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NON-STATE ACTORS AND CHEMICAL WEAPONS THREAT LEVEL IN MIDDLE EAST AND NORTH AFRICA

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Started initially as riot movements focused mainly on inflicting governmental changes, the Arab revolutions rapidly degenerated into ethnic and sectarian conflicts affecting thousands of people and generating the biggest humanitarian crises after the World War II. The incapacity of national governments to manage the crises led to the rise and development of powerful radical Islamic groups all seeking to seize the political power and as many territories as possible. Extended over the large areas of the Middle East and North Africa, some of these Islamic radical groups became a real WMD threat by their capabilities to develop and employ chemical weapons in their military and terrorist actions. This article seeks to determine the chemical threat level posed by these radicalised jihadi groups.

Keywords: Islamic State, Ansar al-Islam, chemical threat level, chemical attacks.

Introduction

As of December 2010, the Middle East and North Africa were focused on continuing social and political transformations. The so-called *"Arab Spring"* led not only to the overthrowing of authoritarian governments from Libya and Egypt, but it also initiated some extremely bloody internal conflicts in countries such as Syria and Iraq. These social conflicts and riots, although, in the long term, they can lead to significant political changes and the establishment of democratic political systems, in the short term, it seems that all the countries from the geographical area under review will have to deal with certain highly volatile and unstable political and security situations.

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This article analyses the chemical threat level created by the post-transitional instability that was generated by the *"Arab Spring"* and the way it affects the chemical weapons (CWs) non-proliferation regime in the subject regions. The analyses focus in particular on the jihadi groups diasporas, who have concerns related to the development and use of chemical weapons in order to achieve political and military goals. Some of the states from the Middle East and North Africa have developed chemical weapons programmes. Despite the synergic efforts of the Organisation for the Prohibition of Chemical Weapons and United Nation Office of Disarmament Affairs, the level of expertise regarding the synthesis of chemical weapons is still present in the area and many of the existing experts, for various reasons (economic, political views, ideology, personal frustrations, personal security and family threat, etc.), have chosen to associate themselves with various jihadi groups and develop different chemical and biological weapons programmes for them. As such, taking into consideration the effects of the *"Arab Spring"* in the area, the article evaluates the chemical weapons capabilities of various jihadi groups that are active in the area of interest. The results of the evaluation are further used to determine the chemical weapons threat level and its associated risks and consequences.

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Short history of chemical weapon programmes developed by various countries from the Middle East and North Africa

After the World War I, chemical weapons became a permanent concern for the developed countries and it was believed that only adequate economic development can support such a weapon programme. Between 1960 and 1970, the non-conventional weapons gradually became part of the arsenal of developing countries. In that period, the military doctrines considered that unconventional weapons can counter the technological military superiority of the economic developed states and influence the regional politico-military power balance between the countries of different regions. As such, Middle Eastern and North African countries such as Libya, Egypt, Syria and Iraq initiated various armament programmes among which the non-conventional weapons systems occupied a central place. For the purpose of this article, I will briefly present the characteristics of the non-conventional weapon programmes of the 4 countries of interest.

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Libya began its chemical and biological weapons programme in the 1980s under the rule of totalitarian leader Muammar Qaddafi. Two politico-military factors can be considered primordial in starting such a programme. The first element considered by Colonel Qaddafi was the one to compensate the military inferiority of Libya in relation to its neighbours, particularly Egypt and Israel. The second element was the regional arms race and the danger posed by Syria and Iraq which were very close to acquiring unconventional weapons. Furthermore, in this political-military context, Qaddafi's calculations proved that a successful chemical weapons programme would grant him and his totalitarian regime immunity from any attempts to overthrow them.

In the 1980s, the Qaddafi regime built 3 chemical weapons production facilities[1]. The first facility was built at Rabta, near Tripoli, under the name of *Pharma-150* and had an estimated production capacity for nerve or vesicant chemical warfare agents (CWAs) of around 4.5 tons per day[2]. Libya also built two other facilities[3], heavily

[1] *Country Profile, Nuclear Threat Initiative*, http://www.nti.org/country- profiles/libya/.
[2] Joshua Sinai, *"Libya's Pursuit of Weapons of Mass Destruction"*, in *Nonproliferation Review*, Spring-Summer 1997, http://cns.miis.edu/npr/pdfs/sinai43.pdf.
[3] *Ibid*.

fortified against any air attack. Once with the production of chemical warfare agents, Libya began the development of chemical weapon delivery systems and made a special effort to produce ballistic missiles[4]. In 1993, Egypt, Libya and few other Arab countries announced that they would not sign the Chemical Weapons Convention (CWC) if Israel did not abandon its nuclear weapons programme. In 2003, following a secret agreement with the United Kingdom that aimed to normalise Libya's relations with the international community, Libya allowed one US-British team to inspect its non-conventional weapons production facilities[5]. As a result of this inspection, in December 2003, Libya announced its decision to forego its unconventional arms programmes and its intention to adhere to all weapons of mass destruction non-proliferation treaties[6]. In 2004, Libya sent a partial declaration to the Organization for the Prohibition of Chemical Weapons (OPCW)[7] in which it declared the possession of 3,500 bombs intended to be loaded with various chemical warfare agents and of 24.7 tons of neat sulphur mustard and 1,390 tons of chemical warfare agent precursors[8]. The Organization for the Prohibition of Chemical Weapons started systematic inspections activities over Libya's declaration. The OPCW inspections showed that the declared arsenal was overestimated and it lay under major degradation.

