

# Fact Sheet



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Defense Nuclear Agency  
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Subject: SANDSTONE Fact Sheet

SANDSTONE was a three-detonation nuclear weapon test series held at Enewetak Atoll, the Atomic Energy Commission's (AEC) Pacific Proving Ground (PPG), in the spring of 1948. Located in the Central Pacific Ocean, the PPG consisted principally of Enewetak\* and Bikini atolls in the northwestern Marshall Islands.

Assigned Name	Local Date	Location	Yield (KT) <sup>a</sup>
X-RAY	15 April	200-foot (61-meter) tower on Enjebi Island	37
YOKE	1 May	200-foot (61-meter) tower on Aomon Island	49
ZEBRA	15 May	200-foot (61-meter) tower on Runit Island	18

Note:

<sup>a</sup>One kiloton equals the approximate energy release of a one-thousand-ton TNT explosion.

## HISTORICAL BACKGROUND

Operation SANDSTONE was the second test series to be held in the Marshall Islands, but it differed from the first series (CROSSROADS in 1946) in that it was primarily an AEC scientific test series with the armed forces serving in a supporting role. Its purpose was to proof-test improved-design atomic weapons, whereas the purpose of CROSSROADS was to test nuclear weapons effects on ships.

The weapons were tested at Enewetak by a joint military and civilian organization designated Joint Task Force 7 (JTF 7). This was a military organization in form, but contained military, civil service, and contractor personnel of the Department of Defense (DOD) and the AEC. The commander of this force was the appointed representative of the AEC and reported to both the Joint Chiefs of Staff and the Commander in Chief, Pacific.

Peak DOD numerical strength at SANDSTONE was approximately as follows:

Uniformed military	9,890
DOD civilians	350
DOD contractors	126
	<u>10,366</u>

\* Formerly Eniwetok. A better understanding of the Marshall Islands language has permitted a more accurate transliteration of Marshall Island names into English language spelling.

Numerous technical experiments were carried out in conjunction with each of the three detonations. These experiments measured the yield and efficiency of the devices and attempted to gauge military effects of the explosions. DoD personnel participated in this test operation as individuals involved in AEC weapon design and development, as units performing separate experiments, and as units performing various support roles.

An extensive radiological safety (radsafe) program with the following objectives was instituted:

1. Keeping personnel radiation exposure at the lowest possible level consistent with medical knowledge of radiation effects and the importance of the test series
2. Avoiding inadvertent contamination of populated islands and transient shipping.

This program established an organization to provide radsafe expertise and services to commanders of the separate components of the task force, who were responsible for personnel safety within their commands. Personnel were trained in radiological safety. Standards governing permissible exposure were established. The standards were 0.1 roentgen (R) per 24-hour period and a maximum exposure of 3R for specifically approved missions. Film badges were issued to persons likely to be exposed to radiation, as well as a representative group of the task force. An extensive weather forecasting group was established to predict wind directions and areas of potential fallout. Personnel were evacuated from danger areas before each detonation. Reentry to radioactive areas was restricted to personnel required to retrieve important data, and their radiation exposures were monitored.

#### TEST OPERATIONS AND EXPOSURES

Each of the SANDSTONE tower shots produced fallout; however, none of the inhabited islands in the area received appreciable fallout. Kwajalein received measureable fallout on 3 May, two days after the YOKE shot. The estimated dose from fallout for persons who were on Kwajalein for the entire test series was calculated to be 0.075 R.

Most task force personnel were on Kwajalein or aboard ships. The remainder were on Enewetak and stayed there for the three shots. The temporary camps on the northern and eastern islands of the atoll near the detonation sites were abandoned and dismantled before the shots. Task force ships evacuated the lagoon, except for USS Albemarle (AV-5), USS Mount McKinley (AGC-7), USS Curtiss (AV-4), and USS Bairoko (CVE-115), which remained in the lagoon near the base islands on the southern side of the atoll.

Highest DoD exposures for both the Army (6.050 R) and the Navy (5.140 R) were accrued by radiation monitors from the Joint Radiological Safety Group. Only eleven personnel (0.6 percent of those badged) received exposures in excess of the imposed standards of 3 R. In fact, radiation exposure for badged JTF 7 personnel at SANDSTONE averaged less than 0.25 R, and approximately 65 percent had zero exposures. The unbadged men were not expected to be exposed to radioactivity. Recorded SANDSTONE exposures are summarized in the table on the following page.

SANDSTONE Joint Task Force 7 Personnel Exposures

	Number Badges	Exposure Ranges (roentgens)				High (R)
		0	0.001-1	1-2	Over 2	
Army	327	168	141	10	8	6.050
% of Total		51	43	3	3	
Navy	973	730	233	8	2	5.140
% of Total		75	24	1	1	
Air Force	350	195	144	8	3	3.060
% of Total		56	41	2	1	
Marines	112	102	9	1	0	1.040
% of Total		91	8	1	0	
Non-DoD Participants	119	18	83	6	12	17.0
% of Total		15	70	5	10	
Totals	1,881	1,213	610	33	25	17.0
% of Total		65	32	2	1	