

The Atomic Crucible

FORGING TACTICS IN THE SHADOW OF THE BOMB

By Major Robert Billard Jr., USMC

Abstract: The emergence of the atomic bomb prompted the U.S. Marine Corps to develop tactics and procedures to maneuver within a nuclear environment. This led to the establishment of Marine Corps Test Unit no. 1 (MCTU 1), which represented a unique chapter in the history of the Corps. Established in 1954, this experimental unit served as a testing ground for developing tactics and doctrines in the nascent age of nuclear warfare. This article explores the motivations behind the MCTU's creation, analyzing what the Marine Corps hoped to achieve in this new strategic landscape. It explores the training conducted during Exercises Desert Rock IV (1952) and V (1953) with provisional atomic brigades, then examines the MCTU's development and accomplishments, including its participation in Exercises Desert Rock VI (1955) and VII (1957) and its role in refining doctrine. Finally, the article delves into the long-term impacts of both MCTU 1 and atomic testing, assessing its influence on the evolution of Marine Corps force reconnaissance, heliborne tactics, and the enduring legacy of its research on nuclear combat scenarios.

Keywords: atomic bomb, nuclear warfare, Desert Rock, test unit, Operation Tumbler-Snapper, Operation Upshot-Knothole, Operation Teapot, Operation Plumbbob

The splitting of the atom has changed everything save our mode of thinking, and thus we drift towards unparalleled catastrophe.

~ Albert Einstein¹

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¹ Thomas H. Saffer and Orville E. Kelly, *Countdown Zero* (New York: Penguin Books, 1983), 15.

The Marine Corps' Role in a New Atomic Age

After witnessing the effects of the atomic bomb during World War II, U.S. Army and Air Force leaders believed that amphibious landings and even ground warfare would soon become obsolete.² The bombings of Hiroshima and Nagasaki, Japan, in August 1945 ushered in a new landscape for the prosecution of future wars. By 1949, the Soviet Union had developed its own nuclear capabilities, and the subsequent arms race forever reshaped how fighting forces waged war. The development of these new weapons necessitated new innovations in both the tactics and strategy of warfare. In the face of the unknown, senior U.S. military planners, in conjunction with the Atomic Energy Commission (AEC), conducted a total of 626 nuclear detonations between 1945 and 1962, requiring more

² "Heritage, Irregular Warfare," U.S. Marines Special Operations Command, accessed 30 May 2024.

than 250,000 military personnel in support of these efforts.³ These military personnel served in a variety of roles and most experienced some degree of exposure to atomic detonations. These tests were largely conducted in the Pacific Ocean as well as at the Nevada Test Site (NTS) in vicinity of Camp Desert Rock, Nevada.⁴ Both locations provided opportunities for the United States to perfect its nuclear command and control capabilities, nuclear weapons arsenal, and its tactics and techniques associated with maneuver in an atomic environment. Pacific Ocean tests famously included detonations over the Marshall Islands and tested airburst and sea-based nuclear detonations. Simultaneously, exercises conducted at Camp Desert Rock took on numbered designators with named operations nested under each.⁵

1. Desert Rock I–III: Operation Buster-Jangle (1951)
2. Desert Rock IV: Operation Tumbler-Snapper (1952)
3. Desert Rock V: Operation Upshot-Knothole (1953)
4. Desert Rock VI: Operation Teapot (1955)
5. Desert Rock VII: Operation Plumbbob (1957)⁶

Of note, Marines did not participate in the first three Desert Rock exercises (corresponding with Buster-Jangle) but were present for all remaining iterations that took place between 1952 and 1957 (the Desert Rock exercises did not continue after this point).⁷ The seemingly innocuous operation names were selected by the AEC and, according to a contemporary AEC representative, were arbitrarily “dreamed up.”⁸

The existence of such weaponry may have called into question the continued need for conventional fighting forces. The U.S. Marine Corps, no stranger to defending its existence, was once again forced to reckon



Terrence R. Fehner and F. G. Gosling, *Atmospheric Nuclear Weapons Testing, 1951–1963*, vol. 1, *Battlefield of the Cold War: The Nevada Test Site* (Washington, DC: U.S. Department of Energy, 2006)
Desert Rock troops attack toward ground zero during Operation Tumbler-Snapper.

on with how to fight America’s wars in a global landscape that suddenly appeared alien to the beachheads of World War II. This period called for the Service to develop innovative thinkers capable of creatively posturing the Corps into the nuclear age.