Syria's interest in unconventional weapons began in the 1970s and there are evidences that, prior to the 1973 Yom Kippur war, Egypt helped Syria by initiating programmes for the development of various offensive Chemical, Biological, Radiological and Nuclear (CBRN) capabilities[9]. At the beginning of its non-conventional weapons programme, Syria acquired CBRN capabilities from other countries, but in the early '80s it began developing these capabilities in its own production complexes. Syria's chemical weapons programme was motivated by its attempts to balance the security equation in the area and to create an advantage

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[4] *Country Profile, Nuclear Threat Initiative*, http://www.nti.org/country- profiles/libya/.
[5] *Ibid*.
[6] Arms Control Association, *"Chronology of Libya's Disarmament and Relations with the United States"*, http://www.armscontrol.org/factsheets/ LibyaChronology.
[7] *Ibid*.
[8] Organisation for the Prohibition of Chemical Weapons, *"OPCW Inspectors Return to Libya"*, http://www.opcw.org/the-opcw-and-libya/opcw- inspectors-return-to-libya/.
[9] *Country Profile, Nuclear Threat Initiative*, http://www.nti.org/country- profiles/syria/.

over Israel's conventional military superiority. Furthermore, in order to hinder Israel's air superiority, Hafez al-Assad's political regime decided to develop ballistic capabilities that could hit Israeli territory with chemical or biological warheads[10].

As a result of internal and external pressures, in 2013, Syria signed the Chemical Weapons Convention and, by mid-2014[11], with the support of the international community, transferred its entire chemical arsenal abroad for destruction. Between 7 July 2014 and mid-august of the same year, the United States totally destroyed 600 tons of nerve and vesicant chemical warfare agent precursors that belonged to Syria's arsenal. The destruction was for the first time carried out on a special ship (Cape Ray) that sailed in the international waters during the entire process[12]. The neutralisation of chemical warfare agents was carried out by a hydrolytic chemical process produced in a special mobile installation and the reaction mass was later destroyed by incineration on shore. This method fully protected the environment and no harm was done to ocean water or terrestrial areas of transfer and incineration. Other 200 tons of various precursors were sent for destruction in the United Kingdom[13].

Iraq started to develop chemical weapon programmes in the early '60s. During the Iran-Iraq war, the latter widely used tabun, sulphur mustard and sarin against both the Iran armed forces and its own Kurdish populations. Iraq's chemical weapons programme was ended as a result of the implementation of United Nations Security Council Resolution 687 issued after the first Persian Gulf War.

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[10] *Ibid*.

[11] *"Syria Chemical Weapons Facilities 'Destroyed'"*, Al-Jazeera, 1 November 2013; Organisation for the Prohibition of Chemical Weapons, Announcement to Media on Last Consignment of Chemicals Leaving Syria, OPCW News, 23 June 2014, www.opcw.org.

[12] David Alexander, *"U.S. Ship Finishes Neutralising Syria's Worst Chemical Arms: Pentagon"*, Reuters, 18 August 2014, www.reuters.com; Jim Garamone, *"Cape Ray Begins Neutralizing Syrian Chemical Materials"*, DoD News (Washington), 7 July 2014, www.defense.gov.

[13] *"UK to Destroy More Syria Chemical Weapons"*, Al-Jazeera, 9 July 2014, www.aljazeera.com.

synthesis[14]. The UNASCOM confirmed the destruction of 88,000 chemical munitions, over 690 tons of CWAs in weapons or loaded in different storage systems, approximately 4,000 tons of CWAs precursors and 980 pieces of essential equipment intended for the production of chemical weapons[15]. Although Iraq signed the CWC in 2007, the security situation allowed only the partial fulfilment of the OPCW inspection teams mandates aimed to check the complete destruction of Iraq chemical weapons programme and its entire chemical arsenal. An investigation done by C.J. Chivers of the New York Times revealed that the neutralisation and destruction of Iraqi chemical weapons did not have the expected effect. After the 2003 war, in Iraq, there were recovered about 5,000 chemical munitions of various types (warheads, artillery shells and air bombs)[16]. Although these munitions were produced before 1991, they represent a real chemical threat that resulted in the contamination of at least 17 American soldiers and 7 Iraqi police officers[17]. An investigation done by Chivers and Eric Schmitt revealed CIA's[18] effort to recover the chemical weapons placed on the weapons black markets in Iraq. As a result of the operation, over 400 Borak missiles were recovered (bought) and destroyed, many of them containing sarin[19]. The civil war began in Syria caused concern regarding the legacy of Iraqi's chemical weapons programme. In July 2007, the Islamic State conquered one of Iraq's former chemical weapons production facilities that belonged to its chemical weapons programme. The representatives of the United States of America believe that this production facility still contains what was left from the Iraqi chemical arsenal[20]. The latest UN report regarding the unconventional weapons programme of Saddam Hussein's regime stipulates that this facility contains 2,500 chemical rockets of 122 mm calibre loaded with sarin,

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[14] Thirteenth quarterly report on the activities of the United Nations Monitoring, Verification and Inspection Commission in accordance with paragraph 12 of Security Council resolution 1284, S/2003/580, 30 May 2003, United Nations Security Council, p. 40.

[15] UN Security Council Document S/1999/356, Annex 1 para 19.

[16] C.J. Chivers, *"The Secret Casualties of Iraq's Abandoned Chemical Weapons"*, in *New York Times*, 14 October 2014, www.nytimes.com.

[17] *Ibid*.

[18] Operation Avarice.

[19] C.J. Chivers and Eric Schmitt, *"C.I.A. Is Said to Have Bought and Destroyed Iraqi Chemical Weapons"*, *New York Times*, 15 February 2015, www.nytimes.com.

[20] *Ibid*.

180 tons of sodium cyanide and numerous artillery shells containing residues of sulphur mustard[21]. However, these items are manufactured in 1980 and it is unlikely that they can be used for military purposes.

