

## Chemical Challenges in Syria

On 7 April 2018, Syrian forces hit Douma, a town in the Eastern Ghouta region east of Damascus, with a toxic chemical agent presumed to be chlorine. More than 40 people are believed to have been killed, while scores more were exposed to the agent's deleterious effects. It is the third major chemical strike recorded in 2018. The incident exemplifies the challenges the international community in general, and the Organisation for the Prohibition of Chemical Weapons (OPCW) in particular, face. As events over the past year demonstrate, the world can unite in the condemnation of chemical warfare, but the attribution of responsibility for violation of international laws of war and the norm against the use of poison remains politically sensitive and subject to immediate geopolitical interests. The international split and resulting paralysis in organisations responsible for international peace and security and the prevention of chemical warfare enable the continuation of chemical attacks.

Besides investigating alleged use of chemical weapons (CW), OPCW operations in Syria have also included the elimination of the country's chemical warfare capabilities after accession to the Chemical Weapons Convention (CWC) in October 2013. These operations posed a particular challenge, as no CW destruction and onsite verification activities had ever been conducted in active war zones. The states parties to the CWC adapted operational procedures maintained by the Technical Secretariat of the OPCW. The Technical Secretariat had also already concluded memoranda of understanding with other international organisations, including the United Nations, in anticipation of eventualities such as those presented in Syria. They laid the foundation for collaboration in the field. The successful evacuation of chemical agents and their precursors undoubtedly prevented escalation of chemical warfare in the Syrian civil war, as is paradoxically testified by the resort to chlo-

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rine as an agent of choice. Indeed, despite 100 years of scientific and technological progress, the agent used in the first major chemical attack near Ypres, Belgium in April 1915, made its tragic comeback to the battlefield.

Also in 2013, the OPCW received the Nobel Peace Prize for its work in eliminating CW stockpiles worldwide and its contribution to the prevention of the re-emergence of CW. It thrust an anonymous organisation into the spotlight. Today, events in Syria overshadow the OPCW's successes: its membership is only second to that of the United Nations; it had verified the destruction of over 90,000 metric tonnes of chemical agents and associated delivery systems and infrastructure. It has also conducted special operations not just in Syria, but also in Libya. Today, public impressions could easily nurture a discourse of failure of the disarmament enterprise.

For this edition of *Trust & Verify*, VERTIC has invited four experts in CW disarmament to share their impressions of the achievements of the OPCW and the challenges the CWC currently faces with respect to the war in Syria. The authors – Ralf Trapp, Richard Guthrie, Jean Pascal Zanders and Alastair Hay – each address specific facets: weapon elimination, investigation of alleged use, the difficulties with attribution, and the outrage by industry and scientific associations about the misuse of chemistry. Yet their contributions find great commonality about the challenges the Syrian case poses to the norm against CW.

## **Ralf Trapp: On the disarmament of Syria's chemical weapons**

In 2012, when the Technical Secretariat of the OPCW first looked into the challenges it might face if called to 'go into Syria,' it could hardly imagine that it would be deployed into an active war zone to remove hundreds of tonnes of CW, and to destroy the associated manufacturing infrastructure.

This changed after the United Nations Secretary-General confirmed the sarin attack on Ghouta in August 2013. To

prevent punitive Western air strikes, Russia and the United States agreed on a framework for the elimination of Syrian CW. Synchronised with Syria's accession to the CWC on 14 September 2013, the OPCW Executive Council transferred this framework into a series of decisions that set out the order of destruction and the verification procedures for eliminating Syria's CW stockpile and its mobile and stationary production facilities. The Security Council sanctioned these decisions and established the UN-OPCW Joint Mission to supervise their implementation.

Within days, the OPCW deployed the first team of inspectors and verification experts to Damascus to make arrangements for the future removal and inspection work and to provide technical guidance to the Syrian authorities on the requirements for their disclosure of CW materials, equipment and facilities. This first mission was followed by regular team deployments supported by offices working out of Damascus and at times Latakia, as well as Beirut and Nicosia. While the footprint of these deployments was kept to a minimum, OPCW inspectors were able, within the extremely short timelines established, to verify the Syrian declaration and secure the declared facilities and materials. The teams were also able to render the declared production and mixing equipment unusable, supervise the in-country destruction of materials (isopropanol, mustard agent contaminations), and supervise the preparation and repackaging as necessary of the remaining chemicals for removal from Syria.

Beginning in January 2014, the Joint Mission supervised the transportation of 1,300 tonnes of declared chemical agents and key precursors across the conflict zone to the port of Latakia. There, chemicals were loaded onto two container ships (made available by Norway and Denmark) and transported to Germany, Finland, the United Kingdom, and the United States for disposal. Several hundred tonnes of the most dangerous chemicals—methylphosphonyl difluoride (DF), a sarin binary component, and mustard agent—were shipped to Italy for reloading onto US vessel Cape Ray, which had been fitted out as a destruction facility and completed their destruction at high sea by August 2014. The effluents of this

operation were subsequently destroyed in Germany.

