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Reflections on Khamisiyah

By Albert J. Mauroni

Ten years ago, most of our military forces committed to the Persian Gulf War were on their way home. It was a good news story; with minimal casualties, they had liberated Kuwait, defeated the fourth largest military force in the world, and avoided the threatened use of chemical and biological (CB) weapons. Many veterans and a majority of the public don't quite believe we dodged that bullet entirely, despite the presence of more than 4,000 chemical specialists, thousands of chemical detection devices, and medical specialists watching for CB agent symptoms. While it may be accepted that Iraqi forces did not employ CB weapons against the coalition force, there is the perception that the Department of Defense (DOD) didn't fully understand the effects of blowing up Iraqi chemical production sites or abandoned stores of Iraqi munitions. The DOD CB defense community sees the negative CB reports and lack of medical and physical (expended munitions) evidence as proof that there was no exposure, but that is not conclusive enough evidence to convince the U.S. political leadership. Rather, the events immediately following the cease-fire continue to plague our ability to move forward from the Gulf War. I refer to the Khamisiyah depot and Khamisiyah pit explosive ordnance demolition operations in March 1991.

On 4 March 1991, engineers from the 82d Airborne Division rigged and detonated 38 of the approximately 100 bunkers filled with what they assessed as conventional ammunition. One of these bunkers is now believed to have held chemical munitions, specifically 122-mm rockets filled with sarin or cyclosarin mixes. On 10 March, the same engineer units blew up a large number of 122-mm rockets in a pit about 1 kilometer south of the depot, destroying about half of the rockets. None of the munitions at the bunkers or in the pit were marked as unconventional munitions, nor were any leaking to the degree that chemical specialists might have identified the munitions as chemical-filled. One M8A1 chemical detector activated in the engineer's location, but an M256A1 chemical detector kit did not confirm the

presence of agents. It was not until October 1991, when a United Nations Special Commission (UNSCOM) team found unexploded 122-mm rockets still in the pit that it was identified that the rockets were filled with sarin and cyclosarin nerve agents. In May 1996, a UNSCOM inspection of the depot bunkers revealed that the remnants of munitions in one of the shattered bunkers were identical to those found in the pit, leading UNSCOM to report the potential release of chemical warfare agents. The Pentagon and the Central Intelligence Agency oversaw computer simulations of the possible release of chemical warfare agents and gave this data to the Presidential Advisory Committee, which started a media blitz questioning DOD's previous claims that no military personnel were exposed to chemical warfare agents in the Gulf.

Details of these events are laid out in great detail on <http://www.gulflink.osd.mil>, thanks to the fine investigative work of the Office of the Special Assistant for Gulf War Illnesses (OSAGWI). In fact, Dr. Bernard Rotsker noted, in a recent newsletter, that the Khamisiyah incident was the primary reason for establishing OSAGWI in 1996. Because OSAGWI believes that the Khamisiyah pit demolition represents the only Gulf War event that may have exposed service members to chemical warfare agents, it became the center of focus for both veterans' and DOD groups, especially those who work to prepare our military for future conflicts. If you have not read OSAGWI's investigative narratives of these events, as professionals in this field, you should become intimately familiar with their details.

Ten years after the event, and 5 years since the revelation of the Khamisiyah incidents, DOD still struggles to understand what happened in 1991 and, more importantly, what we should do to ensure that this confusion does not happen again. In the National Defense Authorization Act of 1999, Congress tasked DOD to examine the effects of low-level chemical agent exposure to understand what actions were necessary to protect military personnel against even single exposures of low

levels of chemical agents. An Office of the Secretary of Defense working group has been formed to execute this tasking. From this group, two working groups were created—a technical working group to develop the medical and nonmedical data required to understand how one protects against low-level chemical agent exposure and an operational working group to identify the conditions under which military personnel would be exposed to low-level chemical agents.

Chemical Warfare Agents Research

The United States has been working with chemical warfare agents for decades—in the case of mustard agents, research has gone on for more than 80 years. Two things have changed: first, Edgewood scientists have postulated that expressions of lethality are not constant over time, as previously thought. For instance, the lethal dose for 50 percent of the population for sarin was thought to be 100 mg-min/m³, which meant a person exposed to 100 mg of sarin for 1 minute or 50 mg of sarin for 2 minutes had a fifty-fifty chance of dying. Recent research indicates that exposure to lower doses of a chemical agent for longer durations may be more potent than previously believed, that the calculations are not as linear as had been portrayed. This means much of the chemical lethality data that we previously accepted as gospel has to be revalidated, and past corollaries of chemical defense must be challenged. Now, in addition to lethal dose, incapacitating dose, and effective dose, we add low-level dose measurements.

