957 maps identify these structures as food supply areas. Oral interviews suggest these may have also served as drinking water stations.

The types of barracks in each of the parcels was variable. During Exercises Desert Rock I through IV, the barracks areas consisted of squad tents. Wooden tent stakes, evidence of the early occupation, are found throughout the barracks areas. However by 1955, a large number of tents were replaced by wooden hut housing in the area between Second and Fifth streets. Evidence for this later occupation is found in decorative rock alignments and building outlines. These features indicate structures with the long axis and doorways oriented north-south. This corresponds to historic photographs showing tent

barracks oriented east-west and prefabricated barracks oriented north-south. In 1957, quonset barracks replaced approximately half the squad tents in the area between Fifth and Seventh streets. The quonsets had simple reinforced concrete slab foundations and these are still in place. Six rows of three foundations are located on the east side of Fifth Street. The same number are located on the east side of Sixth Street. The foundations are 20 ft., 9 in. wide by 48 ft., 1 in. long and are spaced approximately 40 ft. apart. Electrical conduits and propane/fuel oil lines protrude from the center of each slab indicating these barracks had a more convenient heating system than the typical pot-bellied stove.

The tract of land bounded by Desert Rock Drive, Engineer Road, and Seventh and Eighth streets apparently remained a tent area throughout the camp's occupation. The archaeological remains confirm that wood-framed tent barracks were utilized on this parcel. Numerous notched wooden tent stakes and several 4x4 corner posts are still embedded in the ground. The pattern of the stakes and posts suggests that there were at least five north-south rows consisting of approximately 20-22 tents each. The tent stakes stop approximately 130 ft. south of Desert Rock Drive. There are no features to suggest prefabricated housing was ever used in this area.

The enlisted personnel barracks area included several operational and communal service buildings such as the Provost Marshall's Office, the Red Cross lounge and chaplain's office, the post exchange, the enlisted men's beer hall, a mess hall, a food service building, and the Battalion or Company offices

for the various support units. Many of these were located adjacent to the east-west row of "food supply" structures. For most of these structures, only faint outlines and architectural debris remain. However, extensive decorative rock alignments and landscape plantings mark the former location of the Engineering Battalion (T-319) (Figures 40 and 41) and Chemical Company (T-419) offices. The concrete foundation of the camp's third large capacity mess hall (T-325) also remains in place. Located along the west side of Fourth Street, the dimensions, floor plan, and construction method are nearly identical to the two mess halls in the administration/headquarters area. The only notable differences are in the configuration of the loading dock and grease pit on the south end of the structure. Interestingly, a photograph attributes the construction of this mess hall to the 95th Engineer Battalion in 1955. However, an inscription in the concrete slab at the north entrance reads "412 ENGR CONST. BN., Co. C". The 412th Engineering Construction Battalion only participated in the 1953 Upshot-Knothole exercises.

One of the most noticeable features of the enlisted men's barracks area are the extensive decorative rock alignments and plantings of native vegetation. The alignments consists of both painted and natural rocks and include straight line, rectangular, square, and circular patterns. The plants include Joshua trees, Mojave yuccas, and various cacti. Some of the planting areas have been covered with colored rock. The alignments are scattered throughout the area. Some surround the battalion and company offices, but many are associated with individual prefabricated and squad tent barracks. The areas with the

