

A 21-kiloton underwater nuclear weapons effects test, known as Operation Crossroads (Event Baker), conducted at Bikini Atoll 1946. Image courtesy of US Defense Threat Reduction Agency

Aftermath

— *at the nuclear playground*

Text by Arnold Weisz

During the period between 1945 and 1958, a total of 67 nuclear tests were conducted on Bikini and Eniwetok Atolls and adjacent regions within the Republic of the Marshall Islands. U.S. nuclear testing on the Marshall Islands inflicted significant damage to property—lands, vegetation, lagoons, and surrounding ecosystems—as well as to people's health.

In Bikini on 24 July 1946, an enormous water column beneath a mushroom cloud left 500,000 tons of radioactive mud in the atoll's lagoon. As a result of the underwater nuclear bomb, "Baker Test", the Bikini atoll was so devastated, that nearly all of the atoll's vegetation was destroyed, and the islands were sufficiently contaminated to render them all uninhabitable until at least 2030. This was just the beginning of an insane atomic arms race that jeopardized many pacific islanders' lives and destroyed the surrounding nature.

Eight years later, the mother of all bombs completely vaporized five of the atoll's northern islands (a total of about 68 acres or 27.5 hectares—four percent of the pre-test lands). The Castle Bravo test on 1 March 1954 was the most powerful nuclear weapon ever tested by the United States.



Bravo was an experimental thermonuclear device with an estimated explosive yield of 15 megatons and led to widespread fallout contamination over the inhabited islands of Rongelap and Utrök Atolls, as well as other atolls to the east of Bikini. The Bravo bomb wreaked havoc with nature, as it raised water temperatures to 55,000 degrees Celsius,

shook islands 200km away and left a crater 2km (1.24 miles) wide and 73m (240 feet) deep.