Critical to this effort was Colonel Robert E. Cushman Jr. (later served as the 25th Commandant of the Marine Corps) who, in an open letter penned for the *Marine Corps Gazette* in April 1955, advocated sweeping changes across the Service to account for the modernization that atomic warfare demanded: “I consider this to be the greatest challenge which has yet faced the Marine Corps: in this atomic age, to formulate a sound concept of modern amphibious warfare.”⁹ Additionally, Lieutenant General Roy S. Geiger urged

³ Saffer and Kelly, *Countdown Zero*, 16.

⁴ Saffer and Kelly, *Countdown Zero*, 16.

⁵ LtCol Lynn Kimball, “Atomic Marines,” *Historians’ Corner*, Carolina Museum of the Marine, 25 April 2022.

⁶ Kimball, “Atomic Marines.”

⁷ Kimball, “Atomic Marines.”

⁸ Associated Press, “Innocuous Names Are Dreamed Up by AEC,” *Wilkes-Barre (PA) Times Leader*, 6 February 1954, 2.

⁹ Col Robert E. Cushman Jr., “Amphibious Warfare Tomorrow,” *Marine Corps Gazette* 39, no. 4 (April 1955): 30–34.

General Alexander A. Vandegrift to rethink the Corps' amphibious doctrine in light of nuclear weapons.¹⁰ Consequently, General Vandegrift approved recommendations to activate Marine Corps Test Unit No. 1 (MCTU 1), an experimental unit that served as a testing ground for developing nuclear warfare tactics and doctrines, under the command of Colonel Edward N. Rydalch.¹¹ As an aside for historical context, while the correspondence of Colonel Cushman, Lieutenant General Geiger, and General Vandegrift provides the predominant baseline for the creation of this particular testing unit, the 1950s were a transformative time for the Marine Corps, with other letters urging the Commandant to consider air-ground relations, the Marine air-ground task force concept, a provisional force service regiment, landing force logistics concepts, and the employment of Marine Corps aviation.¹² There were many voices recommending various concepts and organizational changes to the Commandant at this time, and while there were seemingly few advocating for the inclusion of atomic tactics, their advice was registered and yielded action. The atomic maneuver lessons learned from MCTU 1 and from the Marines directly involved in atomic testing came at a great cost to many of those involved—but the exercises and testing were vital to forging tactics that an uncertain nation felt would be necessary in future conflicts.

Establishment of MCTU 1

The conclusion of World War II sent a message to strategic planners that new methods had to be pioneered to fight future wars. As historian Bruce F. Meyers describes,

With the lessons of the use of nuclear weapons that ended World War II still fresh in the minds of Marine Corps planners, Col. Robert Cushman . . . authored a staff report in December

1946 to Commandant Archibald [sic] Vandegrift that questioned the viability of massive World War II-type amphibious landings over small areas subject to potential tactical nuclear weapons.¹³

At this time, the deterrent of mutually assured destruction was not the de facto philosophy among military planners. As evident by both Colonel Cushman's advice as well as the Marines' experience at Tumbler-Snapper and Upshot-Knothole, the prevailing thought process assumed that tactical nuclear weaponry was now the standard for future conflicts. As a result, underlying Marine Corps tactics needed to evolve to fit within this new paradigm, necessitating the creation of a new experimental test unit.

On 1 July 1954, the unit was formally established at Camp Horno at Marine Corps Base Camp Pendleton, California.¹⁴ The primary purpose of MCTU 1 as promulgated by the Commandant of the Marine Corps was to “evolve organizational concepts for the marine landing force under conditions of nuclear warfare.”¹⁵ An additional objective for the test unit was to “develop tactics and techniques responsive to the full employment of nuclear weapons.”¹⁶ In practice, this resulted in the following objectives outlined in reporting filed by the 3d Marine Corps Provisional Atomic Exercise Brigade (the first to be fielded, which contained the test unit) as follows:

1. To afford commanders and staffs realistic training in planning and conducting operations that are supported by atomic weapons.
2. To further test and evaluate tactics and techniques for the execution of air-ground task force missions when atomic weapons are employed.
3. To develop new tactics and techniques to exploit the effects of an atomic explosion when

¹⁰ “Heritage, Irregular Warfare.”

¹¹ “Heritage, Irregular Warfare.”

¹² LtCol Kenneth J. Clifford, *Progress and Purpose: A Developmental History of the U.S. Marine Corps, 1900–1970* (Washington, DC: History and Museums Division, Headquarters Marine Corps, 1973), 85.

¹³ Bruce F. Meyers, *Fortune Favors the Brave* (New York: St. Martin's Paperbacks, 2004), 37.

¹⁴ Meyers, *Fortune Favors the Brave*, 40.

¹⁵ Meyers, *Fortune Favors the Brave*, 39.

