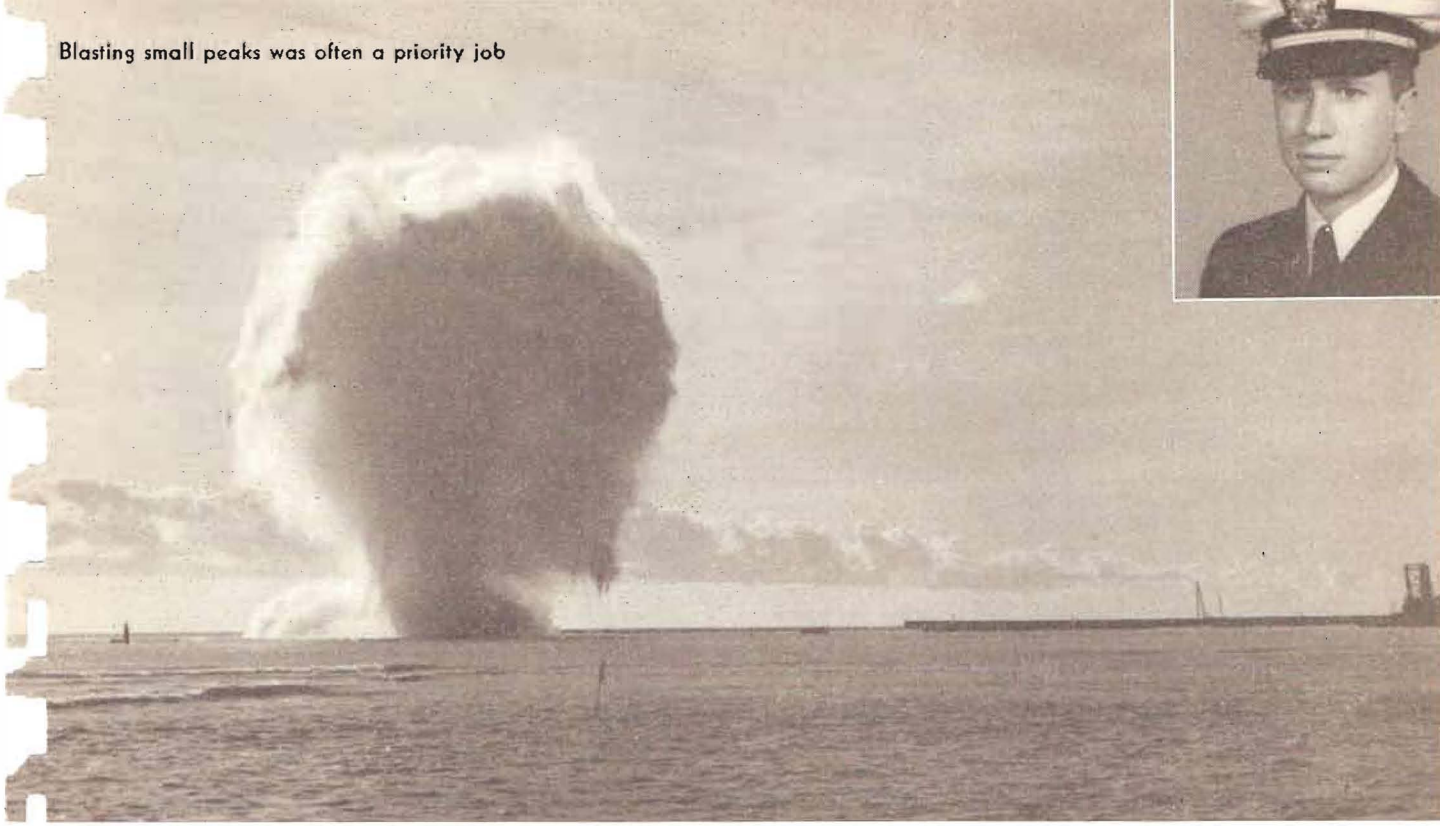


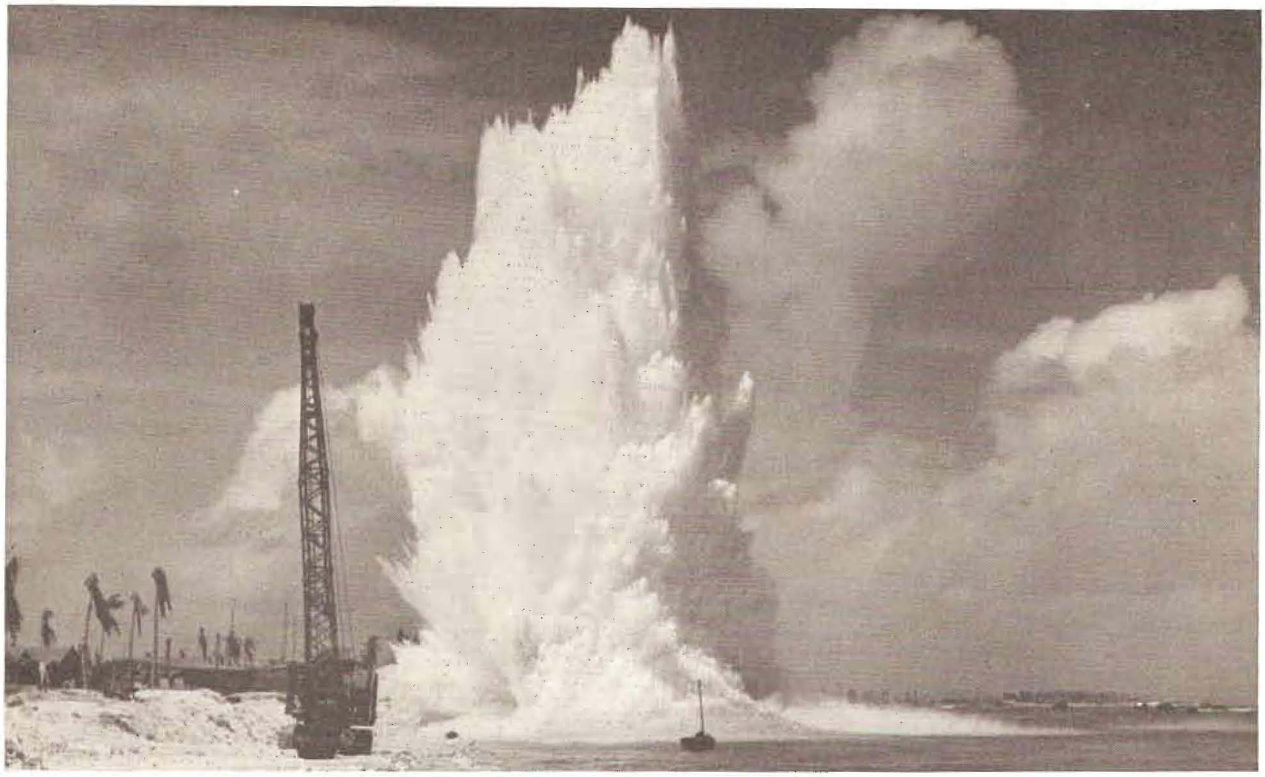
Blasting small peaks was often a priority job

DIVERS, DYNAMITE AND DEMOLITION

Lt. (jg) Cushing Phillips, Jr., CEC, USN, describes his job of blasting underwater coral when diving helmets were improvised from surplus gas masks

IN THE CONSTRUCTION of the Leyte-Samar Naval Operating Base, particularly the Ship Repair Facility located on Manicani Island, considerable dredging was necessary to remove coral which was a menace to shipping. During the first 6 months of operation no dredging or drilling equipment was available, so all coral removal had to be accomplished by "bulldozing," with diver-placed charges of dynamite. Though admittedly requiring more explosive, the method of placing the charges on the surface of the submerged coral was effective and can be used even in fairly deep water.

The blasting unit which accomplished this work was organized by Lt. Robert C. Smith, CEC, USNR, with the writer as assistant and diving officer, under the Third NCB, at the time under Commodore W. M. Angas, CEC, USN. Operations were begun in March 1945, and continued until January 1946. In September 1946, the writer took over the unit upon detachment of Lieutenant Smith for discharge, and combined forces with a hydrographic group under WO Otto F. Buzhardt,



Small pinnacles yielded to a single charge

CEC, USNR, which did the necessary charting, location, and sounding work for blasting operations.

