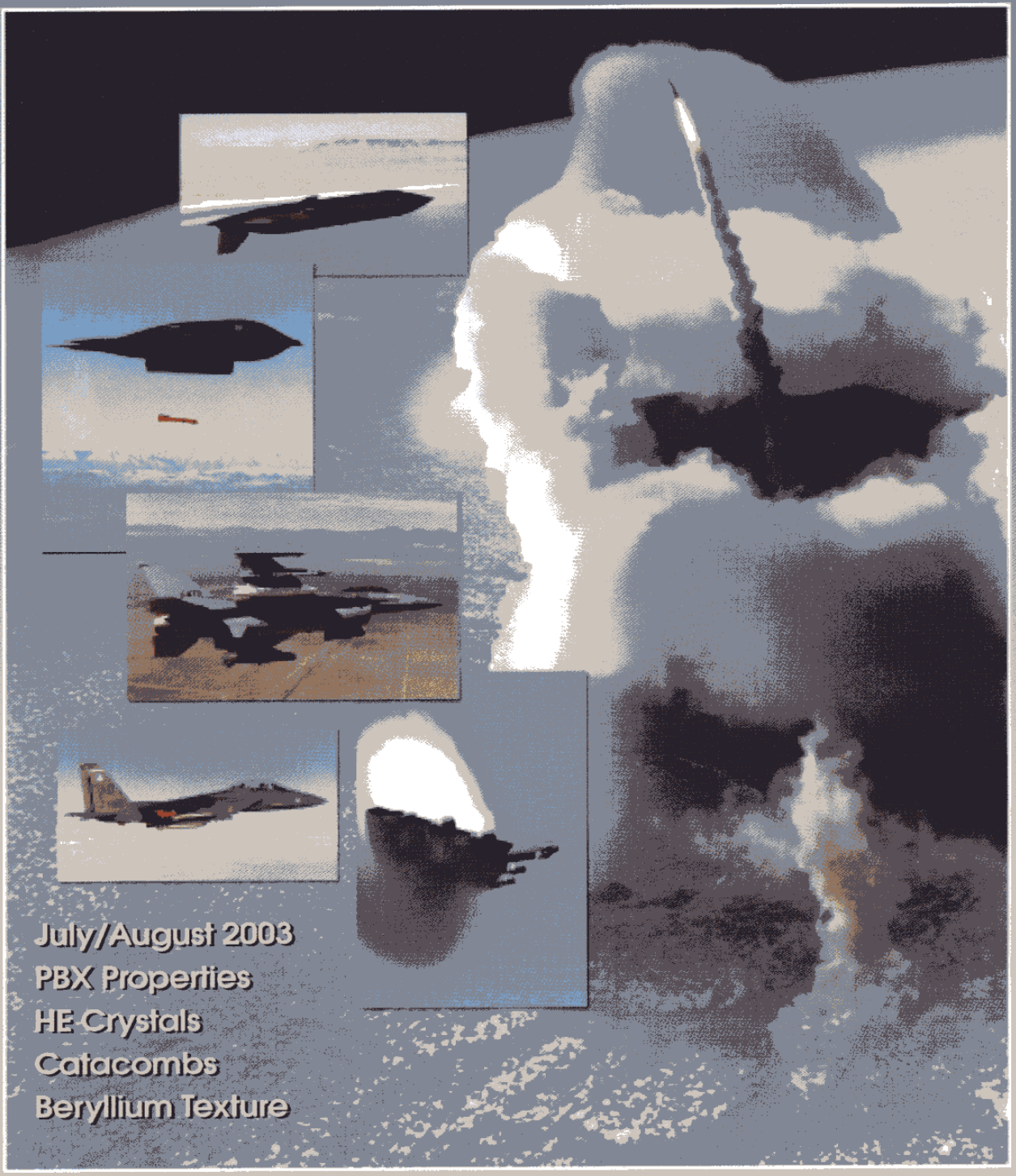
nuclear weapons journal



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PBX Properties

HE Crystals

Catacombs

Beryllium Texture

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Alison Grieggs, Senior Science Writer/Editor
Randy Summers, Designer
Ed Lorusso, Science Writer/Editor
Larry McFarland, Science Writer/Editor

Lupe Archuleta is printing coordinator, Denise Derkacs is editorial advisor, and Sieg Shalles is technical advisor. Send comments, questions, and address changes to nwpub@lanl.gov.

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A BACKWARD GLANCE

Bikini Atoll: Operation Crossroads

Late in 1943, Navy Captain William S. (Deak) Parsons, the wartime Ordnance Division Leader at the Laboratory, suggested developing a nuclear torpedo, the first proposal for a tactical nuclear weapon. J. Robert Oppenheimer killed the idea, citing his own research showing that shock damage from a nuclear torpedo would not be very effective in the shallow waters of a harbor—the most likely combat scenario.

Two years later, the idea of a tactical nuclear weapon was presented to Oppenheimer again, this time by Glenn Fowler, who was working with Norman Ramsey in the Delivery Group. Noting the fierce and savage combat conditions in the Pacific Theater, Fowler proposed developing a tactical nuclear weapon that could be used against Japanese-held caves, which represented a particularly vicious and deadly form of combat for Allied Forces. Fowler noted that if nuclear bombs were reserved for combat delivery only by airplane, their targets would be limited to cities, since aerial bombardment was notoriously inaccurate. World War II ended before any action could be taken on Fowler's idea.

Immediately after the war, Parsons again brought up the idea of developing a tactical nuclear weapon. Changing his argument from the development of a specific weapon to the broader concept of tactical use, Parsons asked mathematician John von Neumann to analyze the possible effects of a nuclear burst on naval vessels. Von Neumann quickly warmed to the idea and calculated that a ship could be sunk from an explosion occurring at a depth roughly equal to its distance from the target. Von Neumann suggested that serious attention be given to developing an underwater delivery system and using atomic bombs against single ships. In addition to making a technical argument, von Neumann also noted that "during the war, building a battleship was cheaper than building an atomic bomb, but now the situation is reversed." It was now cost effective to target individual vessels.

Building on von Neumann's analysis, the nascent Navy Atomic Bomb Group [Parsons, Frederick Ashworth (the Nagasaki weaponeer), and Horatio Rivero] began planning a series of atomic bomb tests against naval vessels that ultimately became known as Operation Crossroads. They proposed four tests with a target array of ships: detonation of a device suspended by a blimp, a deep-water detonation, a shallow-water burst, and a high-altitude delivery by a B-29 bomber. The blimp test was quickly eliminated, while planning proceeded on the remaining three proposals.

In the first nuclear tests held in the Marshall Islands, the Able test was a high-altitude drop that occurred over the Bikini Lagoon on June 30, 1946, followed by the Baker shallow-water test on July 24. Impressed by the extensive damage caused by Baker (eight ships were sunk, and eight others were severely damaged) and mindful of the very small stockpile of nuclear weapons, scientists abandoned the deep-water test.

USS Independence after Able test

Although Parsons' and Fowler's concept of a tactical nuclear device was not proven during World War II, the Crossroads tests did demonstrate that tactical use of an atomic bomb was possible.

Roger Meade, 667-3809, rzxm@lanl.gov

Baker test, July 24, 1946