The elimination of Syria's CW production facilities—both mobile and stationary, including some set up in tunnels and aircraft hangars—took place alongside these removal operations, albeit hampered by access limitations to some facilities given security constraints. The last two of these facilities were inspected by the OPCW in November 2017, and work towards their final destruction was underway in early 2018.

The Joint Mission closed down on 30 September 2014. The OPCW continued inspections to complete the elimination of the remaining CW production facilities, supported by the United Nations Office for Project Services (UNOPS). Its widely recognised success was made possible by the close collaborations of the OPCW and the UN in Syria and between their respective headquarters—both contributing their specific competencies and capacities in a complex undertaking in unchartered political, legal, security and technical territory. It also was possible thanks to financial and in-kind contributions by a large and diverse number of countries. However, it did not altogether stop the use of CW in the Syrian conflict, and neither did it resolve all the questions about the accuracy and completeness of the Syrian declaration.

New CW uses were reported beginning in spring 2014, leading to the establishment of the OPCW Fact-Finding Mission (FFM) and subsequently the UN-OPCW Joint Investigative Mechanism (JIM).

Moreover, concerns about gaps in the Syrian declaration led to the establishment of the Declaration Assistance Team (DAT) in April 2014. The DAT, set up initially by the Director-General in consultation with Syria and subsequently endorsed by the Executive Council, attempted to reconstruct the genesis of the Syrian CW programme. It assessed the data available from the Syrian declaration and subsequent submissions, from previous inspections, as well as information made available by states parties. The DAT deployed to Syria on numerous occasions to interview senior personnel involved

in the Syrian CW programme, visit sites of particular interest, including Syria's Scientific Studies and Research Centre (SSRC), and collect and analyse samples as physical evidence of agents and activities that Syria still needed to disclose. Its work resulted in the declaration by Syria of facilities and activities, including work with ricin. Its latest round of inspections of the SSRC facilities in Barzah and Jamarayah was conducted in November 2017, and samples then collected were sent to Designated Laboratories of the OPCW for analysis in February 2018.

## **Richard Guthrie: On investigating alleged use of CW in Syria**

In March 2013, when the first formal allegations were made regarding the use of chemical weapons in Syria, the country was not a party to the CWC. This precluded using the measures agreed within the text of the Convention for investigation of alleged use as they only apply to states parties. However, there was another arrangement that could be used that was overseen by the UN Secretary-General (UNSG). This arrangement, known as the UNSG mechanism, was used to establish an investigation led by Åke Sellström. The Sellström team had been in Syria for only a few days when on 21 August 2013 the sarin attack in East Ghouta took place. The team was tasked to investigate the incident as a priority.

The Sellström team took environmental samples (including from munitions), biomedical samples from people who indicated they had been exposed to the poison and interviewed witnesses. Its report concluded that the nerve agent sarin had been used but did not formally attribute blame for who used it. Many Western governments assessed that Syrian forces had carried out the attack. The Syrian and Russian governments denied this.

While the final Sellström report was in preparation, Syria joined the CWC. Once Syria was a State Party to the Convention, it was no longer appropriate to use the UNSG mechanism. However, the provisions of the Convention were not ideally suited for what was going to be ongoing investiga-

tions into alleged use. The FFM (mentioned by Ralf Trapp above) was established as an ad hoc arrangement ‘based on the general authority of the OPCW Director-General to seek to uphold at all times the object and purpose of the Chemical Weapons Convention’. The FFM was used by the OPCW to carry out investigations in circumstances that had not been discussed in the negotiations that concluded the text of the CWC.

On its first outing, in May 2014, the FFM convoy came under attack, and a vehicle was damaged beyond repair. While there were no serious injuries sustained by the FFM personnel, understandable concerns about the safety of investigators put limitations on investigation activities.

Despite these limitations, the FFM concluded in June 2014 that toxic chemicals, most likely a pulmonary irritating agent such as chlorine, had been used in the Syria conflict. In its second report, published in September 2014, the FFM resolved that it had found information constituting ‘compelling confirmation’ that a toxic chemical had been used ‘systematically and repeatedly’ as a weapon in villages in northern Syria earlier in the year. It noted ‘the descriptions, physical properties, behaviour of the gas, and signs and symptoms resulting from exposure, as well as the response of patients to the treatment’. The FFM, therefore, determined ‘with a high degree of confidence that chlorine, either pure or in mixture, is the toxic chemical in question’.

These conclusions of the FFM were challenged, most notably by Russia, on grounds such as that interviews with witnesses had been carried out away from the scenes.