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Jihadi groups and their concerns for the development and use of chemical weapons

Islamic State and chemical weapons

Less than one year ago, the Central Command of the United States Army announced that one of the Islamic State (IS) experts in weapons of mass destruction was killed following an air strike over some IS targets in Mosul, Iraq. Iraqi engineer Mahmoud al-Sabawi[22] was part of the expert team who worked on former Iraqi President Saddam Hussein chemical weapons programme. After the 2003 invasion of Iraq by the US troops, Al-Sabawi, as many other Iraqi soldiers, joined the Islamist group al-Qaeda in Iraq. Before being killed, al-Sabawi, also known as Abu Malik, was coordinating one of the Islamic State programmes

[21] Julian E. Barnes, *"Sunni Extremists in Iraq Occupy Hussein's Chemical Weapons Facility"*, in *The Wall Street Journal*, Washington, 19 June 2014, http://online.wsj.com.

[22] Salih Jasim Muhammad Falah al-Sabawi was part of the team of chemical experts who set up the al-Muthana factory which produced mustard gas and sarin.

designed to create some specific military capabilities by which the Islamic State would be able to employ offensive chemical weapons. This information caused concern among American military analysts because it confirmed other information related to the attempts of Islamic State to purchase or smuggle any kind of weapons of mass destruction. Furthermore, the intelligence sources from Syria and Iraq engaged in the war against the Islamic State could not specify exactly neither what role this expert played nor how advanced the IS chemical weapon programme was. An official of the United States Army Intelligence Service stated for *The Daily Beast* that *"He was gathering a lot of equipment—we're not really sure for what—before we killed him, but it's concerning that someone who was fairly seriously high up in the [chemical weapons] infrastructure linked up with [ISIS]. This wasn't some enlisted guy"*[23]. This information not only cast a new light on the Islamic State's concerns of production and usage of chemical weapons, but reopened the old humanity wound that was caused by the genocide of the Kurds in Halabja in the late 80's[24]. The capacity of Islamic State to produce chemical weapons was seen by military analysts as a nightmare scenario. However, this scenario appeared to be confirmed as early as the summer of 2014 when radical Sunni militants captured the al-Muthanna chemical weapons complex. After the takeover of the complex, the Iraqi Government informed the United States that in al-Muthana complex laid an important stock of chemical munitions belonging to Sadddam Hussein's chemical weapons programme[25]. Although the stock remained in the al-Muthanna chemical weapons complex is evaluated by UNSCOM's experts[26] as deprecated and highly

Although the stock remained in the al-Muthanna chemical weapons complex is evaluated by UNSCOM's experts as deprecated and highly deteriorated, the interests of the Islamic State for it demonstrates that, if they get the chemical weapons offensive capabilities, they will not hesitate to use them over those who are not subject to the authority of the new caliphate.

[23] Noah Shachtman, *"ISIS Chemical Weapons Specialist Was 'Gathering Equipment' Before He Was Killed"*, in *The Daily Beast*, 30 January 2015.

[24] In the evening of 16 May 1988, Iraqi troops conducted a chemical attack using sarin and mustard gas against the ethnic Kurds from Halabja. The air strike (14 sorties using each 8 fighters MIG and Miraj, coordinated from helicopters) takes almost 5 hours and was preceded by a line of indiscriminate attacks using conventional and incendiary weapons (napalm). The attack produced between 3,200 and 5,000 dead and 7,000-10,000 wounded. It was planned and conducted as part of Al-Anfal military campaign in North of Iraq and had as main objective the rejection of Iranian offensive (Zafar 7 Operation).

[25] Julian E. Barnes, *"Sunni Extremist in Iraq Occupy Hussein's Chemical Weapons Facility. Officials Don't Believe the Militants Will Be Able to Create a Functional Weapon From the Material"*, in *The Wall Street Journal*, 19 June 2014.

[26] United Nation Special Commission.

deteriorated[27], the interests of the Islamic State for it demonstrates that, if they get the chemical weapons offensive capabilities, they will not hesitate to use them over those who are not subject to the authority of the new caliphate.

The interest of the Islamic State in developing a chemical weapons programme dates back to the beginnings of its existence. Abu Musab al-Zarqawi, the Jordanian terrorist who founded the group in 1999[28] and gained his military experience in Afghanistan, was constantly interested in not only in purchasing the chemical weapons but also in how to use various poisons in terrorist actions. Zarqawi was born in 1967, in Jordan, and up to the moment when he established the aforementioned terrorist group, he was involved in several terrorist plots and spent several years in prison. He also has travelled twice in Afghanistan to join the Afghan Jihad. In 2000, during his second term in Afghanistan, he arranged a deal with Osama bin Laden, which allowed him to establish a terrorist training camp in the eastern of Afghan city of Herat. The camp was dedicated to the training of extremists from Jordan and, in accordance with the understanding, they would act on their own account and were not affiliated to al-Qaeda. At that time, Zarqawi's terrorist organisation started its research on using poisons and chemical weapons in its operations. After the American decision to participate with troops in Afghanistan, in October 2001, Zarqawi has joined for a while the mujaheddin who fought against US troops, then he abandoned the fight and withdrew in Iran and later in Iraq. Here, he reportedly engaged himself in a collaborative relationship with Iraqi Kurdish extremist group Ansar al-Islam, founded in 2001. At that time, Ansar al-Islam group controlled a small semi-autonomous region in Iraqi Kurdistan, near the Iranian border.

As in the case of Zarqawi, Ansar al-Islam was supported by al-Qaeda but the group maintained its independence from it. This group was also very interested in developing chemical weapons or poisons which would be subsequently used in terrorist attacks.

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[27] Iraqi Govern appreciated that in complex remained around 2500 chemical missile.

[28] What we call today Islamic State was established in 1999 by Abu Musab al-Zarqawi under the name of Jamaat al-Tahwid wa-i-Jihad (JTWJ). The initial goal was to change the political regime in Jordan although its leader gained jihadi experience in Afghanistan where he met Osama Bin Laden.