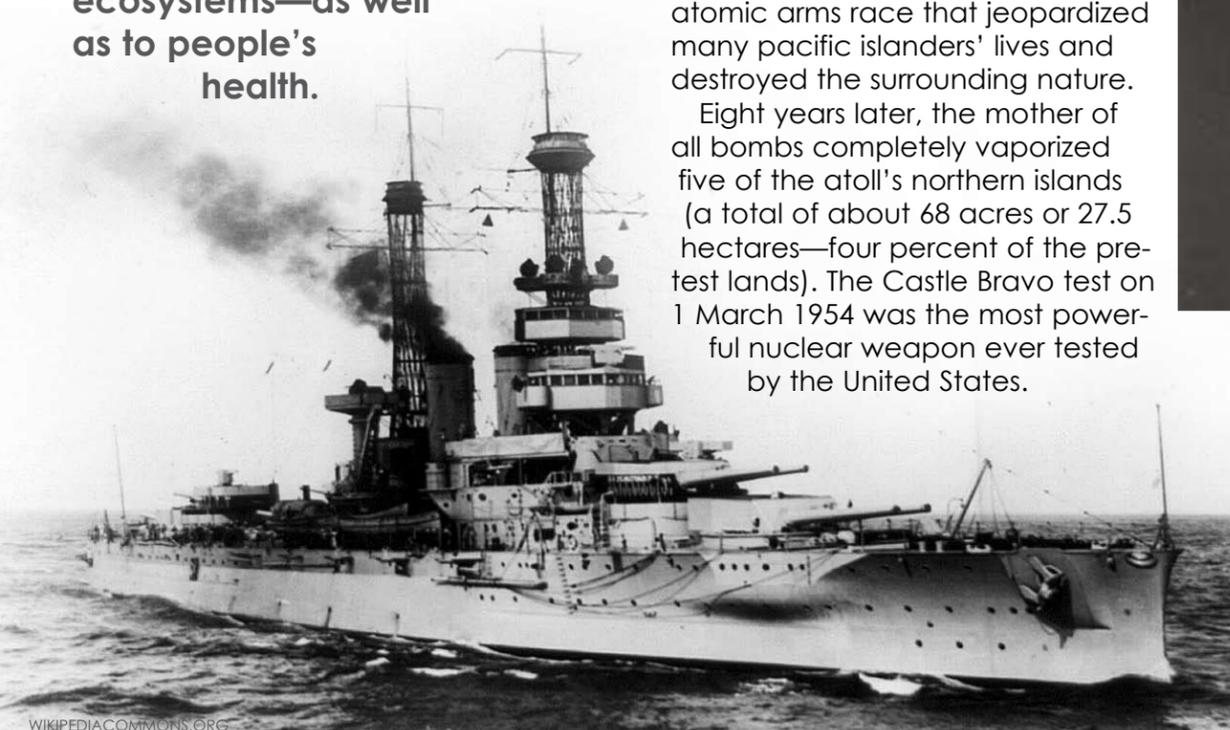
Waiting to return

Today, while the people of Bikini have yet to resettle their homeland; the island is populated by Bikini Project Department construction workers and some US

Department of Energy staff. There is, however, a large population of Bikinians living elsewhere in the Marshall Islands and overseas who hope to have the ability to return to their homeland someday soon.

Over the past three decades, researchers from the Lawrence Livermore National Laboratory (LLNL) have been evaluating radiological conditions on

USS Arkansas (BB-33), a Wyoming-class battleship was the third ship of the United States Navy named in honor of the 25th state





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A gamma spectrometer for determination of external gamma exposure rates in village and housing areas where people spend most of their time.

affected atolls and using the data to develop dose assessments for resettled and resettling populations. According to scientists at the LLNL, should the Bikinians decide to resettle, then it will probably be necessary to monitor the return of the population to provide ongoing assurances that safety standards are being met. These programs would probably stay in place at least through the next 10-20 years.

The LLNL provide technical support and conduct radiological surveys to verify the effects of cleanup activities to the local government.

There are established a number of permanent radiological monitoring facilities at remote locations in the Marshall Islands.

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Cleaning up

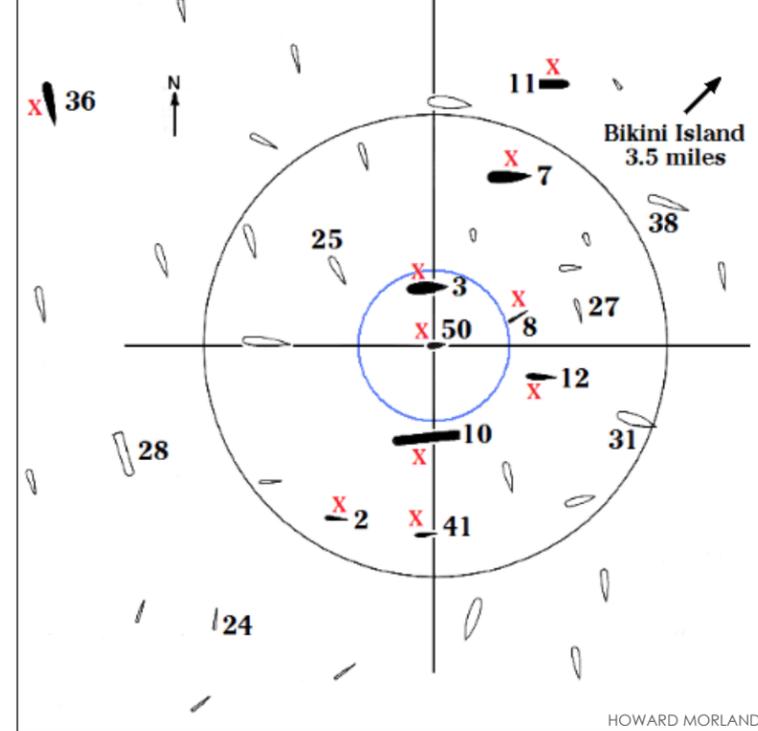
The largest contributor to radiation doses from exposure to residual fallout contamination in the Marshall Islands comes from cesium-137. This substance has entered the food chain and is found in, for example, Coconut crabs and locally grown breadfruit, which are important food sources on the islands.

Cesium-137 radiation from plants that grow on the islands is another major contamination source. Another contamination source is plutonium, which is also being tracked through measurement technology in support of the Marshall Islands plutonium urinalysis (bioassay) program.