The second change is trying to understand what exactly low-level chemical agent exposure is. What are we trying to protect our forces against? One definition of low-level chemical agent exposure is “exposure to chemical warfare agents without causing any immediate harmful or adverse reactions.” OSAGWI has used the term “first noticeable effects” as the term for chemical agent exposure that would cause miosislike effects. For instance, low-level chemical agent exposure would occur when a person is exposed to agent levels below the standard of “first noticeable effects.” The question is, what is the operational impact of low-level agent exposure? If there is no immediate adverse effect on troops, maybe there is no operational impact. It then falls to the medical community to determine long-term health consequences of that exposure.

To add to the confusion, the duration of exposure to chemical warfare agents must be identified also. Exposure is temporary (also called acute), short-term, or long-term (also called chronic). Some categorize acute exposure as less than 8 hours, short-term as less than 2 weeks, and chronic exposure as more than 2 months. Specifically,

this means a person is continuously exposed to a substance for the duration. So, low-level acute exposure means a person has been exposed to agent levels that do not cause any immediate harmful effects for less than 8 hours duration. The medical community, in particular, is often more interested in chronic-exposure effects than the nonmedical community, which focuses more on the acute-exposure effects.

The Khamisiyah Pit

How exactly did we get to the DOD statement that 100,000 military personnel may have been exposed to nerve agents as a result of the demolitions? In May 1997, DOD completed a series of small-scale demolition tests using simulant-filled 115-mm rockets at Dugway Proving Ground, Utah. These tests allowed OSAGWI to understand better what might have happened when engineers blew up the Iraqi 122-mm rockets at the Khamisiyah pit in 1991. These tests, combined with a better understanding of conditions on the day of the explosion, lowered the estimated agent release from 715 kilograms to 315 kilograms. OSAGWI employed five different computer models when trying to identify where the agent might drift in a 4-day period. This included three weather models and two chemical warfare agent dispersion models (SCIPUFF and VLSTRACK). The resulting plume stretched 250 miles south, stopping north of King Khalid Military City (KKMC) (see Figure 1). On day one of the demolition, more than 45,000 military personnel may have been exposed with possibly more than 61,000 more on day two. This yields the now-famous number of 100,000 military personnel that may have been exposed.

Exposed to what? Interestingly enough, the downwind hazard area that might have caused first noticeable effects of chemical warfare agent exposure extended only 4 miles downwind from the pit and no one was in that area (see Figure 2). All the exposed personnel were in a hazard area at a level generally known as the general population limit, which would not have caused an M8A1 alarm to go off. This level is 0.000003 mg/m³, or 0.013 mg-min/m³ for sarin in a 72-hour period. General population limit is defined as a standard used for those workers who handle toxic chemical agents. It means that if a worker was exposed to this level of agent for 40 hours a week for the extent of his working career, he will not show health effects.

An independent peer-review panel stated that OSAGWI's methodology, while improved, would “still be on the conservative side; (that is), they very likely are overestimates of the dosages actually received by personnel.” DOD made the deliberate decision to be

conservatively safe-sided, “on the side of the veteran,” to ensure that they didn’t omit anyone who could have been exposed to low levels of agents. By the previous estimates, had those veterans stayed downwind of the Khamisiyah depot and pit explosions for the rest of their life, let alone another few days, they would not have been exposed to levels against which unprotected civilians working every day at the chemical stockpile sites are protected. What message are we trying to communicate here?

The Army’s chemical demilitarization program is closely watching the results of OSAGWI’s work because there is a definite parallel to occupational chemical agent exposure and their risk-management practices. If the level of acceptability for chemical agent exposure to soldiers on the battlefield goes down, there is the significant possibility that it will go down for the agent workers during peacetime operations. There are other interesting parallels between chemical demilitarization and OSAGWI’s assessments, as well. Consider the following two passages:

“The first group will be veterans who deployed to the Gulf War and who reported symptoms which include fatigue; lightheadedness; headaches; nervousness; difficulty sleeping; muscle pain; trouble thinking, concentrating, or remembering; or a fast heart rate.” This is from the November/December 2000 *GulfNEWS* newsletter discussing a planned John Hopkins research effort on Gulf War illnesses.