¹⁶ Meyers, *Fortune Favors the Brave*, 39.

atomic weapons are employed in support of air-ground task force.

4. To familiarize personnel with the phenomena incident to an atomic explosion, and the effects thereof.
5. To familiarize personnel with the passive defense measures that serve to minimize or protect against the effects of an atomic explosion.¹⁷

Other developing tactics were refined throughout these exercises, such as reconnaissance and heliborne operations, but the MCTU 1 was by and large focused on adapting to the effects of nuclear warfare.¹⁸ The reports from MCTU 1 were given directly to the Commandant of the Marine Corps to aid in the development and testing of new tactics and techniques for the nuclear age.¹⁹ Marine participation in the Desert Rock series of exercises envisaged, and previously executed in Desert Rock IV and V, a coordinated air-ground exercise that could be conducted during a single or in multiple series of atomic tests.²⁰

The planning for Desert Rock VI with MCTU 1 was designed to significantly expand on the lessons learned from the previous exercises. Early in the planning process, it was identified that the “achievement of the utmost precision and the closest coordination between the air (both helicopters and close support aircraft) and the ground troops was clearly recognized.”²¹ Further, MCTU 1 specifically had a training mission to “achieve a high state of readiness in conventional tactics and techniques.”²² Training blocks for MCTU 1 were broken down into three phases to fully prepare the troops for the rigors of atomic maneuvers: preliminary, advanced, and Desert Rock rehearsal training.²³ Specific items included the organization of heliteams, slingloading equipment, embarkation and debarkation training, helicopter support unit training, heli-

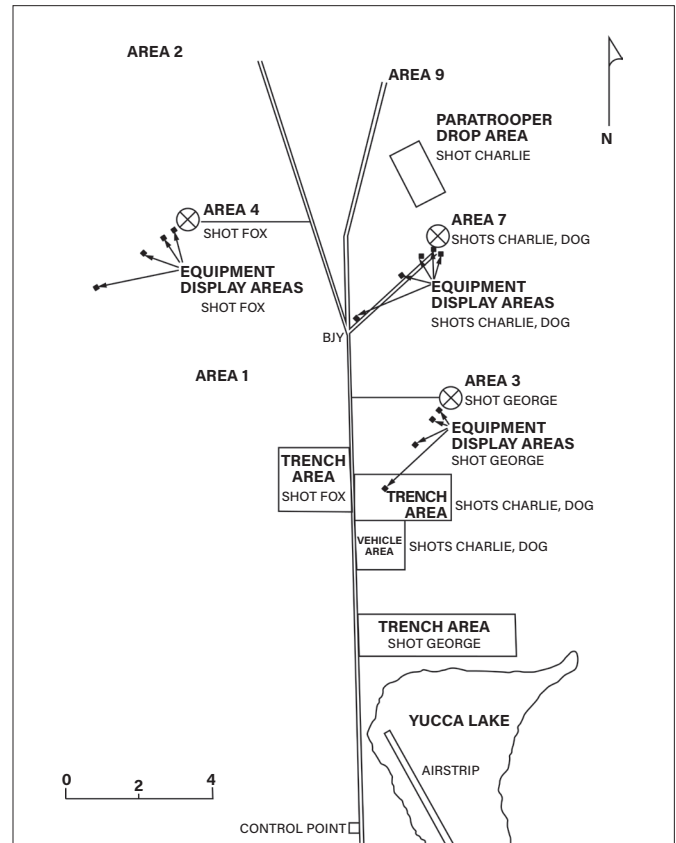


Figure 3-1 in Ponton et al., *Operation Tumbler-Snapper*, 1952, 68, adapted by MCUP

Figure showing Exercise Desert Rock IV trench and display areas. The shot Dog trench area for Marines was less than 10 km from the detonation area.

borne assault on hastily prepared defensive positions, landing and employment of infantry supporting arms, understanding the principles of atomic explosions and their effects, and medical care for radiological effects as well as radiation detection.²⁴ The after action report for the exercise indicated by all accounts that the training phases were adequate for developing an effective air-ground task force operating in a nuclear environment.

The Corps' First Foray into Atomic Warfare

Prior to the formal establishment of MCTU 1, the Marine Corps provided troops to Desert Rock Exercises

¹⁷ Report of Exercise Desert Rock VI—Marine Corps (Camp Pendleton, CA: Technical Library of the Armed Forces Special Weapons Project, 3d Marine Corps Provisional Atomic Exercise Brigade, 1955), I-1.

¹⁸ Meyers, *Fortune Favors the Brave*, 39.

¹⁹ Meyers, *Fortune Favors the Brave*, 100.

²⁰ Report of Exercise Desert Rock VI—Marine Corps, I-1.