Researchers from LLNL have worked out a rehabilitation scenario involving treatment of agricultural areas with potassium fertilizer and removal of the top 40cm of soil from the housing and village area. This method would actually expose the future habitants of the contaminated islands to a radiation level well below what is normal from natural radiation sources in, for example, the continental United States.

Is it really safe to dive at Bikini?

As Bikini has been developed into a dive travel destination, the question of the potential radiological dose from recreational diving and swimming in and around the ships has been raised. There is concern about the radiation both from the radionuclides present on the ships and in the seafloor of the lagoon (sediments).



A map of the array of target ships in Bikini lagoon for the Baker shot of Operation Crossroads on 25 July 1946. The ten red X's mark the ten ships that sank. The area of serious ship damage is marked by the black circle, with a radius of 1,000 yards from the point of detonation. The rim of the shallow underwater crater created by the blast, as well as the circumference of the hollow water column that lifted the *Arkansas* is marked by the blue circle, which has a 330-yard radius. Submerged submarines were the *Pilotfish*, (ship #8) at 56 feet, and the *Apogon* (ship #2) at 100 feet

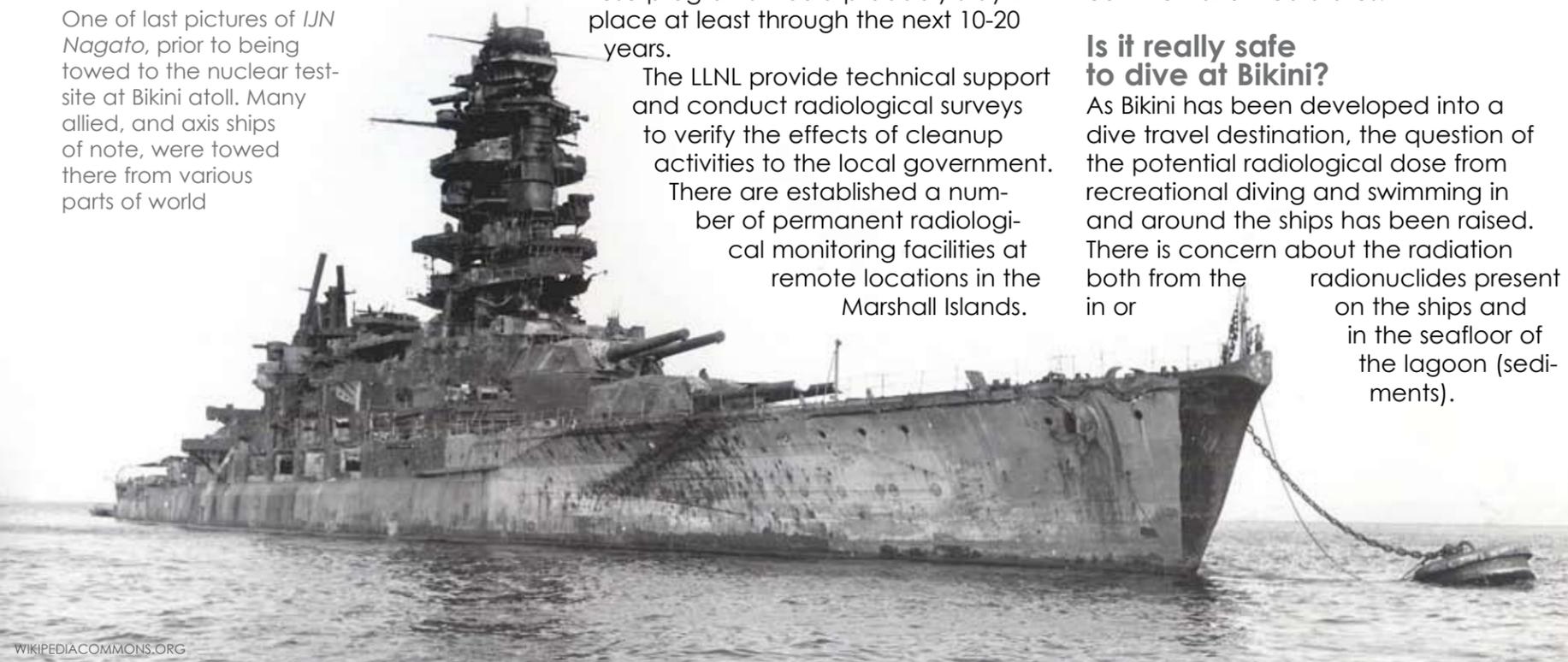
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Research shows that the dose from caesium-137, cobalt-60 and bismuth-207 in the sediments on the ships and in the lagoon bottom while swimming near the ships is so low that it is, for all practical purposes, zero. The dose to a person on

