

# Fact Sheet



**Defense Nuclear Agency**  
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## Operation IVY

IVY was an atmospheric nuclear weapons test series held in the Atomic Energy Commission's (AEC) Pacific Proving Ground at Enewetak Atoll in the Marshall Islands during autumn 1952. The series consisted of the two detonations listed below.

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Assigned Name	Local Date	Location	Yield <sup>a</sup>
MIKE	1 Nov	Eluklab Island; surface	10.4 MT
KING	16 Nov	Airburst (1,480 feet 440 meters ) over reef off Runit Island	500 KT

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<sup>a</sup>One kiloton equals the approximate energy release of the explosion of one thousand tons of TNT; one megaton equals the approximate energy release of the explosion of one million tons of TNT.

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## HISTORICAL BACKGROUND

President Truman made the decision to pursue the development of thermonuclear weapons in 1950, and the IVY series was a key step in this development. MIKE was an experimental device and produced the first thermonuclear detonation, in which a substantial portion of its energy was generated by the fusion, or joining, of hydrogen atoms. KING was a stockpile weapon, modified to produce a large yield. It was dropped from a B-36 bomber. The energy from KING was generated by the fission, or splitting, of plutonium atoms. These were the largest nuclear explosions to that time.

## JOINT TASK FORCE 132

Joint Task Force 132 (JTF 132) was the organization that conducted the IVY test series. Elements of the four services, the AEC and other Federal government agencies, and civilians from government laboratory organizations and contractors made up this organization. Commander JTF 132 reported to the Joint Chiefs of Staff, but was also designated the AEC's agent in conducting the tests. The joint nature of this test organization resulted from the requirements of the Atomic Energy Act of 1946. This legislation placed atomic energy development under civilian control; however, the remoteness of the IVY Series test site required a military organization for physical security and technical and logistical support.

The total number of personnel involved in the task force was nearly 11,650, of which 9,350 were military and 2,300 were civilians. Most of the civilians and over 6,600 of the military personnel operated from Enewetak Atoll and from task force ships that were based

there. Most of the remaining military were Air Force personnel who were based at Kwajalein, 360 nmi (667 km) southeast of Enewetak.

#### TEST PLANNING

The safety of the task force personnel conducting the test series was an important factor in planning the conduct of the tests. Pretest measures taken to ensure the safety of personnel were:

1. Modification of ships and aircraft, including the installation of "washdown" systems aboard ships to prevent radioactive fallout accumulation and the installation of filters on aircraft pressurization systems to prevent radioactive particles from entering aircraft.
2. Design of special protective clothing, including a leadcloth shroud for aircraft pilots operating near the radioactive cloud.
3. A training program in radiation safety procedures.
4. The establishment of a technical support unit whose responsibility was to provide the task force with expert assistance in radiation safety, including monitoring of radiation, decontamination of personnel, laboratory support, maintenance of exposure records, and maintenance and calibration of radiation detection equipment.
5. The establishment of a meteorology group whose responsibility was to predict the direction of the winds aloft to avoid conducting the tests during times when radioactive fallout might be carried in the direction of the task force or inhabited islands.
6. The establishment of a program for the evacuation of all personnel from Enewetak Atoll for the MIKE test and the preparation of plans for emergency evacuation of task force personnel from Bikini and Kwajalein. Marshall Islanders living at Ujelang were placed aboard a Navy ship just before the MIKE detonation in readiness for movement to safety if the fallout moved to the southwest.
7. The establishment of procedures for issuing film badges to individuals whose activities might expose them to nuclear radiation so that exposure records could be kept. About 2,100 of the task force personnel received these badges.

#### TEST OPERATIONS AND EXPOSURES

The conduct of the tests went essentially as planned. The experimental MIKE device performed successfully and the winds remained favorable, carrying the radioactive fallout northwesterly over the open ocean. The generally smooth MIKE operations were marred by an accident when a single-place aircraft used for cloud sampling was lost at sea with its pilot. This led to radiation exposures from 10 roentgens (R) to 17.8 R for the 7-man aircrew that flew to assist the downed plane, considerably greater than the maximum permissible exposure (MPE) (3.9 R) of the operation. This crew crossed a zone of fallout in order to reach the area of the downed plane as quickly as possible.

A crew of twelve in a second aircraft was also overexposed when caught in fallout debris while on a photographic mission during the MIKE shot. The highest exposure for this crew was 11.6 R. Other than these two events, no other cases exceeded the established MPE during IVY.

Fallout occurred on JTF 132 ships and on Parry and Enewetak islands following MIKE and KING. A recent calculation based on data collected aboard three ships, which were anchored near the islands, indicates that cumulative personnel exposures due to this

fallout was at maximum from about 0.25 to 0.53 R for personnel continuously at Enewetak from 4 November to 31 December, but only if the effects of weathering on the deposited fallout and shielding by working and living quarters are ignored. Actual exposures were probably much lower.

Nearly 90 percent of the recorded IVY exposures were less than 1 roentgen. The exposures are summarized in the following table.

IVY, Joint Task Force 132 Personnel Exposures

	No. of Persons Badged	Exposure Ranges (roentgens)				High Recorded
		0	0.001-0.999	1.000-2.999	Over 3	
Total Army	164	39	98	26	1	3.3
% of Total		24	60	16	<1	
Total Navy	810	244	526	39	1	3.1
% of Total		30	65	5	<1	
Total Air Force	675	78	541	34	22	17.6
% of Total		12	80	5	3	
Total Marine Corps	14	2	4	8	0	2.8
% of Total		14	29	57	0	
Total Other Gov't	367	45	245	74	3	3.2
% of Total		12	67	20	<1	
Total	2,030	408	1,414	181	27	17.6
% of Total		20	70	9	<1	

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 \* From 1945 to 1962 the United States conducted several series of underwater, \*  
 \* surface, and above-surface nuclear tests. The Defense Nuclear Agency (DNA) \*  
 \* in 1978 was assigned as Department of Defense's (DoD) Executive Agent to \*  
 \* conduct a program to identify DoD participants, determine radiation doses, \*  
 \* and write histories of the series. This fact sheet summarizes information \*  
 \* on OPERATION IVY, one of those test series. Further information can be \*  
 \* obtained from DNA Report #6036F. \*  
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