²¹ Report of Exercise Desert Rock VI—Marine Corps, IV-1.

²² Report of Exercise Desert Rock VI—Marine Corps, IV-1.

²³ Report of Exercise Desert Rock VI—Marine Corps, IV-1.

²⁴ Report of Exercise Desert Rock VI—Marine Corps, IV-1–IV-2.



General Photograph File of the U.S. Marine Corps,
National Archives and Records Administration, photo ID: 532466

Atomic Energy Commission Proving Ground, NV. Marines prepare to charge an objective seconds after an atomic explosion. More than 2,000 Marines participated in the atomic testing, commanded by BGen Joseph C. Burger, comprising the largest number of troops to participate in the tests to date.

IV and V (Operations Tumbler-Snapper and Upshot-Knothole, respectively). An estimated 1,980 Marines from the Provisional Atomic Exercise Units participated first in Tumbler-Snapper, while 2,167 Marines were identified from the 2d Marine Corps Provisional Atomic Exercise Brigade at Upshot-Knothole.²⁵ The Marines task organized to form composite units for

the Joint forces present at Desert Rock for Tumbler-Snapper were tasked with three specific phases:

1. Observation of the nuclear blast,
2. Conduct of the tactical maneuver, and
3. Tour of the display area.²⁶

The first “shot,” as the detonations were referred to, that the Marines were subjected to was shot “Dog” on 1 May 1952 in support of Tumbler-Snapper.²⁷ At approximately 0830 Pacific Standard Time, shot Dog was detonated via airburst at a height of 1,040 feet—exposing the entrenched Marines to a 19-kiloton blast (for reference, the blast at Hiroshima was 15 kilotons).²⁸ The shot Dog tactical maneuver was the first atomic maneuver conducted by U.S. Marines.²⁹ Marines positioned themselves in fighting positions to observe the blast, after which they assembled into tactical formations and maneuvered through predetermined checkpoints and objectives. They were given specific maneuvers to execute out of the trenches on a set timeline following detonation of the shot.³⁰ For the shot, some Marines were located in trenches “as close as 6,400 meters to ground zero,” from where they watched the detonation and executed maneuver objectives, which were followed by radiological survey teams.³¹ The intent was that radiological safety personnel also monitor their movement and advise accordingly.³² During Tumbler-Snapper, the units were also subjected to a follow-on psychological test to compare the effects before and after witnessing a nuclear detonation.³³ During the post-detonation tour of the training site en route to the ground-zero site, Marines encountered displays that were established between 270 and 1,600 meters from the location of the detonation.³⁴ Ultimately, the Marines “stopped their tour

²⁵ Note: Marines from 1st and 2d Marine Corps Provisional Atomic Exercise Battalions at Camp Pendleton and Camp Lejeune, NC, respectively, were among these. These provisional units comprised Marines from 3d Engineer Battalion, 3d Marine Division; 1st Battalion, 3d Marines, 3d Marine Division; 2d Amphibious Reconnaissance Battalion; and 2d Battalion, 3d Marines, 3d Marine Division, as maneuver elements with observers from Quantico, VA; Parris Island, SC; and Washington, DC, as well as 3d Marines. Jean Ponton et al., *Operation Tumbler-Snapper 1952* (Washington, DC: Defense Nuclear Agency, 1982), 11, 173; and Jean Ponton et al., *Operation Upshot-Knothole 1953* (Washington, DC: Defense Nuclear Agency, 1982), 5.

²⁶ Ponton et al., *Operation Tumbler-Snapper*, 70.

²⁷ Ponton et al., *Operation Tumbler-Snapper*, 65.

²⁸ Defense Threat Reduction Agency, “Operation Tumbler-Snapper,” fact sheet, September 2021, 8.

²⁹ “Operation Tumbler-Snapper,” fact sheet, 3.

³⁰ Ponton et al., *Operation Tumbler-Snapper*, 70.

³¹ Ponton et al., *Operation Tumbler-Snapper*, 70.

³² Ponton et al., *Operation Tumbler-Snapper*, 70.

³³ Ponton et al., *Operation Tumbler-Snapper*, 72; and “Operation Tumbler-Snapper,” fact sheet, 3.

³⁴ “Operation Tumbler-Snapper,” fact sheet, 5.



General Photograph File of the U.S. Marine Corps, National Archives and Records Administration, photo ID: 532467
 Marines Poth and Wilson (full names and ranks unavailable) do a little clowning for the camera after shot Dog in Operation Tumbler-Snapper, 1 May 1952.

short, approaching as close as 820 meters to ground zero, due to the intensity of the radiation that was being incurred" (as determined by radiological testing kits carried by participants).³⁵ This type of exposure was later alleged to have been the direct source of various cancers incurred by survivors, as discussed later in this article. It was, however, consistent with the tactical situation envisioned by planners at the time—maneuver elements lying in wait for offensive

atomic weapons to envelop objectives in the wake of the detonation.