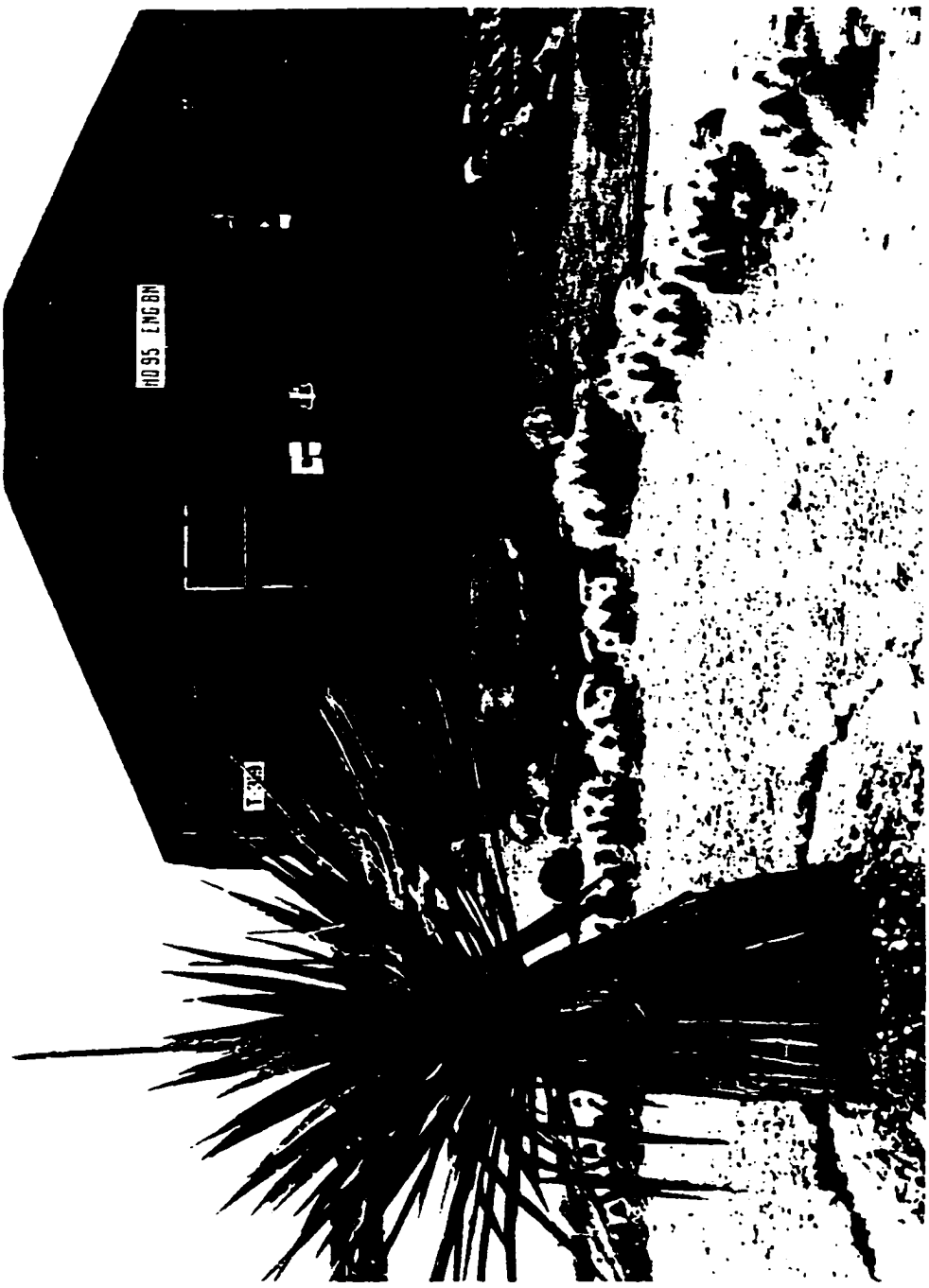

Figure 40. The 95th Engineering Construction Battalion Headquarters building in 1955. Note the decorative rock alignments and native landscaping (*U.S. Army*).