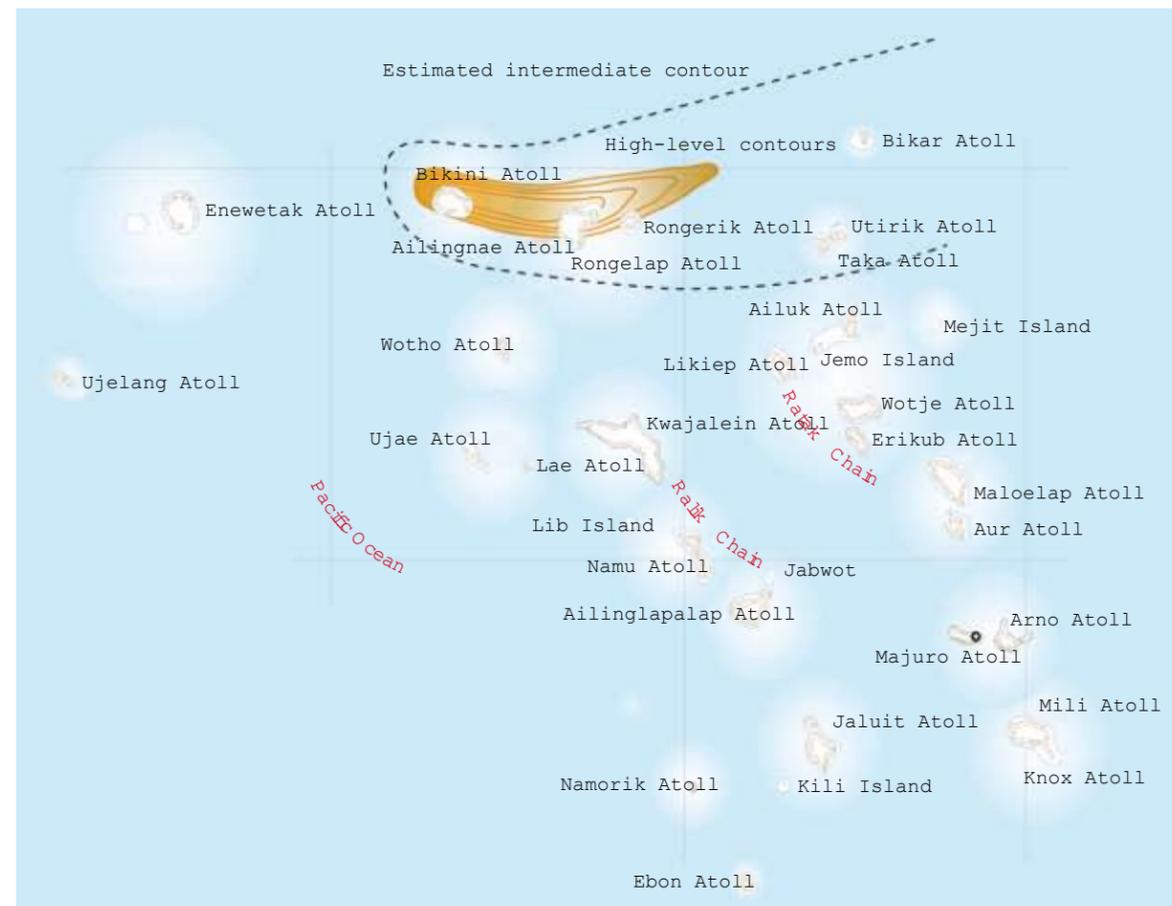
land anywhere in the world, for a specific period of time, would be higher than the dose from swimming in the lagoon and diving near the ships for the same period of time.

