

The Improvised Chemical Dispersal Device

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In the great jihad against the U.S. and other western countries there has been an ongoing effort by a variety of terror organizations to develop and deploy successful improvised chemical dispersal devices, (ICDD). Dating back to before the U.S. invasion of Iraq, intelligence services were aware that jihad organizations were experimenting with toxins dispersed explosively. Abu Musab al Zarqawi, before becoming a member of al Qaeda, reportedly experimented with ICDD in northern Iraq, using livestock as his experimental subjects. But the actual use of these weapons was not seen until the spring of 2007.

On Friday, March 16, 2007 the largest improvised chemical attack was staged in Anbar province, Iraq. Perhaps emulating the attacks of September 11th, this was actually three separate attacks in taking place over little more than three hours.

Specifically, the attacks Occurred between Ramadi, the provincial capital, and Fallujah, Iraq, some five miles to the east. Fallujah had been the site of fierce resistance by both pro-Hussein forces and insurgents following the 2003 invasion, leading to two of the bloodiest battles in the entire war during 2004. Fallujah was the city in which U.S. contractors from Blackwater had been killed, dismembered, and their bodies dragged through the streets to incite the resistance. The follow-up response by coalition forces, led by U.S. Marines, resulted in hundreds of casualties.

Tactically, the attacks in Fallujah were likely designed to both re-ignite the resistance to the coalition forces, and to punish two entities which had cooperated with the new government and coalition forces. One was the Abu Issa tribe, which occupied a region just south of Fallujah. Members of the Abu Issa tribe had become police officers working with the coalition forces in the region. The attack in Ramadi that day was likely designed to punish yet another group that had become the focus of al Qaeda in Iraq attacks, the Anbar Salvation Council (ASC.) The Ramadi home of the leader of the Anbar Salvation Council had been attacked by suicide bombers in February, 2007, and another leader of the ASC had been attacked in neighboring Amiriya on March 1st. Both of those attacks were attributed to al Qaeda in Iraq, then led by Zarqawi.ⁱ Further proof of the motive for the attacks lay in the fact that they occurred just three days after Prime Minister Nouri al-Maliki had visited the region in a bid to win support from local clan chiefs to oppose the Sunni insurgency in the area.ⁱⁱ

All three attacks required suicide bombers driving vehicles to the point of detonation. The first, occurring at 4:11 p.m. local time, was a simple pickup truck loaded with chlorine gas cylinders rigged to an IED. It was detonated at a check point just northeast of Ramadi. A

statement by the military authorities said that one U.S. service member and one Iraqi civilian were injured. Oddly, there is no report of any injuries from the chlorine in this incident.

The second attack occurred about two hours later at 6:36 p.m. in Amiryah, 17 km south of Fallujah. Again the device was a truck borne ICDD with chlorine gas, but in this case a dump truck. It was detonated as it waited in line at a police checkpoint. Authorities believe the suicide driver exploded the device before reaching its primary target. Reports vary on the number of persons killed, the maximum being eight, including two policemen. The reports however agree there were approximately 100 local residents who suffered chlorine exposure, their symptoms ranging from skin and lung irritation to vomiting.ⁱⁱⁱ

Then at about 7:13 p.m. a dump truck bearing a 200 gallon tank of chlorine gas was detonated about three mile south of Fallujah in the Abu Issa tribal district. The attack targeted the reception center of one of the Abu Issa tribal sheiks who had recently denounced al Qaeda. Some 250 residents were affected with chlorine exposure in this incident, including at least seven children, however no deaths were reported.

In each case the devices were a simple combination of improvised explosive devices detonated beside cylinders of compressed liquid “free” chlorine. (“Free” in that it was pure chlorine which had not reacted with anything to form chloramine compounds.) Free chlorine is a gas at normal atmospheric pressure and temperatures. It is used in a variety of industries, but most commonly in water purification and sewage treatment. Compressed to a liquid, much like propane or liquefied natural gas, it is used at literally thousands of small water treatment facilities worldwide. Injected into drinking water in small quantities, chlorine kills bacteria, making the water potable. However, released into the atmosphere free chlorine is a heavier than air gas and choking agent. In concentrations of 1-3 parts per million (ppm) it is an irritant to eyes, nose, throat and lungs and possibly skin, particularly if there are open wounds or abrasions. In concentrations of as little as 15 ppm it begins to do damage to lung tissue, causing respiration to be difficult. At still higher concentrations, estimated to begin at 430 ppm, it will be fatal in 30 minutes or less. (Factors are, of course, variable based on age, physical condition and pre-existing illness.)^{iv}

Chlorine gas was first used by the Germans in World War I, and used quite effectively. Thousands reportedly died in the trenches from asphyxiation by the gas. But the conditions were right for it to be so effective in that case. In WWI armies were dug in, living in trenches along battle lines. Chlorine, being heavier than air, naturally settled into the trenches. Though no doubt the soldiers could readily detect the “mustard gas,” they couldn’t leave the trenches without risking being gunned down. For the Germans there was a downside. They had to be judicious about use of the gas, as a shift of wind might blow the deadly fog back into their own trenches. Nonetheless, it worked quite well, leading to various treaties banning the use of such weapons over the years.