“Direct physiological responses (to stress) are often associated with increased levels of adrenaline and other catecholamines that increase the heart rate and blood pressure and accelerate respiration, perspiration, and other physiological symptoms... Physical symptoms of these responses include muscular tension, memory lapse, headache, insomnia, tiredness, sweating, dizziness, and general weakness. These are typically referred to as somatic stress effects because of a lack of a specific etiology of their manifestation.” This information is the result of the Final Programmatic Environmental Impact Statement of the Army’s Chemical Stockpile Disposal Program, dated January 1988.

Recognizing that many veterans object to the supposition that they could be suffering from stress due to participation in a high-paced, pitched battle between mechanized forces, I make no connection between the two paragraphs. Other medical journals have examined Gulf War veterans and developed better studies on stress. Consider all the evidence

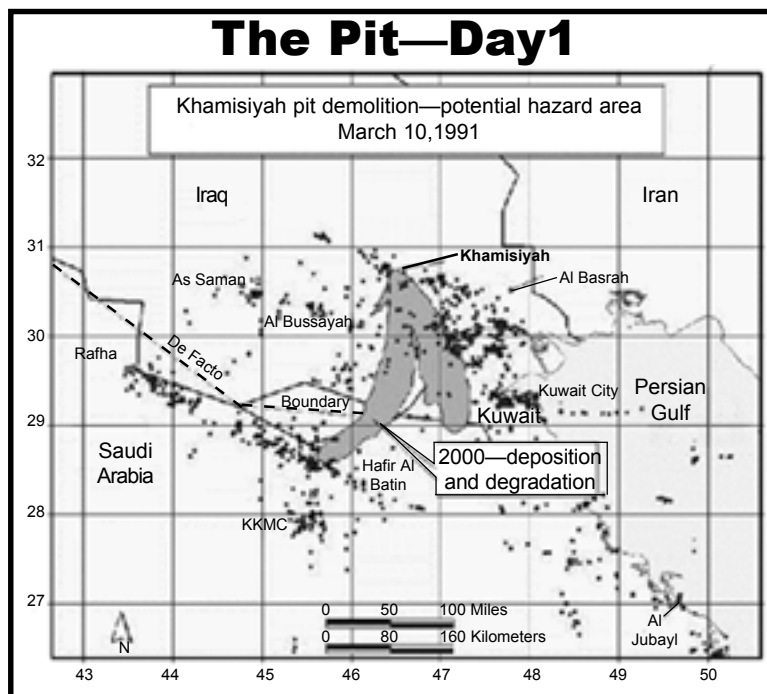


Figure 1

before answering this question—What are we attempting to solve with this low-level agent exposure study?

Questions About the Future

The reason for understanding this event is because it has the strong potential to shape how the warfighter develops requirements for future doctrine, training, leadership, organization, and materiel. There are a number