The following year, Marines once more were committed to nuclear testing during Operation Upshot-Knothole. After action reporting from the previous year pushed the Marine Corps to improve its posture with a more diverse task organization. While the number of Marines committed was comparable to the previous year, one key distinction at Upshot-Knothole was the addition of an aviation component. Shot "Badger" was tailored specifically to "test the ability of helicopters to transport troops in an at-

³⁵ "Operation Tumbler-Snapper," fact sheet, 5.

tack after the employment of a nuclear weapon.”³⁶ The provisional brigade contained a brigade headquarters as well as maneuver elements from 1st Battalion, 8th Marine Regiment, 2d Marine Division; 2d Battalion, 3d Marine Regiment, 3d Marine Division; and Marine Helicopter Transport Group 16 (MAG [HR] 16).³⁷

According to the Defense Threat Reduction Agency report, the maneuver for the Marines followed a similar pattern to the previous year but with trenches now staged approximately “3,660 meters south-southwest of ground zero.”³⁸ The Marines then conducted a ground attack, but 1st Battalion’s maneuvers were halted when dosimeter readings exceeded 3.0 roentgens.³⁹ For reference, committees at the time determined that 0.1 roentgens per day per body constituted a safe exposure limit.⁴⁰ The exposure for some was even worse; some Marines retained radiation film badges with exposure levels reaching up to 7.1 roentgens.⁴¹ Helicopter crews did not fare any better with regard to exposure. For perspective, the following passage describes radiological effects experienced by the heliborne crews.

In the operational helicopter test at [shot] BADGER, four helicopters were airborne at shot-time. Two helicopters were about 14 kilometers southeast of the shot, flying toward ground zero. Two others were hovering at a point 13 kilometers southeast of ground zero. After the shot, the helicopters followed different flight paths toward ground zero and landed at different points determined by radiological conditions in the area. Two of the helicopters encountered radiation intensities greater than 50 R/h before they could take evasive action.⁴²

While R/h measuring roentgens per hour is not commonly used as a measure of radiological exposure anymore, this can be converted to 0.5 sieverts (commonly abbreviated as Sv) per hour. For perspective, the U.S. Nuclear Regulatory Commission states that an annual radiation dose limit for workers is only 0.05 Sv.⁴³ Exposure to 50 R/h, or 0.5 Sv, could potentially lead to the development of acute radiation syndrome (ARS) for those involved, which can cause nausea, vomiting, skin burns, fatigue, infections, and ultimately lead to cancer.⁴⁴ The addition of heliborne maneuvers into the scenario set the stage for the future of the Marine Corps’ participation in atomic exercises by examining the realistic operational proximity for these crews. Following shot Badger, Marines continued to participate in other shots that took place at Operation Upshot-Knothole as both observers and as helicopter support at shot “Simon.”⁴⁵ The tactical appreciation gleaned from both operations only expanded in coming years the Marine Corps’ commitment further to the Desert Rock series of exercises. Specifically, units learned how unit movement, both by ground and air, was affected by nuclear detonations.

The Atomic Crucible

In March 1955, MCTU 1 was finally ready for the conduct of the atomic exercise at Camp Desert Rock. The Marines participated in shot “Bee,” which followed shot “Apple”; fallout from the latter was still present during the conduct of the Marines’ maneuvers.⁴⁶ At 0505 Pacific Standard Time on 22 March 1955, the 8-kiloton shot Bee was detonated in Area 7 of the Yucca Flat area of the designated NTS.⁴⁷ Marines immediately received permission to commence the tactical portion of the exercise; according to the after action report, “troops in the trench area slated to participate in the maneuver . . . commenced marching to Loading

³⁶ Ponton et al., *Operation Upshot-Knothole*, 5.

³⁷ Ponton et al., *Operation Upshot-Knothole*, 5.

³⁸ Ponton et al., *Operation Upshot-Knothole*, 5.

³⁹ Ponton et al., *Operation Upshot-Knothole*, 5.

⁴⁰ “Radiation Safety,” Radioactivity, Science, The Manhattan Project—An Interactive History, Office of History and Heritage Resources, U.S. Department of Energy, accessed 29 May 2024.

⁴¹ Ponton et al., *Operation Upshot-Knothole*, 5.

⁴² Ponton et al., *Operation Upshot-Knothole*, 6.

