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A U.S. Marine inspects the remains of a vehicle destroyed in a roadside bombing that killed 14 Marines and a civilian interpreter near Haditha, Iraq. »The Victims: Faces of the Fallen (Antonio Castaneda / Associated Press)

CORRECTION TO THIS ARTICLE
Army Spec. Hugo Gonzalez was misidentified in two photo captions with the Oct. 1 installment of the Left of Boom series, and his rank was incorrect on Page One. Also, in some editions of the Oct. 2 installment of the series, the full name of an EFP, a type of weapon used by insurgents, was incorrectly given as "explosively formed perpetrator." It should have been "explosively formed penetrator."

PART 3 | SPRING 2005 - SUMMER 2006

'You can't armor your way out of this problem'

By Rick Atkinson
Washington Post Staff Writer
Tuesday, October 2, 2007

BAGHDAD -- On Aug. 3, 2005, the deadliest roadside bomb ever encountered by U.S. troops in Iraq detonated beneath a 26-ton armored personnel carrier, killing 14 Marines and revealing yet another American vulnerability in the struggle against improvised explosive devices.

THIS STORY

'The single most effective weapon against our deployed forces'

PART 4 | SPRING 2006 - SUMMER 2007

2007: 'If you don't go after the network, you're never going to stop these guys. Never.'

PART 3 | SPRING 2005 - SUMMER 2006: 'You can't armor your way out of this problem'

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"Huge fire and dust rose from the place of the explosion," an Iraqi witness reported from the blast site in Haditha, in Anbar province. In Baghdad and in Washington, the bleak recognition that a new species of bomb -- the underbelly, or "deep buried," IED -- could demolish any combat

vehicle in the U.S. arsenal "was a light-bulb moment for sure," as a Pentagon analyst later put it.

Of the 81,000 IED attacks in Iraq over the past 4 1/2 years, few proved more devastating to morale than that "huge fire" in Haditha. At a time when coalition casualties per IED steadily declined, even as the number of bombs steadily increased, the abrupt obliteration of an entire squad -- made up mostly of reservists from Ohio -- revealed that the billions of dollars being spent on heavier armor and other "defeat the device" initiatives had clear limits.

Haditha provided a light-bulb moment for insurgents as well. During the next year, underbelly attacks just in the Marine sector of western Iraq would increase from a few each month to an average of four per day. By early summer of this year, the underbelly IED -- considered a specialty of Sunni bombers -- was killing more American troops in Iraq than all other variants of roadside bombs combined.

A bomb with 100 pounds of explosives detonating beneath an armored vehicle was equivalent to a direct hit from a six-gun artillery battery, but with an accuracy no gunner could hope to achieve. A single 155mm artillery round, which by itself can destroy a tank, typically contained 18 pounds of explosives. "That's just a damned difficult thing to defeat," said Brig. Gen. Joseph Anderson, the current chief of staff for the Multinational Corps in Baghdad.

Two weeks after the Haditha killings, Lt. Gen. James N. Mattis, who headed the Marine Corps Combat Development Command, lamented the failure of American science to vanquish the roadside bomb. "If we could prematurely detonate IEDs, we will change the whole face of the war," he said. For "a country that can put a man on the moon in 10 years, or build a nuke in 2 1/2 years of wartime effort, I don't think we're getting what we need from technology on that point."

Technology was trying. The Pentagon's Joint IED Task Force had spent almost \$1.5 billion by the late summer of 2005, with an additional \$3.6 billion planned for the fiscal year that began Oct. 1; \$4 of every \$5 went to defeat-the-device technologies intended to foil the bomb or mitigate the blast. But with an IED attack occurring in Iraq every 48 minutes in 2005 -- twice the frequency of the previous year -- there was much to foil and a great deal to mitigate.

True, the number of troops killed and wounded was escalating at a lower rate than the number of roadside bombs. "We are being effective," said Brig. Gen. Joseph L. Votel, director of the task force. "The casualties are not going up as much as the IEDs are." Yet nearly 500 troops had been killed in Iraq through August 2005, including those 14 at Haditha. "This thing could unravel on us by wearing down the American public with these IED casualties," Gen. John P. Abizaid, head of U.S. Central Command, told Votel.

Some promising technologies fizzled. The Defense Department invested more than \$2 million in the Stealthy Insect Sensor Project, including extensive research at Los Alamos National Laboratory in New Mexico, where the "Manhattan Project-like" effort that Abizaid had called for had realized its goal: a nuclear bomb. Various engineers were pursuing the "scientific molecular sniffer" that Abizaid had also envisioned shortly after taking over at [Centcom](#) in 2003, but Los Alamos hoped to exploit the honeybee's keen sense of smell as a means to detect explosives.



A honeybee being trained to detect explosives receives a sugar-water reward at the Los Alamos National Laboratory. The Pentagon invested more than \$2 million in the Stealthy Insect Sensor Project before withdrawing its support. (Courtesy of Los Alamos National Laboratory)

Researchers placed each bee in a tiny harness, exposed the insects to various explosive scents for six seconds, and then provided a sugar water reward. This Pavlovian conditioning soon caused a bee to extend its proboscis -- tongue -- in anticipation of sugar whenever it detected a whiff of TNT or C-4 plastic explosive. A small television camera placed in a box where the bees were harnessed would allow a soldier watching a monitor to see whether the "proboscis extension reflex" signaled the presence of explosives. In 2004, bees had stuck out their tongues at 50 pounds of TNT in a simulated IED, according to Robert Wingo, a Los Alamos chemist.

Votel's reaction upon learning of the project was typical: "What?" The practical applications in combat seemed limited. "How do we operationalize this?" he asked. "How does, say, 1st Platoon manage their bees?" Among other problems, harnessed bees tended to be short-lived. After an analysis concluded that the honeybee's "explosive-detection capabilities have

significant reliability issues," as a Defense Department official put it earlier this year, the Pentagon withdrew its support.

Other technologies reached the battlefield only to find that the battle had moved on. Rep. Duncan Hunter (R-Calif.), chairman of the House Armed Services Committee, was aghast to learn that there was no "man-portable" electronic jammer for dismounted infantrymen. The thousands of jammers already sent to counter radio-controlled IEDs in Iraq and Afghanistan -- Warlock Green, Warlock Red, ICE, SSVJ, MMBJ -- were designed to be mounted on vehicles only.

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