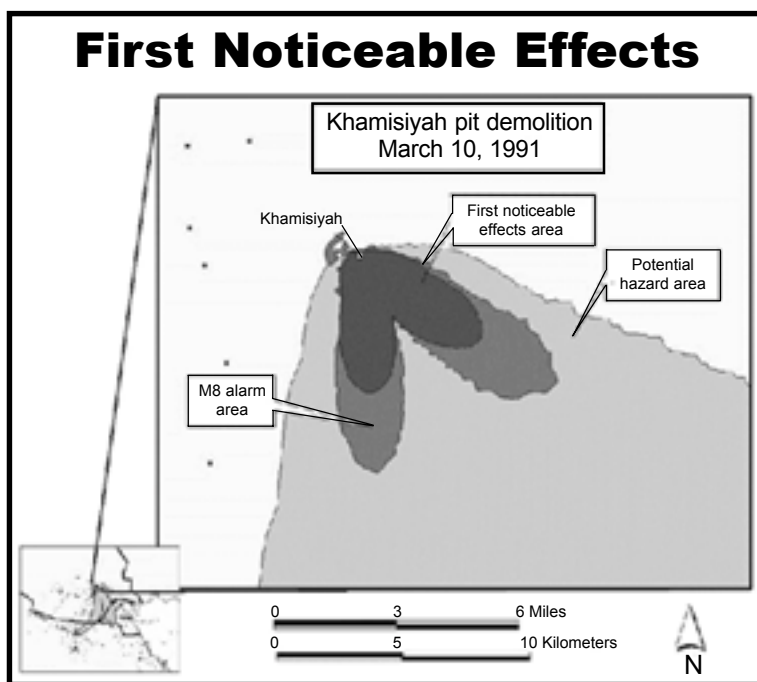


Figure 2

of debates ongoing in the DOD CB defense community, all of which focus on what exactly the future threat is perceived to be. Given the end of the Cold War and new studies on “agent fate,” or how long chemical agents remain a threat in the environment—specifically what happens to an agent when it hits a particular surface given a particular set of environmental conditions over time—some believe the threat of chemical warfare attacks is highly exaggerated. Others believe that the political ramifications of the Gulf War and perceived “zero-risk” mentality will demand that the warfighters increase their concerns about CB agent exposure. There is no current DOD policy that addresses how warfighters should address operational risk management in a military scenario that includes the deliberate employment of CB weapons against our forces.

Part of this absence of policy is because of the lack of hard research data on low-level agent effects. As noted previously, there is a concerted research effort ongoing in the medical and nonmedical CB defense communities. The nonmedical community focuses more on validating the inhalation and percutaneous exposure data to understand what may be required for chemical agent detectors and protective suits and masks to function adequately. The medical community focuses more on validating how the human body responds to agent exposure to understand what diagnostic and treatment regimes are necessary. There is shared data but not so clear agreement on the philosophy of how to use this data.

Some argue that the Gulf War experience has created a new paradigm—which the CB defense community can no longer afford to set its detection limits at lethal and incapacitating levels. While it is generally understood that military personnel in a combatant environment will not be using peacetime general population limits, the alarm level that some would be more comfortable with would be between the incapacitating and the general population limit. This might entail redesigning all our detectors to activate at levels significantly lower than what they do now, increasing protective capabilities of suits and masks, and decontaminating all equipment and personnel to the point of eliminating 100 percent of all traces of agent—not 99.5 percent but 100 percent because people will argue for that last 0.5 percent.

This train of thought has alarmed some as being unrealistic. The concept of risk management is sound, but in terms of what information is valuable to the commander, overreaction is deadly. Imagine the following scenarios:

A lieutenant colonel is about to order his troops to assault a hill, and the chemical officer runs up to him. “Sir! That hill was contaminated with nerve gas 3 weeks ago and may have levels of agent there to which our detectors won’t alarm!” The colonel looks at this chemical

officer with concern and asks, “How many troops might die from the chemical agents if we attack now?” “Oh, none, sir, but in a few years from now, they might not sleep well.”

After the chemical officer is summarily kicked out of the colonel’s command post and sent to the rear as the battalion’s new mail clerk, the unit assaults and clears out the enemy position without incident. After the war, 10 percent of them report health issues.

In the second scenario, the colonel listens to the chemical officer, orders his troops to don full MOPP gear, and sees a third of them killed because they were constrained while the enemy was not wearing any protective gear.

This story may seem a bit exaggerated, but it strikes to the heart of this discussion. Is DOD investing millions of dollars in research because of a political reaction to a single postconflict event where there was no immediate adverse reaction to low-level chemical agent exposure? Or, are there real concerns that our detectors, suits, masks, and decontamination systems are not addressing the necessary threat levels? If the decision is that DOD must protect its forces from low-level agent exposure, do we then invest in very sensitive, false-alarming chemical detectors, impermeable protective suits and masks, and decontaminants that destroy all agents (good-bye to striving to be environmentally friendly)? Are we convinced that the threat of low-level chemical agent exposure is significant enough to mandate overturning the existing materiel program? Or have we overreacted to the low-level issue rather than calling for the need to educate our military and political leaders that we can afford some operational risks on the battlefield? Is there a middle ground here?

I don’t pretend to have the answer to this low-level issue. This issue calls for inspired discussions and continued strong leadership to ensure that the joint CB defense community is heading down the right track. We may not have the necessary research data for many years to come, but people are making decisions on doctrine, policy, and materiel solutions now. We need to ensure that we understand what near-term and far-term courses of action are required and what assumptions have been made in developing them. At the base of this discussion lies the shadowy history of Khamisiyah.

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