⁴³ Subpart C—Occupational Dose Limits, Part 20—Standards for Protection against Radiation, NRC Regulations, Title 10, Code of Federal Regulations, U.S. Nuclear Regulatory Commission, 21 May 1991.

⁴⁴ “Radiation Health Effects,” U.S. Environmental Protection Agency, accessed 19 November 2024.

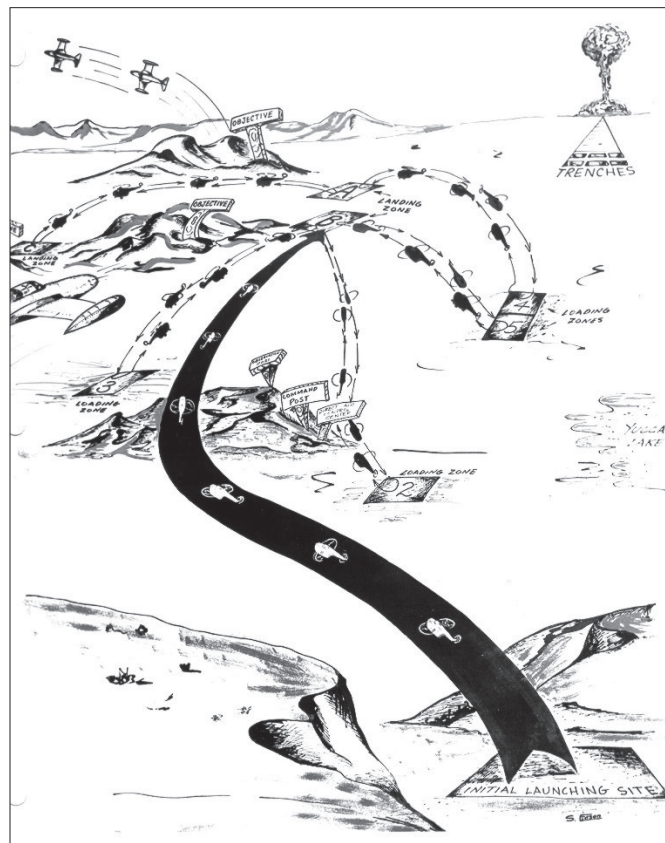
⁴⁵ Ponton et al., *Operation Upshot-Knothole*, 8.

⁴⁶ *Report of Exercise Desert Rock VI—Marine Corps*, VI-1.

⁴⁷ Defense Threat Reduction Agency, “Operation Teapot,” fact sheet, September 2021, 4.

Zones,” which it noted represented aircraft carriers for the purposes of the exercise.⁴⁸ Throughout the maneuvers, helicopter lift was used extensively to transport troops between the various loading zones to test the viability of embarkation and troop transport in a nuclear environment. The exercise report highlighted that helicopter availability ultimately exceeded the original planned timeline—leading to the realization that rapid troop movement and objective seizure was possible through extensive leverage of helicopter assets.⁴⁹

The lasting impact from the Marines associated with Desert Rock VI was best summed up as: “All hands gained a high degree of appreciation of its power . . . and its proper place in the family of weapons, both nuclear and conventional, available to the Marine Corps. From the standpoint of the individual Marine, the opportunity to witness a nuclear detonation was a most interesting experience, and proved highly instructive.”⁵⁰ It was deemed that nuclear weapons could be exploited with great success by a Marine force as envisioned by the Commandant of the Marine Corps.⁵¹ While acknowledging that the circumstances of amphibious operations in a nuclear environment were unprecedented, nuclear weapons nonetheless still fit into this concept of a future fight for Marines by treating them as an evolution of existing conventional munitions. Consistent with the recommendations in the after action report of Desert Rock VI, MCTU 1 continued to execute these training endeavors at Desert Rock VII, Operation Plumbbob, in 1957. The recommendations from Desert Rock VI stated that the Marine Corps should continue to participate, doctrine should continue to be updated to reflect this type of special warfare, and that developmental units should participate to the extent necessary to continue developing doctrine and tactics that can be used in special warfare.⁵² This latter point di-



*Photo courtesy of the National Nuclear Security Administration,
Nevada Site Office*

Visual depiction of Marine involvement in Desert Rock VI, shot Bee, from start to finish. Minutes after an atomic explosion at the Nevada Test Site, Marines aboard assault helicopters swarmed from widely dispersed points on the objective in a realistic maneuver to exploit the immediate effects of an atomic device against a hypothetical enemy. Although the actual atomic device is shown exploding in the upper right, it was theoretically air-dropped over the objective area so the hard-hitting Marine forces could move in immediately after the explosion. The helicopter shuttle service was accomplished in record time. The last troops picked up were those in loading zones 4 and 5 who had witnessed the explosion from the trenches, and they proceeded to their pickup station immediately after the blast. As the deep penetration maneuver was being conducted, Marine jet fighter aircraft buzzed angrily overhead to provide close air support.

rectly corresponds to the mindset that forged reconnaissance units from the atomic fires of these tests.