But absent confinement in a low lying area, a building, or other confined space, the chlorine will dissipate, blown by the wind, ultimately reacting with any moist material and hence losing its potency. (Consequently, covering ones face, including the eyes, with a moist cloth is an effective way of minimizing the effects of free chlorine.)

In the March 16th attacks the intent of the jihadis was clear: to stage an attack resulting in massive casualties by unleashing the deadly free chlorine in large quantities. Given this objective, the attacks were an abysmal failure. Taking into account the largest variation in number of reported killed, the attacks at best killed eight. And though there were reportedly some 350 injured by chlorine exposure, whether any significant portion of those were permanent injuries is an unanswered question. Either way, the attacks clearly did not cause the massive casualties they were evidently designed to inflict. Further, each attack required a vehicle borne IED, complete with suicide driver. For the jihadis of Zarqawi the number of deaths inflicted were paltry compared with the typical body count resulting from a VBIED attack on an occupied building, or a suicide bomber on foot carrying a device into some assembly or meeting.

So why were these attacks unable to achieve the objective? First, the objective in a ICDD attack is to envelope a large crowd in the chemical and thereby injure or kill them. Because the dispersal is through the air, the objective of enveloping a crowd almost certainly means in an open air environment. This leads to all sorts of complications including consideration of wind, heat, weight of the chemical when disbursed in air, and relative elevation of the target crowd in relation to the surrounding area.

Another factor that may have limited their success is the thermal effect of the IED used to disperse the chlorine. Experts theorize that the thermal effect of the bombs in these attacks neutralized much of the chlorine, making the devices far less effective than if the chlorine had been dispersed by other means, such as by simply opening a valve.

It's worth noting that following the attacks of March 16, 2007 there were only two more attacks utilizing dispersal of chlorine in Iraq. Both resulted in many more deaths than the events of March 16, but again, there is no evidence that the deaths were from the chlorine versus the explosion itself.

The reasons why this tactic was abandoned are not clear, and may be multiple. The security forces did increase security on shipments of chlorine to water facilities in Iraq, which may have contributed. Though there's no record I have found to indicate a shift in process, the fact is that there are alternatives to use of free chlorine in purifying water, alternatives that do not include such a readily hazardous material. But it seems likely that the reason why this tactic was abandoned was because it wasn't giving the jihadis the results that they wanted. The objective was to inflict mass casualties, and it just wasn't happening. Making a few hundred people temporarily sick was not nearly as intimidating as killing half that many. That, in my view, is why this tactic has faded from the theater.

So where are we today, some four years hence? Do we have no worries of chemical attack? Do we no longer have to be concerned about improvised WMD of a chemical nature? Unfortunately this is not the case. First, one has to consider the desires of the jihadis. They WANT to inflict damage on the scale of a weapon of mass destruction on us. The question for them is how best to do so. As a matter of science, the chemical attack is still the best solution. Despite its limitations, it is still a more easily achieved improvised WMD than a biological, radiological or nuclear device. The reasons? Biologics would require the ability to grow virulent strains of something, and then have a means to disseminate them over wide areas. The concept of spraying biologic agents from crop dusters is impractical, as most would not survive the pressure and impact involved in the spraying process. As for the “dirty bomb,” gathering enough radiological material is a challenge. Moreover, the detonation of a dirty bomb would affect only one area, and, like the ICDD, it would be subject to atmospheric conditions at the time of detonation (i.e. wind, heat, thermal rise, etc.) which would affect the efficiency of the strike. Then, of course, there is the possibility of a nuclear attack from some non - state operator. At the moment this seems very unlikely. Even if a nuclear device were stolen, it is unlikely that a rogue organization could make it function as a fission or fusion device. The more likely result would be the dispersal of the nuclear material by the explosives contained in the device. The dispersed nuclear material would be a mess to clean up, but the likelihood of it amounting to a WMD in terms of human loss is minimal.

To be sure we need to keep a close eye on the threat of the improvised WMD, and in particular the ICDD. But such devices are limited. Absent a theatre wherein persons are caught in a closed environment the device is likely to lose efficacy due to environmental conditions. And while various jihadi publications give instruction on building devices that would be effective to small groups in enclosed environments, such as a single room or train car, that’s not the big score of thousands dead that the jihadis seek. So for the time being it appears the ICDD that is truly a WMD remains out of reach.

ⁱ Roggio, Bill, The Long War Journal; Al Qaeda’s Chlorine Attacks: The Dirty War in Anbar, March 17, 2007

ⁱⁱ Associated Press, Insurgent Chlorine Attacks Injure 350 Iraqi Sunnis: GI Killed in Baqouba; March 16, 2007.

ⁱⁱⁱ Frayer, Lauren, Al Qaeda Blamed for Chlorine Bombs, Associated Press, March 18, 2007.

^{iv} Jones, Robert, MD; Wills Brandon, DO; Kang, Christopher, MD; Chlorine Gas: An Evolving Hazardous Material Threat and Unconventional Weapon; Western Journal of Emergency Medicine, Volume XI, No. 2: May 2010.