To give you an additional perspective,

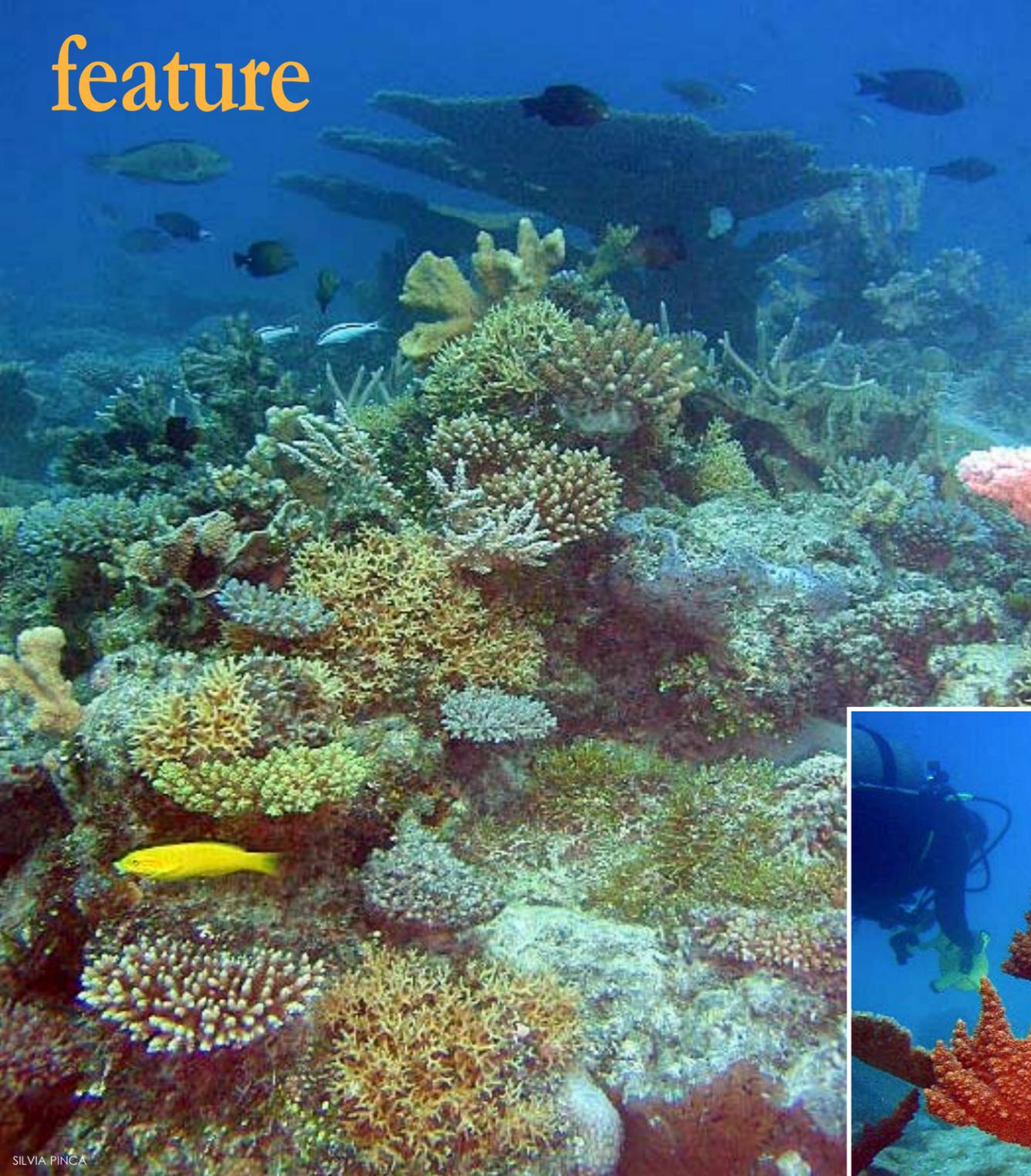
One of last pictures of *IJN Nagato*, prior to being towed to the nuclear test-site at Bikini atoll. Many allied, and axis ships of note, were towed there from various parts of world



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Map of the Marshall Islands



Lagoonal coral reef habitat at Bikini

the cesium-137 concentration in lagoon sediment is much less than the cesium-137 concentration in surface soil in the United Kingdom and Northern Europe from the Chernobyl accident. The primary potential route of exposure of people from alpha and beta-emitting radionuclides is by inhalation. There is no chance of inhalation of these radionuclides while

diving on the ships or swimming in the lagoon near the ships. It can therefore be concluded that a diving trip to the Bikini Islands is not harmful.