By the end of 2002 and the beginning of 2003, Ansar al-Islam's terrorist activities and increased interest thereof for the manufacture of chemical weapons[29] led to a disagreement between President George W. Bush's advisers regarding planning of some attacks over the Group's camps in northern Iraq[30]. The Department of Defense, through the voice of the Chairman of the Joint Chiefs of Staff, not only endorsed this action, but also made the military plan for the neutralisation of the terrorist camp. President Bush, fearing that the plans for ousting Saddam Hussein from power would be thus compromised, declined this option. In the end, this operation was implemented due to strong opposition from the Department of State. In March 2003, when US troops raided the Ansar al-Islam camp facilities, they found laboratories in which the group tried to manufacture different toxic chemicals and poisons.

In this context, and taking advantage of its experience in Afghanistan, Zarqawi advanced in his terrorist career. In 2004, he was promoted leader of the al-Qaeda Branch in Iraq. From this leadership position and taking advantage of al-Qaeda resources, Zarqawi continued his chemical weapons programme focusing mainly on the creation of a network of chemical weapons specialists that would also include access to former Saddam Hussein's engineers. This type of network-based warfare was financed from several sources, including hostage taking, taxes collection, businesses vandalising, looting materials from former factories belonging to Saddam Hussein, weapons trafficking and taxation of land from controlled areas. Al-Qaeda's chemical weapons programme in Iraq was further confirmed by al-Hashimi Hisham, ISIS analyst (Islamic States in Iraq and Syria)[31] and security adviser to Iraqi National Office, who declared: *"Zarqawi assigned Abu Mohammed al-Lubnani*[32] *and an engineer called Ammar al-Ani to handle the chemical weapons profile. Special development units were built on farms … to the north of Baghdad. However, all the development experiments failed due to difficulties in acquiring basic*

Al-Qaeda's chemical weapons programme in Iraq was further confirmed by al-Hashimi Hisham, ISIS analyst (Islamic States in Iraq and Syria) and security adviser to Iraqi National Office, who declared: "Zarqawi assigned Abu Mohammed al-Lubnani and an engineer called Ammar al-Ani to handle the chemical weapons profile. Special development units were built on farms … to the north of Baghdad. However, all the development experiments failed due to difficulties in acquiring basic manufacturing materials or local replacements.

[29] Ansar al-Islam tried to manufacture in Khurmal camp (North-East Iraq) sulphuric acid, ricin and some other toxic chemicals that later would be used in terrorist attacks in Europe and United States.

[30] Micah Zenco, *"Foregoing Limited Force. The George W. Bush Administration's Decision Not to Attack Ansar Al-Islam"*, in *Journal of Strategic Studies*, August 2009.

[31] Previous name of Islamic State.

[32] Zarqawi's deputy.

manufacturing materials or local replacements. They were also unable to control the strength of the explosion once the chemicals or poisonous stuff burned or melted".

Although these experiments were doomed to failure, the fact that the chemical weapons proliferation activities led by Zarqawi were not limited to the territory of Iraq was worrying. US military officials made public the fact that Zarqawi also trained other jihadi groups in the use of toxic chemicals as ricin. Thanks to that training, the terrorists would be able to carry out attacks in Europe or other countries of interest. Thus, on 26 April 2006, the Jordanian authorities announced the dismantling of an al-Qaeda plot to use chemical weapons in Amman. The objectives of this terrorist attack were the US Embassy in Amman, the Jordanian Prime Minister's Office and the headquarters of the Jordanian Intelligence Service. Following a night raid at a terrorist cell in Amman, the Jordanian Special Forces seized 20 tons of chemicals, including sulphuric acid and very much explosive[33]. The intention to use sulfuric acid is not very clear because it can be used both as a vesicant chemical warfare agent and, in combat, in most of the cases, as an enhancer for conventional explosives. The planning officer within the terrorist cell that was to execute the operation, Al Jayyousi, said later that he received direct orders from Abu Musab al-Zarqawi. Moreover, during the interrogatory, he said: *"I took explosives courses, poisons high level, then I pledged allegiance to Abu Musab al-Zarqawi, to obey him without any questioning"*[34].

In 2006, after the killing of al-Zarqawi in an air raid, his successors, Abu Ayoub al-Masri and Abu Omar al-Baghdadi, continued the chemical warfare agent project initiated by al-Qaeda in Iraq. Al-Masri and al-Baghdadi set up, in October 2006, the Islamic State of Iraq. Coincidentally, exactly in the same month, a series of attacks with chlorine took place over various targets on the territory of Iraq.

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- In October 2006, a car bomb that carried two chlorine tanks of 100 litres was detonated in Ramadi, wounding four Iraqis[35].

[33] John Vause, Henry Schuster and David Ensor, *"Jordan Says Major al-Qaeda Plot Disrupted"*, *CNN International.com*, 26 April 2004.

[34] *Ibid*.

[35] Peter Bergen (CNN National Security Analyst), *"Al Qaeda's Track Record with Chemical Weapons"*, *CNN iReport*, 7 May 2013.

- In January 2007, a suicide attacker detonated a chlorine tanker. The explosion killed 16 people but did not lead to the dissemination of chlorine[36].
- On 20 February 2007, a chlorine attack took place in Baghdad. The attack killed 5 and contaminated 140. Just one day later, a similar attack took place in Taji, killing 9 people and contaminating 150. In that same day, the Iraqi Government forces discovered two chlorine factories in Fallujah and Karma[37].
- In February 2007, a bomb hit a chlorine tanker in the North of Baghdad, killing 9 people and intoxicating other 148. A few hours later, a pickup truck loaded with chlorine cylinders exploded, killing 1 man and sending over 50 in hospital. All 50 hospitalised victims were showing the symptoms characteristic for contamination with chlorine.
- On 16 March 2007, al-Qaeda in Iraq planned and executed three suicide attacks using chlorine tanks. Detonated over different targets[38] from the cities of Ramadi, Fallujah, and Amiriya, the explosions killed two policemen and contaminated more than 350 people[39].
- Also in March 2007, a truck loaded with chlorine was detonated in southern Fallujah. The result of the attack: 6 dead and 250 wounded or infected persons. Few days later, a suicide attack was simultaneously executed with two trucks, one of which was loaded with chlorine. The explosion killed 14 American servicemen and injured 57 Iraqi soldiers[40]. The purpose of this attack appears to be the retaliation against the Anbar Salvation Council for its support against al-Qaeda in Iraq.