Perhaps the most extensive Marine Corps maneuvering within a nuclear environment occurred in 1957. Operation Plumbbob took place at the NTS, with applicable shots from the Marine Corps—“Priscilla,” “Diablo,” and “Hood”—occurring between

⁴⁸ Report of Exercise Desert Rock VI—Marine Corps, VI-4.

⁴⁹ Report of Exercise Desert Rock VI—Marine Corps, VI-5.

⁵⁰ Report of Exercise Desert Rock VI—Marine Corps, VII-1.

⁵¹ Report of Exercise Desert Rock VI—Marine Corps, VII-1.

⁵² Report of Exercise Desert Rock VI—Marine Corps, VII-2.



National Museum of the U.S. Navy, photo ID: 330-PS-7272 (A-327284)

A Marine Fairchild R4Q Packet transport plane drops supplies during tactical training preparatory to atomic bomb blast at Yucca Flat, NV. Two-thousand Marines participated in the series of atomic tests conducted by the Department of Defense with the Atomic Energy Commission, 16 March 1955.

24 June and 5 July 1957.⁵³ While 311 Marines served solely as observers for Priscilla, and Diablo ended in a misfire, shot Hood was the “largest nuclear burst ever detonated in the United States up to that time” at 74 kilotons.⁵⁴ Hood required the Marines to further

evolve the tactics that had been tested during shot Bee during Operation Teapot, as close air support tactics in an atomic environment played a large role in this exercise.⁵⁵

In addition to close air support and heliborne tactics, an important legacy of the MCTU’s involvement in the Desert Rock exercises, albeit indirectly related to atomic maneuvers, was the inception of Marine Corps Force Reconnaissance. Bruce Meyers, a

⁵³ G. Frank et al., *Analysis of Radiation Exposure, 4th Marine Corps Provisional Atomic Exercise Brigade, Exercise Desert Rock VII, Operation Plumbbob* (Washington, DC: Defense Nuclear Agency, 1981), 9–10.

⁵⁴ Mary Jo Viscuso et al., *Shot Priscilla: A Test of the Plumbbob Series* (Washington, DC: Defense Nuclear Agency, 1957), 65; and *Analysis of Radiation Exposure, 4th Marine Corps Provisional Atomic Exercise Brigade, Exercise Desert Rock VII, Operation Plumbbob*, 5.

⁵⁵ Kimball, “Atomic Marines.”



National Museum of the U.S. Navy, photo ID: 330-PS-7272 (A-327286)

Marine helicopters transport troops and supplies during tactical training preparatory to atomic bomb test at Yucca Flat, NV, conducted by the Department of Defense with the Atomic Energy Commission, 16 March 1955.

Marine officer and reconnaissance veteran, described that

[M]arines recognized the need for long-range reconnaissance operations deep in hostile territory to provide timely combat intelligence information, particularly as it concerned proposed landing zones and sites. Test Unit 1's recommendations to test and evaluate these new techniques for gathering intelligence were approved, and the force recon journey was underway. . . . The emphasis in Test Unit

1, and during the early days of 1st Force . . . was on the development of new operational techniques for insertion, both parachute and submerged submarine, and extraction of reconnaissance and pathfinder personnel deep behind enemy lines.⁵⁶

Nuclear testing provided a unique target of opportunity for Marines to test new and innovative approaches to warfare.

⁵⁶ Meyers, *Fortune Favors the Brave*, ix, xv.

Operational Challenges, Near and Far

Despite the exercise reports touting the initial MCTU 1 participation in Desert Rock as a rousing success, there were many challenges associated with developing tactical procedures in a nuclear environment. Many were directly associated with exposure to such blasts and the attendant radiation. As a veteran of shot Hood later described, “You could see the two bones in your forearm, and a bright red light. Within a few seconds, shock waves from the bomb hit these trenches and I was immediately thrown from one side of the trench wall to the other. . . . I was frightened beyond belief.”⁵⁷ Some were the indirect results of constraints placed by either military or atomic energy experts. For example, a report from the 3d Provisional Atomic Exercise Brigade following Desert Rock VI stated that restrictions imposed on troop maneuvers precluded the desired realism and a number of artificialities not normally present in a field exercise were introduced, namely the allowable proximity to atomic blasts.⁵⁸ A historical report from the Department of Energy echoes this sentiment—there needed to be reasonable proximity to the blasts to properly simulate the type of warfare that troops were being trained to fight. For safety concerns, distance limitations were placed on participating troops; at one point, troops were not authorized to stage any closer than 11 kilometers from the blast location.⁵⁹ This represented an artificiality inconsistent with emerging doctrines of atomic maneuvering that the exercises sought to replicate. Pressure from the military demanded closer proximity to the blasts for training to the extent that the Marine Corps stated it would not participate in Desert Rock if the 11-kilometer limit was imposed again.⁶⁰ Ultimately, the pressure from the military forced the Atomic Energy Commission to drop objec-