Radiant marine life
Nature has again showed an

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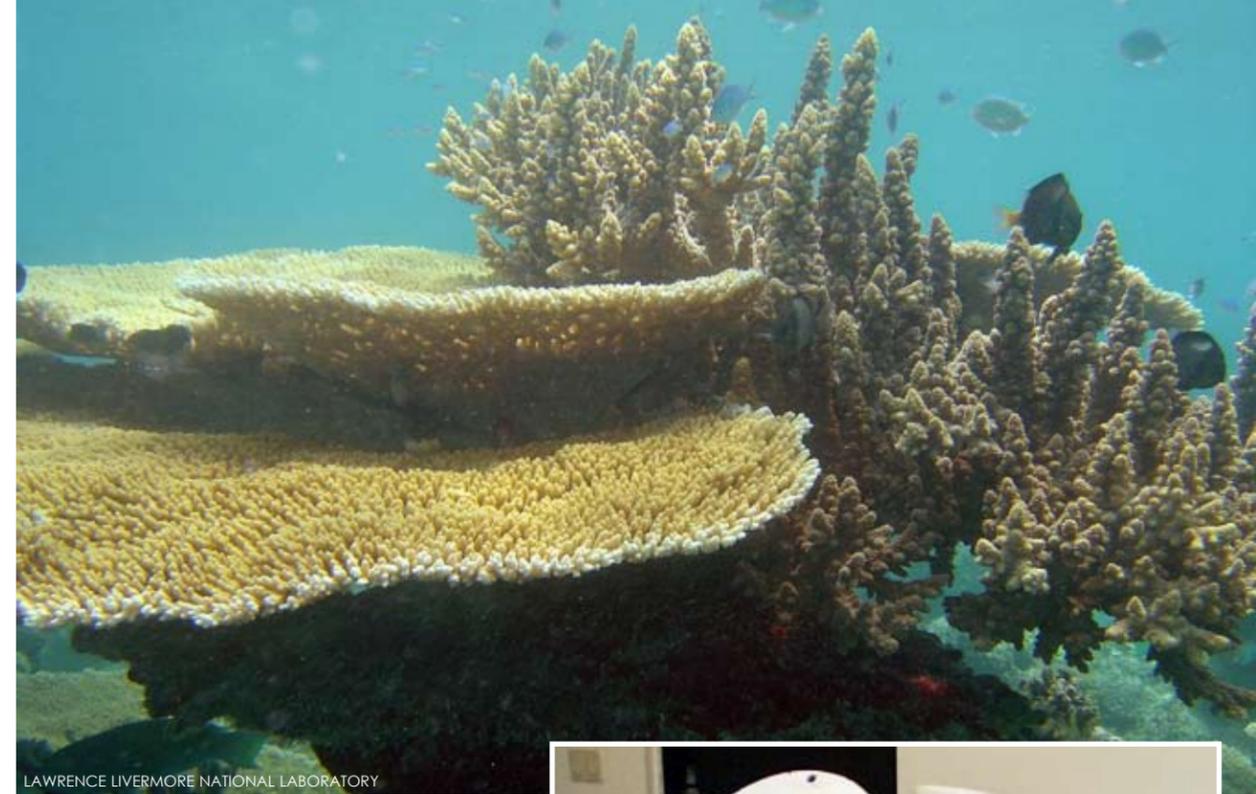
astounding ability to recuperate after manmade disasters. Half a century after the last earth shattering atomic blast shook the Pacific atoll of Bikini, the corals are flourishing again.