[36] Bill Roggio, *"Al-Qaeda's Chlorine Attacks the Dirty War in Anbar"*, in *The Long War Journal*, 17 March 2007.

[37] *Ibid*.

[38] The al-Qaeda type of attacks were conducted to one hour interval and had as main purpose the mass killing of Albu Issa tribe, a declared opponent of al-Qaeda and supporter of new Iraqi Government.

[39] Damien Cave and Ahmad Fadam, *"Iraqi Militants Use Chlorine in 3 Bombing"*, in *The New York Times*, 21 February 2007.

[40] Bill Roggio, *"Fallujah Government Center Struck by Chlorine Suicide Attack"*, in *The Long War Journal*, 28 March 2007.

- A month later, in April 2007, three chlorine tanks were detonated. Two in Ramadi (27 killed and 30 contaminated[41] in the first attack and 6 killed and 10 infected in the second[42]) and one in West Baghdad (1 dead and 2 injured).
- In May 2007, a chlorine bomb exploded in a village from Diyala province, killing 32 people and wounding 50.
- In June 2007, a car bomb exploded in Diyala. The gas used intoxicated at least 62 American soldiers[43].

Regarding the capacity of the Islamic State to produce chemical warfare agents, it can be said that although there are obvious concerns, IS failed to synthesise them. An important role in diminishing the IS's capacity to produce chemical weapons was played by the American air strikes. In 2008, the US Air Forces hit the Islamic State chemical factories situated in al-Tarmiya.

If we compare the number of the attacks and their achieved effects, we can draw the conclusion that they were badly planned and executed because much of the toxic chemicals were damaged by the heat produced by the explosives used to disseminate them. The attacks, although produced hundreds of victims, cannot be considered as a feasible way to cause massive casualties. Although probably this was not the main objective of the attacks, the main effect was generalised panic and an impressive number of civilians intoxicated with chlorine. The symptoms and the degree of intoxication of the victims revealed that the attacks produced a dose of contamination that could not be considered lethal. However, in high concentrations, chlorine can cause fatal lung damage. Although widely used in World War I, because of its physical and chemical properties, chlorine can no longer be considered effective enough to be used as an improvised chemical weapon. As a last resort, and in the view of the chemical attacks efficiency, we can say that the Islamic State experiments in the development and use of chemical weapon miserably failed. In the case of chlorine, if not used directly on an indoor target (in enclosed space), it cannot be considered as a lethal weapon like the ones in the category of modern chemical weapons.

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[41] Alissa J. Rubin, *"Chlorine Gas Attack by Truck Bomber Kills Up to 30 in Iraq"*, in *The New York Times,* 7 April 2007.

[42] Bradley Hope, *"Police on Alert as Chlorine Hits Iraq"*, in *The Sun*, 1 May 2007.

[43] Jim Garamone (American Forces Press Service), *"Terrorists Using Chlorine Car Bombs to Intimidate Iraqis"*, in *DoD News*, 6 June 2007.

strikes. In 2008, the US Air Forces hit the Islamic State chemical factories situated in al-Tarmiya. According to al-Hashimi[44], in the attack there was also killed Abu Gazwan al-Hayali, the engineer who supervised and protected the engineers and specialists employed there. The American troops did not found any clue that the factory would produce chemical warfare agents or dissemination systems.

In 2010, US and Iraqi forces killed Zarqawi's two successors. This event paved a new way for Abu Bakr al-Baghdadi in rebuilding and expanding his jihadi organisation. In 2011, immediately after the outbreak of the revolution in Syria, al-Baghdadi gradually expanded the scope and influence of his organisation. In the same year, al-Baghdadi renamed the organisation as the Islamic State of Syria and Iraq.

In 2014, taking advantage of the political and social destabilisation of Iraq and Syria and the divergent geopolitical interests of Arab States in the region, the Islamic State captured Mosul. By continuing its successful military operations, the Islamic State was able to capture important regions in Northern and Western Iraq. At the same time, it extended its control over key areas in northern Baghdad, where there were former production facilities or chemical laboratories part of Saddam Hussein's chemical weapons programme. Fortunately, these facilities were completely destroyed by UNSCOM inspectors[45].

Once with the intensification of the US led coalition aerial attacks, the Islamic State lost strategic initiative. After August 2014, the Islamic State lost military initiative in Iraq as well. The Islamic State military operations were almost stopped by both coalition air strikes and ground forces. The fact that the ground forces engaged in the fight against Islamic States are both regular and military forces and various militias that belong to the various ethnic groups settled in the area is noteworthy. After October 2014, the Islamic State was constantly defeated on all fronts from Syria and Iraq. This new military posture of the Islamic State may explain why it reconsidered its military options including the chemical warfare strategy. Much more, the last events in the Middle East show that the Islamic State ambitions for the purchase or production of chemical weapons have revived.

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[44] Hisham al-Hashimi, analyst specialised in Islamic Stat that works for Iraqi Office for National Security.

[45] See *"Second Report of the Executive Chairman of UNSCOM"*, S/23268, 4 December 1991.

At the end of January 2015, a chemical incident took place in one of the Islamic State's factories from Mosul where the chlorine bombs were manufactured. According to a blogger from Mosul, Maouris Milton, *"The Islamic State members informed nearby residents about the incident and advised them to shut the doors and windows. The Islamic State members stated that was a gas leak caused by an air strike. But there were no air strikes ... the area's residents were panicked"*.