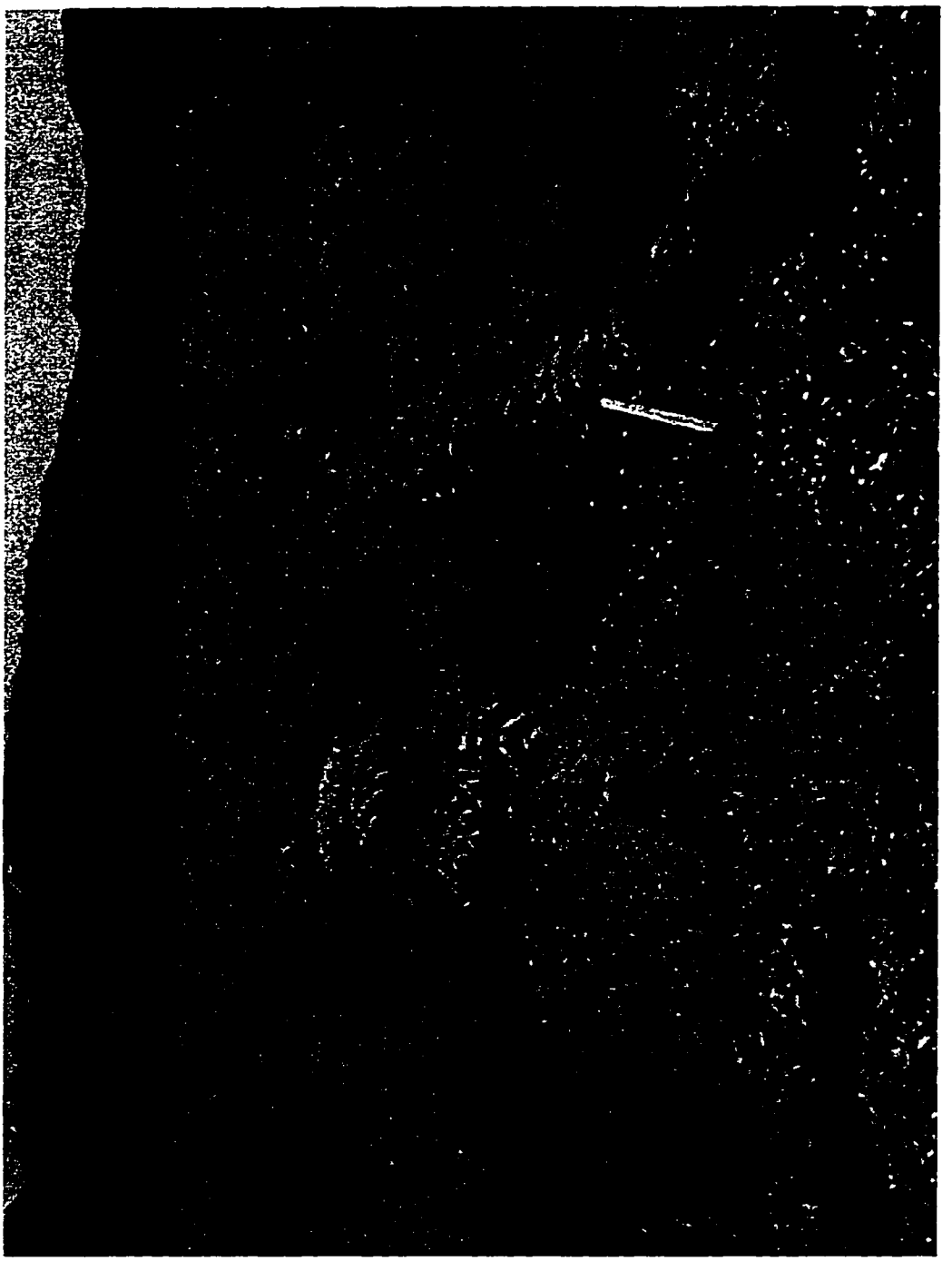

Figure 41. The location of the 95th Engineering Construction Battalion Headquarters building in 1997. The rock alignments and some of the plants remain in place.

heaviest concentration of landscaping are barracks buildings T-300 through T-322, T-419 through T-423, and T-500 through T-517. A row of 28 Joshua trees (most are now dead) surrounded by rock alignments and red cinder extends along the east edge of Seventh Street and corresponds with the westernmost rows of squad tents.

Camp Infrastructure

An extensive sewer system was constructed between February 27 and March 3, 1952 and consists of more than 20 octagonally-shaped sewer vaults with concrete manhole covers. The date of construction is etched in the concrete vault covers. The sewer system in the main portion of the camp is no longer operational. Many of the vaults are open and debris has either been blown in or dumped into them. The only portion of the sewer system that may still be functional is a pair of vaults located at the Desert Rock Airport tower complex.

The camp's water system is inoperable. The huge water storage tank is gone and large sections of the water delivery pipes have been removed although spigots and stubbed off pipes remain in several locations. The concrete pad that held the camp's 100,000 gallon water tank sits approximately 900 ft northeast of the intersection of Desert Rock Drive and Mercury Highway. The pad has five large eyebolts embedded in it and is surrounded by guy wire anchors. Another small structure may have been located about 60 ft. north of the water tank as evidenced by a concentration of lumber fragments and a guy

wire anchor. This may have been the water chlorination tank noted on the maps.

The only evidence of Camp Desert Rock's electrical service is the hundreds of ceramic and glass insulators and the utility pole guy wires and anchors located throughout the camp. The 500 kw generator installed during the 1955 exercises sat approximately 600 ft. north of the guard station. The generator has been removed, but the concrete pad it rested on is still in place. A graded service road led to the generator and it appears that the area was surrounded by a wire fence. None of the utility poles that once spread across the main cantonment or storage areas remain in place. However, the poleline that supplies the airport may be part of the camp's original electrical service. The line extends from Mercury and runs along the north side of Desert Rock Drive and south along Second Street to the airport. All that remains of the camp's communications system are wire runs and fragments of switchboard panels.