In applying this method at Samar, not only was it necessary for the blasting operations to break up the coral but also to move the fragments off into deep water. Varying in size from small pinnacles 20 feet in diameter to deposits of 180,000 square feet, the reefs were covered with from 20 to 40 feet of water. It was necessary to clear to depths of 45 feet in some places to provide for floating drydock operations.

Exploratory work and placing of the charges was done by divers from a self-propelled 3 x 7 pontoon barge on which was mounted a 210-cfpm compressor for diving work. The compressor was equipped with a charcoal filter, water trap, and 12-cubic-foot accumulator tank. Nearly all diving was done with improvised shallow water equipment. Diving masks were converted Mark III and Mark IV Navy gas masks. A T-fitting replacing the mask canister was connected to a valve by a 3-foot length of hose. The valve was secured to a web cartridge belt filled with lead and weighing about 30 pounds. The diver's air hose and life line were married together, the hose connected to the valve, and the life line secured to the belt.

The explosive found best suited to these operations was 60 percent gelatin dynamite. This charge has sufficiently high velocity and strength to propagate well under water. It does not deteriorate rapidly under water, and it is slow enough to have a heaving effect. The 60-percent gelatin was not always available, requiring the use at times of 40-percent with poorer results. It was necessary to use some condemned dynamite (part of which was more than 2 years old) making the operations more hazardous and the results less certain.

The shots were detonated by propagation from a single primer placed at one end of the charge and fired by a manual blasting machine. Two caps (usually No. 8) were used so that if one were ineffective the charge might still fire.

The pattern of the shots varied with the size and shape of the reef. Nearly all the reefs rose from 18 to 24 feet from the bottom, making it possible to slough coral off the reef with the shot without

leaving broken coral to be removed by some other means.

On reefs less than 60 feet wide, a line of 50-pound boxes of dynamite 5 feet apart (about 3 tons to a shot) was placed on each side about 15 feet in from the edge of the reef. This would cut the edge in beyond the line of powder boxes, leaving the top of the roof peaked. The second shot was placed in a single line 10 to 15 feet from the crown and would shear the top off. If additional blasting were necessary, the same sequence was followed, cutting down the edges and shearing off the top.

On reefs of greater width, the foregoing procedure was modified in order to be sure of moving all the material clear of the reef. After cutting down an edge, a second charge was placed at the reef edge to blast a shelf below grade. Successive edge shots were used to throw material into shelves thus blasted. More dynamite was used per yard of coral moved on wide reefs than on narrow reefs.

Small reefs were often priority jobs. To save time, the reefs were overloaded with two side charges and a heavy crown charge, usually knocking down the reef in one shot. About twice the dynamite per yard of coral was required by this method as compared with a series of two or more blasts.

Small pinnacles, 20 to 30 feet across, were removed with a single charge wherein the boxes of dynamite were placed in a semicircle around one edge of the obstruction.

For deep water blasting, the following results were obtained in a 6-month period:

Coral removed (cubic yards)	423,300
Dynamite used (all types) pounds	1,767,250
Dynamite used per cubic yard (pounds)	4.18

The above figures are representative of the overall results of blasting operations. It was estimated that average dynamite consumpion for the different types of work was as follows:

	Pound per cubic yard
Deep water, 15 to 40 feet over reef:	
Large reefs (50 by 100 feet)	4.5
Small reefs (20 by 50 feet)	3.0
Pinnacles (unless overloaded)	2.5
Shallow water, 3 to 15 feet over reef:	
Large reefs	6.0
Small reefs	5.0
Pinnacles	3.5

The blasting operations described in the foregoing were undertaken primarily because of lack of dredging equipment. They were not as efficient nor as rapid as dredging operations would have been. The main advantage was that such blasting operations were quickly organized both in equipment and personnel. Furthermore, the blasting unit was able to remove reefs which were too small for efficient dredge operations and it could also operate in water too deep for dredges.

About 3 tons of dynamite was used to blast the sides off reefs less than 60 feet wide

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YOUR CEC EXPERIENCE

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