The FFM was not given the mandate to attribute who carried out the attacks, but it did find clear evidence of use. To allow for attribution, the UN-OPCW JIM was established by United Nations Security Council resolution 2235 (adopted unanimously on 7 August 2015). The JIM produced seven reports. JIM operations were overseen by a ‘Leadership Panel’ of Virginia Gamba, Adrian Neritani and Eberhard Schanze. The appointment of a Leadership Panel was in-

tended to reduce the potential for political pressure on the investigation by creating independence from governments in its leadership. The political issues surrounding attribution are considered by Jean Pascal Zanders below.

The third and fourth JIM reports determined that the Syrian armed forces have been involved in the use of toxic chemicals as weapons in three cases: Talmenes, on 21 April 2014; Qme-nas, on 16 March 2015; and Sarmin, on 16 March 2015. The third report also concluded that the so-called Islamic State (also called ISIL, ISIS or Daesh) had been involved in the use of mustard gas in Marea, on 21 August 2015.

The JIM mandate was renewed for a year by the adoption of United Nations Security Council (UNSC) resolution 2319 on 17 November 2016. A new Leadership Panel was appointed: Edmond Mulet, Judy Cheng-Hopkins and Stefan Mogl.

Under the new Leadership Panel, the JIM reviewed two new cases identified by the FFM concerning incidents reported in Umm Hawsh, Aleppo Governorate, in September 2016, and Khan Shaykhun, Idlib Governorate, on 4 April 2017. On the Khan Shaykhun attack, the FFM had reported: ‘Based on its work, the FFM is able to conclude that a large number of people, some of whom died, were exposed to sarin or a sarin-like substance. The release that caused this exposure was most likely initiated at the site where there is now a crater in the road. It is the conclusion of the FFM that such a release can only be determined as the use of sarin, as a chemical weapon.’ Drawing on this, and other evidence, the seventh JIM report stated, ‘the Leadership Panel is confident that the Syrian Arab Republic is responsible for the release of sarin at Khan Shaykhun on 4 April 2017.’ Russia rejected these findings and suggested that the JIM conclusions were based ‘primarily on assumptions and a selective use of facts’.

The lack of consensus on the JIM findings remains. When the JIM mandate came up for renewal again towards the end of 2017, Russia cast its veto within the Security Council. Eleven of the fifteen members of the Council voted in favour.

At present, there are two ongoing investigation arrangements—the Independent International Commission of Inquiry on the Syrian Arab Republic, which is a broad range of activities within the Syria conflict, and the International, Impartial, and Independent Mechanism for Syria (IIIM) in December 2016, established by UN General Assembly resolution 71/248. Neither has the resource or expertise that was embodied in the JIM.

On 8 April 2018 further allegations of use of CW were made. Numerous reports suggested the use of CW in the town of Douma in Eastern Ghouta. These latest allegations highlight the need for investigatory capacities.

## **Jean Pascal Zanders: On the challenge of attributing responsibility**

After Syria's accession to the CWC in October 2013, the international community almost immediately had to confront a vexing dilemma: how to ensure the country's full cooperation with the international efforts to eliminate its chemical warfare capabilities while seeking criminal justice for the use of CW in the civil war. A silent understanding not to further investigate responsibility for the sarin nerve agent strikes against Ghouta on 21 August 2013 accompanied the Syrian government's agreement to forego CW. After a lull of seven months, the first reports of chlorine strikes against territories under insurgent control emerged in April 2014. The rapid increase in the number of incidents, details about the nature of the attacks, and casualty reports led the Director-General of the OPCW, Ahmet Üzümcü, to establish the FFM within the Technical Secretariat.

The CWC, however, does not give the Technical Secretariat the mandate to determine responsibility for the attacks. To this end, the UN Security Council unanimously adopted Resolution 2235 on 7 August 2015 establishing the UN-OPCW JIM. The OPCW limited its role to supplying factual information in support of the JIM's mission. In November 2017, Russia refused to renew its mandate. In response,

France launched on 23 January 2018 the International Partnership against Impunity for the Use of Chemical Weapons. At the time of writing, 25 countries and the European Union had signed up to the Declaration of Principles. They have thereby committed themselves, among other things, to gather information on those who are responsible for chemical warfare with a view of holding them accountable in the future. They also pledge to collaborate to bring such persons and entities to justice.

Two other UN initiatives collect information on war crimes to support future trials. In August 2011, the Human Rights Council set up the Independent International Commission of Inquiry on the Syrian Arab Republic (COI). Several reports, which draw on interviews, analysis of documentary evidence, medical and forensic investigations, and other sources, refer to CW use. The COI frames the allegations in a human rights context.