The camp road system remains nearly intact although there have been several minor modifications. When the airport was expanded in 1969, portions of First Street, Engineer Road, and Desert Rock Drive were truncated by the runway extension. Desert Rock Drive still picks up on the west side on the runway and continues on gently curving to the south until it intersects with U.S. Highway 95. Wooden barricades were erected across these roads to prevent vehicles from driving onto the runway. Another upgrade of the airport in 1975 resulted in a 1,300 ft. elongation and slight realignment of Second Street

extending it to the airport terminal parking area. During the same period, the construction of the National Weather Service weather station required the addition of a short access road leading south from Engineer Road to the facility's entrance. To direct vehicle traffic onto the primary airport and weather station access roads, a combination of wooden barricades, earthen berms and shallow ditches have also been erected near the north end of Third, Fourth, Fifth, and Seventh Streets, on the east side of the intersection of Engineer Road and Second Street, and across Desert Rock Drive east of Second Street.

CHAPTER 5

CONCLUSIONS

Methodological Evaluation

The research at Camp Desert Rock convincingly demonstrates the utility of Schuyler's historic ethnographic approach in the evaluation and investigation of Cold War- related sites. While this study in historical archaeology clearly has an emphasis on the "historical" data, the oral narrative and archaeology enrich the interpretive context by expanding, clarifying, reaffirming and even correcting the documentary record. By emphasizing the utilization of the full range of data sources available, it yields a more balanced interpretive framework within which a site can be evaluated. Awareness of the inherent biases in the data and the strengths and weaknesses of each type of data are also important. This understanding helps the investigator avoid many of the pitfalls inherent in an uncritical use of documentary, oral, and archaeological records.The data derived from the historical ethnographic investigation of Camp Desert Rock effectively demonstrates the site's potential to address questions concerning the material culture of the military and the Cold War. The cultural history developed for the site should prove useful for those researchers interested in comparative

studies.

However the historic ethnographic method cannot be employed without caution. For recent sites, and especially for those related to government activities, there is a real danger of "data overload." Government bureaucracies produce and preserve enormous quantities of written records. There is a high degree of variability in both the quality of the data and the quality of the documents themselves. Researchers need to identify ways to limit the scope of the investigation and the number of documents reviewed. This might be accomplished by redefining or scaling back the research questions or by dividing the project into smaller, more manageable components. The document ranking system employed in this study appears to be a practical approach. It provides adequate, high quality data without overwhelming the researcher.

The incorporation of oral history as a field technique in historical archaeology research requires the formulation of clearly stated methods, a definition of priorities, and explicit ethical guidelines (Purser 1992:27). A great deal of time needs to be spent doing background historical and archaeological research prior to the informant interviews. An almost equal amount of time should be devoted to the transcription, editing, and analysis of the oral narrative.

Ideally, interviews should be conducted on-site, but that will not be possible in most cases. In-person interviews with visual aids such as site photographs or maps are the next best alternative. Telephone interviews, although very informative, are not as satisfying for either the interviewer or the

narrator. Visual cues and body language are often critical to the flow of information. Because oral history involves the element of human interaction, the "art" of the interview is probably the most challenging data gathering technique to master, but it can also be the most rewarding.

Archaeological data is the final member of the information triad. It is also the one most likely to be considered superfluous when abundant historical documentation and oral history exist. The question almost always arises of "why go to all the trouble and expense of digging up material that merely confirms what we already know...?" (Cotter et al. 1993:xx). One of the strengths of the historic ethnographic method is its ability to demonstrate the fallibility of that preconception. As Steven Smith (1991:8) suggests, "all data are significant until proven insignificant." The archaeological remains provide a physical link between the past and the present in a way no document can and the research at Camp Desert Rock proves this.

One of the goals of the historical ethnographic method is the effective utilization of the complementary and interdependent nature of documentary, oral history, and archaeological evidence. For Camp Desert Rock, this is illustrated by the investigation of the location and functions of specific buildings and activity areas. For example, primary documents disclosed detailed information about the official function of the camp's assembly hall. The archaeological fieldwork provided technological data concerning the building's construction and confirmed its function. Oral history verified its function, but also revealed that the structure was sometimes used for non-sanctioned activities

such as viewing "dirty" movies.

As previously discussed, the various data sources can also be viewed as independent and contradictory. Playing the three types of data against one another can identify anomalies that may lead to additional research questions. During the investigation of Camp Desert Rock, several discrepancies between data sources were found. Documents attributed the construction of one of the camp's mess halls to the 95th Engineer Battalion during the 1955 military exercises. However, fieldwork revealed that the structure was actually built two years earlier by the 412th Engineer Battalion. On the surface this may seem like a trivial fact, but it effectively illustrates the problem with taking a single source of information at face value.