A few days later, on 29 January 2015, Islamic State fighters were seen trying to extract some chemical substances and poisons from the chemical waste carefully buried by UN experts in Tikrit. According to Hisham al-Hashimi, the Iraqi National Security Office's analyst specialised in matters of the Islamic State of Iraq, the concrete structure of the toxic waste was an impenetrable obstacle for the Islamic State fighters, resisting to numerous attempts to destroy it with explosives.

For the time being, the chief specialist of the Islamic State is an Egyptian engineer with a Masters in chemistry obtained from Cairo University. According to the same analyst, al-Hashimi, it is believed that the Egyptian engineer is working in an agricultural area situated at South of Baghdad. His assistant was killed in a US air strike few weeks ago.

Ansar al-Islam

Ansar al-Islam is a radical jihadist insurgent group which operates in Iraq[46] and Syria[47]. The group was founded in 2001 on the territory of Iraqi Kurdistan and follows a salafi ideology that requires the strict application of Sharia law in the controlled areas surrounding the city of Biyara, and North-East of Halabja, near the border with Iran. After the invasion of Iraq in 2003, the group members became insurgents and fought against the United States forces and its Iraqi allies. After the withdrawal of American forces from Iraq, the group continued to fight the Iraqi Government. After the outbreak of civil war in Syria, Ansar al-Islam expanded its insurgent actions on the Syrian territory and also fought against Syrian forces loyal to President Bashar al-Asad. On 29 August 2014, through a statement signed by

[46] *"Ansar al-Islam"*, http://fas.org/irp/world/para/ansar.htm.

[47] Aymenn Jawad Al-Tamimi (11 May 2014), *"Key Updates on Iraq's Sunni Insurgent Groups"*, Brown Moses Blog, retrieved on 26 May 2014.

50 of its leaders, Ansar al-Islam ceased to exist and merged with the Islamic State[48]. Even though this statement may be considered the document through which the group ceased to exist, its elements who declined the junction with the Islamic State still operate as an independent jihadist group.

As the Ansar al-Islam group is developing as an independent entity, some issues have raised concerns regarding its military actions: interest in chemical weapons; possible connections with the totalitarian regime of Iraq led by Saddam Hussein and its ties with Iran.

In early 2003, more than 30 militants of the Ansar al-Islam group were captured and imprisoned in the Kurdish capital of Sulaymaniyah[49]. The *International Herald Tribune* noted that, as a result of the prisoners' interrogatory, critical information was revealed regarding the chemical warfare capabilities of the group[50]. Other data-related information obtained by intelligence services led to the conclusion that the Ansar al-Islam group developed and tested offensive chemical capability using ricin and cyanides[51]. The *Washington Post* also reported that, in the fall of 2001, Ansar al-Islam was able to procure and smuggle, chemical warfare agents of VX type through Turkey[52]. Barham Salih, the Prime Minister of the Patriotic Union of Kurdistan, said there were clear evidences concerning chemical tests carried out by Ansar al-Islam on animals[53]. Another Kurdish leader confirmed Salih's statement[54]. After General Powell's speech at the UN, on 5 February 2003, Ansar al-Islam allowed a small group of reporters to inspect the areas where it was believed that the group produced chemical weapons, specifically in Khurmal and Sargat. The group could not confirm or deny the development of chemical weapons on the ricin base[55].

As the Ansar al-Islam group is developing as an independent entity, some issues have raised concerns regarding its military actions: interest in chemical weapons; possible connections with the totalitarian regime of Iraq led by Saddam Hussein and its ties with Iran.

[48] "*IS Disciplines Some Emirs to Avoid Losing Base – Al-Monitor: The Pulse of the Middle East*", in *Al-Monitor*, *"Jihadist Group Swears Loyalty to Islamic State – Middle East – News – Arutz Sheva"*, in *Arutz Sheva*, retrieved on 7 November 2014.
[49] Jonathan Schanzer interview with Barham Salih, 10 January 2003.
[50] *The New York Times*, 6 February 2003.
[51] *Al-Hayat* (London), 22 August 2002; *Los Angeles Times*, 9 December 2002.
[52] Jonathan Schanzer interview with Barham Salih, 10 January 2003.
[53] *Ibid*.
[54] Jonathan Schanzer interview with PUK representative, Washington, D.C., March 2003.
[55] *Ibid*.

Chemical weapons threat level analysis in the Middle East and North Africa

Based on the information presented throughout the article, I will make a brief analysis of chemical warfare capabilities of the jihadi groups that operate in various regions of the Middle East and North Africa. The result of the analysis can reveal, with some scientific accuracy, the level of threat posed by the jihadist group over the studied areas. It also can give us a clear picture about how serious this threat is and how easily it can be transferred all over the world.

The opportunity for engaging chemical weapons is defined as that absolutely necessary condition of the enemy that must be fulfilled and which guarantees that the chemical weapon employed on a specific target becomes effective. Basically, the analysis will reflect a combination of factors synthesised in the trinomial when, where and how the jihadist groups may use chemical weapons.

In evaluating the jihadist chemical weapons capabilities, I will consider only the following elements: chemical weapons or toxic industrial materials *capabilities*, *opportunities* for employment of such capabilities, and *intention*. In this respect, by capability, one should understand as the capacity of jihadi groups use chemicals as method of warfare. This capacity is based on their ability to acquire, manufacture, deploy and use such kind of chemical warfare systems or to commit other various resources to this purpose. The analysis is based on the available information concerning: chemical hazards on the territory of the new Caliphate, available weapon systems, chemical warfare agents production and storage facilities, existing research and development facilities and the methods used for dissemination of the toxic agents or their transport to the target. In restrictive terms, the analysis will be designed by following a number of six (6) questions:

1. Who: characteristics of the jihadi groups that have the ability to use chemical weapons in their planned and carried out actions.