tions and allow for a 7,000-meter mitigating factor.⁶¹ While these mitigation factors were implemented for the safety of the participants, they were largely fought by military units until they were removed to the point of obsolescence. By Desert Rock VI, Marines had successfully been inducted into the world of atomic warfare, including amphibious warfare—deemed inevitable—that the Marine Corps needed to be prepared to support.

Legacy and Impact

The legacy of Marine Corps involvement in atomic exercises is complicated. At its core, there was reasonable expectation that future wars required nuclear weapons. The basic understanding of what that looked, sounded, smelled, and felt like no doubt provided invaluable insight into how maneuver warfare should be conducted in an atomic environment. Close air support and reconnaissance tactics were heavily honed during this period by crafting tactics and doctrine to be utilized in emerging forms of warfare; leaders learned how to leverage heliborne assets to quickly move troops across the battlespace in response to the need presented by an atomic threat. They also learned how to manage the reconnaissance assets that would be needed to determine direct atomic effects in the battlespace. These impacts reached much further than the originally anticipated atomic maneuvering objectives laid out at the beginning. Marine Corps Test Unit No. 1 provided immeasurable value to Marine Corps doctrine that extended far beyond training for a nuclear environment, with reconnaissance capabilities being formalized for future warfighters.

However, the lack of proper precautions against the dangers of nuclear fallout led to the unnecessary suffering and deaths of many Marines associated with the training. Detailed analysis was done between the 1950s and 1980s of the radiological fallout experienced by veterans of the Desert Rock exercises. Ultimately, this culminated in compensation from the government for atomic veterans for resulting cancers as well as other conditions associated with exposure

⁵⁷ Tom Saffer eyewitness interview in “Fallout (1945),” *People’s Century*, PBS, 1995.

⁵⁸ *Report of Exercise Desert Rock VI—Marine Corps*, 1-2.

⁵⁹ Terrence R. Fehner and F. G. Gosling, *Atmospheric Nuclear Weapons Testing, 1951–1963*, vol. 1, *Battlefield of the Cold War: The Nevada Test Site* (Washington, DC: U.S. Department of Energy, 2006), 75.

⁶⁰ Fehner and Gosling, *Atmospheric Nuclear Weapons Testing, 1951–1963*, 75.

⁶¹ Fehner and Gosling, *Atmospheric Nuclear Weapons Testing, 1951–1963*, 76.



National Museum of the U.S. Navy, photo ID: 330-PS-7272 (A-327287)

Marines disembark the helicopters that transported them during tactical training preparatory to the atomic bomb test at Yucca Flat, NV, 16 March 1955.

from atomic blasts.⁶² Operation Plumbbob veteran Thomas H. Saffer, a second lieutenant at the time of the exercise, said, “To be destroyed by an insidious killer because some eager, myopic hawks wanted to play with nuclear firecrackers was . . . more than I could bear.”⁶³ Saffer later gave congressional testimony on the health complications experienced by these veterans. Many of the impacts of the effects of atomic radiation were not well known at the time of testing (e.g., ARS-related effects that ultimately lead to cancer), and thus these effects were not fully studied and understood until decades later. In spite of this, some still believed that the lessons learned were worth the

cost. As Saffer later described a Department of Defense official speaking to a widow: “The experiments were invaluable. We learned so much from them. . . . I just wanted you to know all of us have benefited from those tests. They were worthwhile, and the men who died were not sacrificed in vain.”⁶⁴

The story of atomic Marines during the Cold War is one not often taught or understood in the pantheon of Marine lore; but the threat of nuclear war looms ever-present as an immediate risk to peace and stability in the world order. So long as caches of nuclear arms persist in the world, their lessons may yet prove necessary.

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⁶² Department of Veterans Affairs Veterans Health Administration, “Are YOU an Atomic Veteran?” brochure, 2012.

⁶³ Saffer and Kelly, *Countdown Zero*, 291.

⁶⁴ Saffer and Kelly, *Countdown Zero*, 292.