An investigation concluded in early 2008 by an international team of scientists from Australia, Germany, Italy, Hawaii and the Marshall Islands, has revealed some truly remarkable findings. The expedition examined the diversity and abundance of marine life in the atoll.

One of the most interesting aspects is that the team dived into the vast Bravo Crater left in 1954 by the most powerful American atom bomb ever exploded (15 megatons—a thousand times



SILVIA PINCA



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ABOVE: Corals at Enewetak lagoon off Runit Island, Enewetak Atoll, July 2005. RIGHT: A so-called Massic Chair used for whole body counting, measuring the radiation dose delivered by internally deposited radionuclides

more powerful than the Hiroshima bomb).

"I didn't know what to expect—some kind of moonscape perhaps. But it was incredible, huge matrices of branching Porites coral (up to 8 meters high) had established, creating thriving coral reef habitat. Throughout other parts of the lagoon it was awesome to see coral cover as high as 80 percent and large tree-like branching coral formations with trunks 30cm thick. It was fascinating—I've never seen corals growing like trees outside of the Marshall Islands," said Zoe Richards of the ARC Centre of Excellence for Coral Reef Studies and James Cook University, after diving into the crater.

However, more than 50 years later, not everything has returned to the state it was before. At least 28 species of coral previously found in the area has become locally extinct. "The missing corals are

Large Acropora corals resemble trees in the lagoon at Bikini Atoll



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fragile lagoonal specialists—slender branching or leafy forms that you only find in the sheltered waters of a lagoon," Richards explained.

For comparison, the scientists also dived on neighboring Rongelap Atoll, where no atomic tests were carried out directly, although the atoll was contaminated by radioactive ash from the Bravo Bomb. The Rongelap Atoll is the second largest atoll in the world with a huge

amount of coral reef diversity and biomass; it lies upstream from Bikini. The scientists have reason to think that these corals are seeding the Bikini corals, helping the reefs to recuperate. ■

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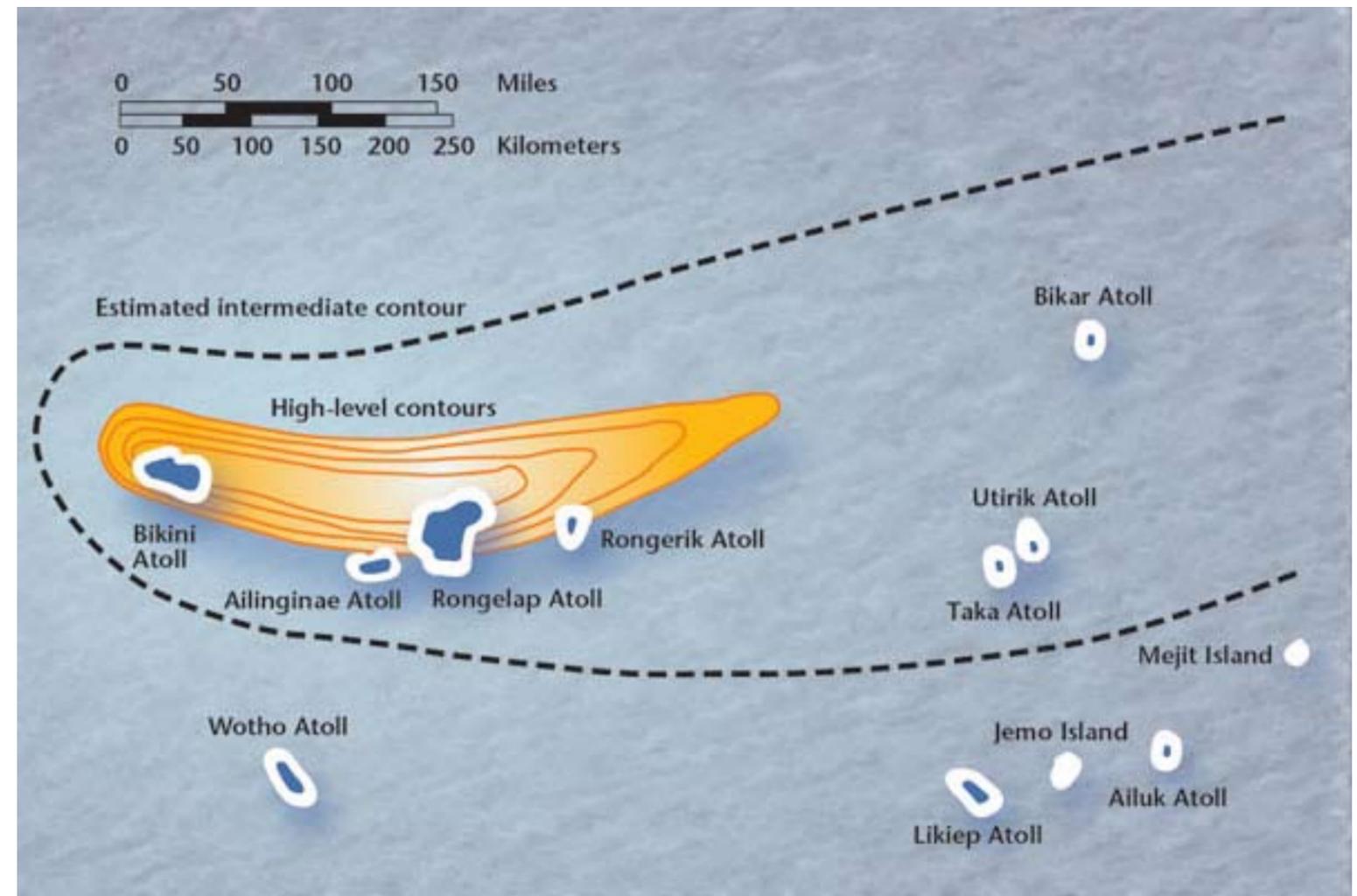
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Bikini on the web:

www.nuclearclaimstribunal.com/tesing.htm
www.ns.iaea.org/appraisals/bikini-atoll.htm
www.bikiniatoll.com

Shipwrecks:

www.nps.gov/history/history/online_books/swcrc/37/chap4.htm



Map of the Republic of Marshall Islands showing the fallout pattern from the Bravo nuclear test conducted on 1 March 1954. Image courtesy of Lawrence Livermore National Library



Woman in two-piece found on the mosaic in Villa del Casale in Piazza Armerina, Sicily, Italy

The Bikini – French fashion that hit the beaches like a bomb

Text by Arnold Weisz

That a minimalistic swim suit creation was named after some “post card pretty” tropical islands in the Pacific is nothing less than what it deserves. On the other hand, the thought behind naming this piece of fashion after these islands is much more sinister.

The bikini, which shocked the world when it appeared on French beaches in 1947, was a Greco-Roman invention. Based

on evidence from Roman mosaics and murals, historians have long believed that the bikini was popular swimming attire for ancient Roman women. In the fourth century, for example, Roman gymnasts wore bandeau tops and bikini bottoms.

However, as archeologists work their way through their discoveries, new insights come to light. Cave excavators have discovered Minoan wall (Greece) paintings from around 1600 B.C. that show a two-piece outfit strikingly similar to the modern-day bikini.

The modern bikini was invented by French engineer Louis Réard in

1946. Strange as it may sound, Louis Réard, the engineer, was actually running his mother's lingerie boutique near Les Folies Bergères in Paris in 1946.

At the time, Réard's main problem was that he didn't quite know what to call his design. Being French, it would of course have to be a name that would stir the masses. So, he searched for something exotic, bold and eye opening.

The clue came from a very remote place, in a rather spectacular fashion. Four days before he was to show the world his new bikini in Paris, the U.S. military provided

him with a name. Réard named his design after Bikini Atoll in the Pacific, the site of the Operation Crossroads nuclear weapon test on 1 July 1946.

On 5 July 1946, he unveiled the bikini at a fashion event at Piscine Molitor, a popular public pool in Paris to this day. Since its unveiling, the bikini has become the favorite swim and beach wear around much of the world, creating its own billion dollar fashion industry. Although the very minimal bikinis worn on Brazilian beaches today have lost some inches of fabric since Réard designed it, his bikini will probably never go out of style. ■