Sometimes contradictions occur within a particular data source. For example, local newspaper accounts often varied from the official Army and AEC/DOE reports of the Desert Rock exercises. Some of these discrepancies can be attributed to speculation by the press in the absence of information because of the security measures and secrecy associated with the nuclear testing program and activities at the NPG. However, some of the official announcements concerning the number of troops scheduled to participate in atomic maneuvers and the possible types of weapons that might be tested (such as guided missiles with atomic warheads and atomic artillery shells) appear to be purposefully misleading (LVMRJ 15 September 1951:1-2). This type of misinformation may have been meant to keep the "enemy" guessing about the scope and nature of the military's atomic training program.

Oral narrative can be contradictory in both detail and meaning. Neither George Younkin (1996), a member of the 1951 Desert Rock support contingent, or Charles Neeld (1996), part of the 1955 Marine Corps maintenance detachment, remember the stage shows at the open-air theater. Yet newspaper accounts, film footage, and several informational pamphlets all highlight the stage shows as major camp events. While the photographs and films verify that the shows actually took place, their failure to make an impression on these soldiers calls into question the real importance of the events.

When it comes to "filling in gaps" in the informational record, not all data are equal. The importance of the various types of data will fluctuate from site to site. It will also vary within a site depending on the research questions addressed. This again illustrates the importance of examining multiple lines of evidence. When one data source is mute, another may find its voice. Examples of this are common at Camp Desert Rock.

The archaeology revealed information on differences between the behavior of enlisted personnel and officers. Landscaping and decorative rock alignments are noticeably absent in the Officers and VIP barracks areas. In contrast, field reconnaissance uncovered fairly extensive landscaping in the barracks areas occupied by the camp's enlisted support personnel. The spatial patterning of the "rock gardens" features raises some interesting questions. Why are they found in the enlisted housing area and not the officer's barracks? Is it because the physical labor involved in creating the decorative gardens was inappropriate for members of the officer corps? Are the rock gardens indicative

of the differences in leave/liberty policies? If enlisted personnel were restricted to camp more than officers, were the rock gardens a way of warding off boredom? This type of behavioral information is not found in the written documentation. It might be obtainable through an analysis of photographs, but the photodocumentation would need to be much more extensive than currently available. Oral narrative has the potential to provide this type of information, but without the archaeological data, questions concerning landscaping practices would probably never be asked.

Fieldwork also provided data on the current condition of the camp and how recent development activities have impacted the site. This is critical for accurately assessing a site's research potential. Historical documents and oral history do not and cannot supply this type of information.

Oral history provided information about the camp that was not recoverable in either the archaeological or documentary record. Only through the recollections of Exercise Desert Rock participants do we know about the flagpole signal for an atomic detonation and the policy of canceling leave for the officer corps prior to a nuclear test (Rosenberg 1980:113; N. Younkin 1996). That type of information provides insights into the effectiveness of the military's security procedures. Oral narrative revealed information concerning scavenging practices and recreational behavior. It also provided insight into how it felt to actually observe an atomic blast and how the experience affected the soldiers' lives.

Documentary evidence, when used with caution, can be an extremely

effective tool for building a contextual foundation. In the case of Camp Desert Rock, written records yielded data concerning the rationale for the camp's establishment, the goals of the atomic exercises, and the tactical scenarios employed during battlefield maneuvers. Many of the materials dating to the 1950s were produced by the U.S. Army and focus on the atomic weapons effects testing program and the various Desert Rock military exercises. The sample of primary documents reviewed during the course of this research produced by the military provide few specifics. While few specifics are provided about the physical make-up of the camp itself, fairly detailed information is given concerning the scheduling and execution of the exercises and the various experiments set up to investigate the effects of an atomic blast on equipment and personnel. Contemporary records produced by the AEC in the form of memoranda, research reports, and minutes from official meetings provide insight into the various factors which influenced the decision to establish the camp and conduct the atomic exercises. Official histories appeared in the early 1980s in response to growing pressure from atomic veterans, the general public and Congress and the White House. The Defense Nuclear Agency (DNA), commissioned an extensive series of reports recounting the history of each of the atmospheric testing programs in the Pacific and at the NTS. Produced to deal with the questions of radioactive fallout and radiation exposure levels in the military personnel, scientists, and civilian population, these documents draw on a vast array of technical data. Their usefulness in this study comes from the summaries they provide on each of the atmospheric events and the types of

experiments conducted.