2. What: which are the toxic substances possible to be used?

3. When: the moments when chemical weapons or toxic industrial chemicals may be used.

4. Where: defines the type and location of potential targets.

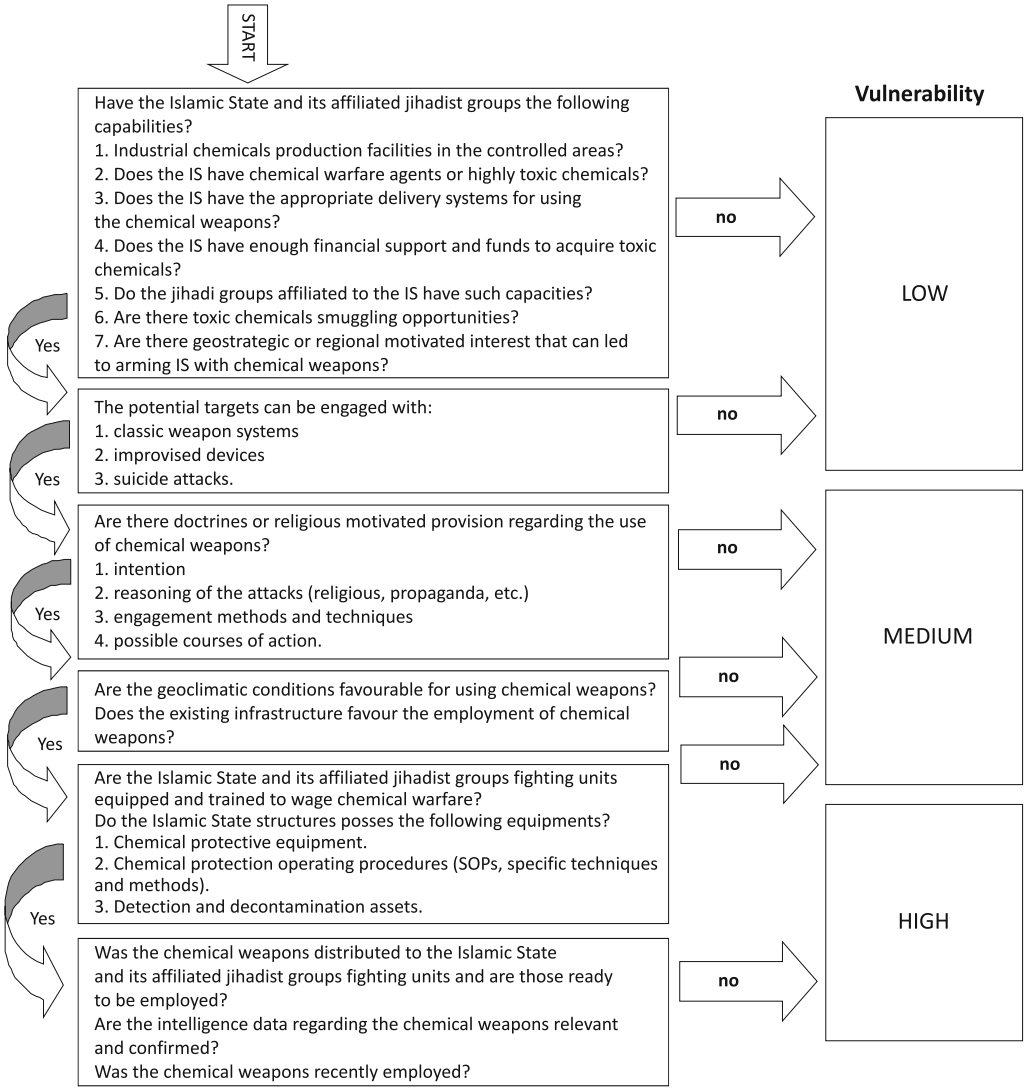
5. Why: which are the objectives and goals for which the chemical weapons may be employed?

6. How: concept of employment of chemical weapons and toxic chemicals.

For the purpose of this article, the *opportunity* for engaging chemical weapons is defined as that absolutely necessary condition of the enemy that must be fulfilled and which guarantees that the chemical weapon employed on a specific target becomes effective. Basically, the analysis will reflect a combination of factors synthesised in the trinomial *when*, *where* and *how* the jihadist groups may use chemical weapons.

The *intention* is represented not only by the goal and objectives of the jihadi groups for use of chemical weapon but also by their decisions concerning the selection of targets and methods used for striking them. For example, the intention may be to produce casualties, contamination, degradation of jihadi groups' opponents operational capacity, creating panic or merely the demonstration of the jihadi's capabilities of using chemical weapons, anywhere and anytime.

To determine the vulnerability, we used the following algorithm:



To determine the chemical weapons threat level posed by the jihadi groups' military operations, I used a threat level matrix model that I compiled from those used by various NATO member states and few other non-allied/neutral countries security systems. At the same time, the matrix presents the deductions revealed by the above presented facts and figures regarding the use of chemical weapons by the various jihadi groups in previous operations.

The presented deductions represent the foundation for the final conclusions.