The local newspapers and magazines proved to be another good source of primary data. The activities at the NTS and Camp Desert Rock of major interest to the people of Las Vegas and the number of stories included in the local newspapers provided evidence of this fact. Although the data contained in these documents is generally derived from official sources, the content and tone is oriented towards the civilian population. These types of documents focus on less technical aspects of the weapons testing program and often contained more of the human interest aspect of the military exercises. The newspapers also document local community support for the weapons testing program and the soldiers of Camp Desert Rock.

Results

Using the interpretive context developed through the historic ethnographic approach, it can be argued that the material culture of Camp Desert Rock reflects the evolution of America's nuclear doctrine. The establishment, expansion, abandonment, and eventual dismantling of the camp parallels the changing political, social, and economic priorities of U.S. political and military policy makers. Examples of the physical manifestation of these policies appear in the archaeological record. First, there is the initial construction of a tent camp in 1951. This is followed by the construction of the first semi-permanent buildings and the installation of key infrastructure components (i.e., sewer, water, communication, and power systems). These

activities echo early attempts to incorporate the use of tactical nuclear weapons into military doctrine. During the mid-1950s, the camp's facilities and buildings are gradually expanded or upgraded. This corresponds to the period when tactical nuclear weapons have been accepted as a legitimate component of the country's military arsenal. The cessation of construction activities and the abandonment of the camp in the late 1950s and early 1960s coincide with the 1958 nuclear testing moratorium, growing public concern about radioactive fallout, and the Kennedy administration's re-emphasis of non-nuclear conventional warfare. Finally, the camp's incorporation into the NTS and its dismantling are the direct result of the permanent ban on atmospheric nuclear testing. Without atmospheric testing, the camp's utility as an atomic training camp ended.

Directions for Future Research

The culture history developed for Camp Desert Rock provides a solid foundation for future research that can embody a wide range of theoretical perspectives including energy theory, cultural materialism, structuralism, and systems theory. Each of these research strategies incorporates an interpretive framework and a series of basic tenets useful for the investigation of Cold War sites. For example, South's (1988) version of energy theory seeks to explain patterns of human organizational behavior in terms of efforts to control energy sources as a means of production. This can be adapted to the study of Cold War sites like Camp Desert Rock by shifting the focus to the control of energy

sources as a means of destruction. Cultural materialism (Harris 1979) also lends itself to the study of military and nuclear weapons related sites since it seeks to interpret cultural behavior in terms of technology, economics, and demographics. The underlying functional orientation of Schuyler's historic ethnographic method probably corresponds most closely with a systemic theoretical model. The holistic approach inherent in systems theory facilitates the examination of military sites like Camp Desert Rock on two separate levels. They can be examined as a closed system by focusing on the rigid rules and principles that govern military society or they can be investigated as a functional component of a larger open system.

No matter what the research strategy, Camp Desert Rock holds potential for both site specific and comparative studies. At the site level, specific questions concerning military settlement patterns, consumption habits, technological evolution, sanitation practices, and training procedures can be asked. Because the military is a "closed cultural system" governed by well documented rules and regulations, variations from the expected patterns should be more visible in the archaeological record.

Comparative investigations typically build on the information derived from site specific studies. Questions appropriate for these investigations should attempt to define the type and range of variability between sites as well as within regions. For example, how do the organizational patterns observed at Camp Desert Rock relate to the organizational patterns of other military installations. How does Camp Desert Rock compare to other temporary Army

facilities of the same era? How does the camp compare with temporary installations of earlier or later periods? What are the differences or similarities between Camp Desert Rock and permanent Army bases? How do the observed differences relate to changing political, military, and social policies?

The site also holds research potential for cross-cultural studies. One obvious area for investigation is a comparison between America's atomic training camp and those utilized by Great Britain, France, the former Soviet Union, and China. Comparative studies examining technological variability and settlement patterning could provide insights into the way political orientation influences organizational behavior.

However, the comparative research value of Camp Desert Rock and other sites like it will only be realized if the data are interpreted within a comprehensive and carefully constructed historical context. By developing a balanced interpretive framework that incorporates multiple data sources, researchers can use specific archaeological and historical facts to achieve a more neutral, objective understanding of human reality (Schuyler 1988:41). Applying the historical ethnographic method will help refocus attention on the power and potential of historical archaeology and how archaeology can contribute to a better understanding of the Cold War.

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