Threat and vulnerability factors	**Conclusions resulting from the analysis of threat factors**	**Threat level**
Chemical capabilities	The Islamic State has no specific capacities to use of chemical weapons. However, it has under its control many former chemical weapons production facilities, as well as a fair developed chemical industry containing chemical plants and afferent laboratories and experts. IS does not have chemical ammunition, but controls areas where this weapons systems were destroyed and it may posses some deteriorated chemical weapons delivery systems that can serve the reverse engineering purposes. IS succeeded to create a credible infrastructure and expertise regarding chemical weapons. The Islamic State managed to create an infrastructure of expertise in chemical weapons. IS has professionals who have previously worked in the chemical weapons programme of Iraqi dictator Saddam Hussein, as well as many other chemical engineers and toxicologists educated in prestigious universities worldwide. Financial funds are sufficient for purchasing the basic materials used in chemical weapons synthesis, but the international verification regime of Chemical Weapons Convention drastically diminished their trade.	Medium

Threat and vulnerability factors	Conclusions resulting from the analysis of threat factors	Threat level
	Geopolitical interests are diverging, but there is no state in the area that supports the Islamic State chemical warfare intentions.	
Economic motivation	There is no economic justification for the use of chemical weapon. Those two states on whose territory the Islamic State established (and declared) the Caliphate are signatories of the Convention for the Prohibiting of Chemical Weapons.	Low
Politic and religious motivation	There is political and/or religious motivation that can stop the Islamic State to use chemical weapons. The IS's medium-term declared objective is to extend its territories that are already under its administration and impose Sharia law in its most radical form. Once the chemical weapons are purchased or produced by the IS, it is highly likely and possible that they are used against other ethnic-religious groups settled in the conflict areas. There is a strong religious justification for establishing, widening and strengthening the Caliphate, and all means can be indiscriminately used for this purpose. The Islamic State's fighters are exceptionally motivated religious. IS's fighters have genocide trends especially against other religious groups that do not endorse their political ideas.	High
History of chemical weapons usage	Chemical weapons were used before, but without the expected efficiency. The attacks were deficiently planned and coordinated and the offensive capabilities are either limited or unconventional. There is an increasing trend in the interest for chemical weapons or toxins.	Low
Intention	The intention was proved.	High

Threat and vulnerability factors	Conclusions resulting from the analysis of threat factors	Threat level
Security situation	The security forces in the area, with the intelligence and lethal support of the international coalition have blocked the production or acquisition of modern chemical weapons for the time being. The security forces are unable to control the illicit activities on the territory of the Caliphate. The security forces are unable to deter the Islamic State's chemical weapons programme.	High
Constrains	There are no constraints on the use of chemical weapon.	High
Conflict fluidity	The Islamic State's disputed or controlled areas are changing frequently, quickly and almost without warning. The disputed areas on the outskirts of the Caliphate were engulfed into an attrition type of conflict similar to World War I. The air strikes executed against Islamic State forces had limited success. There is no consistency or synergy of the coalition forces that fight against the Islamic State. Frequently there can be observed conflicts between various ethnic and religious groups that are engaged in the same military operation against the Islamic State.	Medium
Local population	The population from the conflict areas is terrorised by the atrocities committed by Islamic State's fighters. The humanitarian crisis in the occupied or disputed areas is extreme. The number of refugees exceeds the capacities of the destination countries. Various ethnic groups support only their own militia.	High
Group cohesion and leadership	There is information that reveals cohesion problems between the ethnic groups and fighting militias, on both sides. There are many power struggles or divergences regarding the ways to fulfil medium- and long-term objectives. The authority of the Caliph is not universally recognised.	Medium
CW readiness level	Almost non-existent.	Low

Threat and vulnerability factors	Conclusions resulting from the analysis of threat factors	Threat level
Deterrence actions	Precise, sporadic and uncoordinated. Air strikes have limited efficiency due to the lack of a consistent information system on the ground. Intelligence exchange among the coalition partners is limited.	Medium
Geopolitical interest in the region	Very divergent, but one may notice a sufficient cohesion regarding the Islamic State threat.	Medium
Crimes level	Jihadi groups have a high level of mobility and they can move undetected in the entire area of interest. The law enforcement troops, critical infrastructure targets and civilian population are under constant threat of jihadi groups. Radical jihadi gangs act with high violence. The number of members in one attack cell is more than 4. This staff structure gives to jihadi attack groups a tactical advantage. They can mutually support any type of actions even if they are independently planned and conducted.	Medium to high
Law enforcement actions	Police or security forces are ineffective in carrying out deterrence tasks. Their actions rarely catch the suspects and the responses to emergency calls are delayed by various administrative or legal factors.	High
Security forces training and readiness	The level of preparation is under international standards. Many of the members of such forces are corrupt, unqualified, irresponsible or collaborate with criminals for various reasons.	Medium
General security level	The general situation is characterised by insecurity but not a total lawlessness and impunity.	Medium to High
Intelligence regarding jihadi groups area of operations	Areas controlled by each jihadi group cannot be accurately identified and are extremely fluid and interrelated.	High

Conclusions

From the above analysis, it appears that the Islamic State's chemical weapons threat level is *Medium*. This threat level also applies to almost all IS affiliated groups. Once this radical jihadi structure is fully able to procure or develop a viable method for synthesis and dissemination of chemical warfare agents, it will undeniable use them. This scenario becomes even more predictable as the offensive operations of the Islamic State were slowed down and in some territories its forces were forced to conduct tactical retreats. The political and religious credibility, the territorial expansion and strengthening of the Caliph and Caliphate authority is closely linked to its military successes[56]. As a result, any military option that can guarantee success, including chemical weapon, is possible.

For the time being, the most recent development of chemical weapons by jihadi groups in Iraq and Syria was limited to chlorine attacks. Although those attacks prove that the groups has limited understanding of the techniques and methods required to make a chemical weapon effective, those attempts demonstrate a change in the IS (and its affiliates) approach that may, if developed and followed by jihadist operations outside the studied areas, open a new era in which the world will encounter an increasingly deadly chemicals terrorism producing mass casualties.

The failure of technique in Iraq and Syria may not be considered as a norm and more importantly it is not a failure of imagination. In the long term, it is unreasonable to believe that, if those techniques are improved and exported outside Iraq and Syria, the jihadi groups will not plan attacks against chemical infrastructure generating significant number of civilian casualties. Over even a longer term, it is difficult to anticipate how the coming together of radical ideology, increasing access to already widespread knowledge, acceptance of instrumentality of violence, and further empowerment of individuals will play out.

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