Taking note of the blockage in the Security Council, the UN General Assembly established the International, Impartial, and Independent Mechanism for Syria (IIIM) in December 2016. According to Resolution 71/248, IIIM is 'to collect, consolidate, preserve and analyse evidence of violations of international humanitarian law and human rights violations and abuses and to prepare files in order to facilitate and expedite fair and independent criminal proceedings, in accordance with international law standards, in national, regional or international courts or tribunals'. Its mandate also stipulates cooperation with the COI.

## **The difficulty of attribution**

One can easily quip that in any investigation into allegations of CW use, however controlled the process and assiduous the analyses, the truth is never scientific; it is always political. Attribution is not an end in its own right; it is a step towards achieving justice. That finality, however, appears illusive. Historically, no single individual has ever been indicted and convicted under international criminal law for violating rules or the norm against chemical warfare. Calls for justice fluctuate between the legalist position that without punitive justice

there can be no peace or reconciliation, on the one hand, and a more pragmatist approach that justice may be pursued at a later stage of the transitional process, on the other hand. States' interest in justice may shift quite fast depending on factors such as war developments, domestic contingencies, or the forum in which national positions are being expressed.

Regarding Syria's civil war, three elements appear particularly salient to the attribution question. First, no clarity exists about what attribution beyond the immediate gratification of naming and shaming can ultimately achieve. On 22 May 2014 China and Russia vetoed a draft UN Security Council Resolution to refer Syria to the International Criminal Court, thereby foreclosing that particular route for justice. Upon her resignation from the COI in August 2017, Carla del Ponte called for a special tribunal to circumvent vetoes in the Security Council. Her appeal gained little traction.

Second, there has been little clarification of the juridical purpose of attribution. For instance, the JIM mandate did not specify whether its reports represent evidence as being 'beyond reasonable doubt', 'more likely than not', 'plausible', or 'reliable as to its truthfulness and usefulness', conditions which have different legal weight in trial contexts. Without such clarification, in the political sphere, the findings may be used as justification to take action, including sanctions. Unilateral resort to retribution may easily delegitimise the whole attribution process.

Finally, the OPCW works towards fully eliminating Syria's CW capabilities. Disarmament requires cooperation with government authorities, irrespective of the nature of the government in question. Given the unique situation of disarmament under war conditions in Syria, cooperation includes the government guaranteeing the safety and security of OPCW staff during onsite activities. Yet, calls for regime change often accompany calls for justice. This raises the question why the regime would want to collaborate when knowing that this will not ameliorate longer-term regime security. Given that a similar situation presented itself during the disarmament of Iraq in the 1990s, this conundrum requires future consideration.

## Alistair Hay: The role of stakeholder communities

As noted by my colleagues, the OPCW established the FFM to investigate allegations of the use of chemical weapons in Syria. In the second of the FFM's reports, it confirmed that chlorine had indeed been used as a weapon in Syria, in several locations. The confirmation was based on evidence collected which included personal testimony from witnesses, medical professionals and others; screen grabs of photographic evidence of vegetation showing leaves of plants dried, shrivelled and turning yellow; medical records; details about people and animals who had died; descriptions of the agent being pungent, irritating and like 'chlorine'; together with the sound bombs made when dropped which were described as more of a 'thud' than the 'boom' of conventional ordnance. Further evidence included a 1 x 2-metre barrel reported to contain chlorine, a bomb with a 'CL2' marking, the symbol for chlorine; and descriptions of the cloud released which appeared honey-wax to yellow in colour.

The JIM was established with the remit to both investigate and hold accountable those responsible for using chlorine as a weapon. In the third of its reports, the JIM reported that the evidence it had reviewed enabled it to conclude that the Syrian Arab Republic was responsible for dropping chlorine barrel bombs in three locations namely Talmenes (21 April 2014), Sarmin (16 March 2015) and Marea (21 August 2015).

Reaction to this news from the academic chemistry community was swift, with numerous resolutions passed by societies condemning the use of chlorine as a weapon. One of the first to do this was EuCheMS, the European Association for Chemical and Molecular Sciences representing more than 160,000 chemists from more than 40 Member Societies and other chemistry-related organisations. At the 6th EuCheMS Chemistry Congress in Seville, 36 Presidents of Chemical Societies in Europe and beyond, or their representatives, signed a declaration deploring the use of CW in Syria and calling for the misusers of chlorine to be brought to justice.

Others, including the International Union of Pure and Applied Chemistry (IUPAC) and more than 40 international and national scientific chemical societies from Africa, Europe, the Middle East, and North America issued similar statements.

However, it was not just the academic chemistry community who felt betrayed by the use, as a weapon, of a chemical with so many beneficial uses. The chemical industry was equally strident in its condemnation of chlorine as a chemical weapon. Those condemning use included the European Chemical Industry Council, Cefic, representing 29,000 large, medium, and small chemical companies in Europe, the American Chemical Council, and the International Council of Chemical Associations, with a membership producing some 90% of the world's supply of chemicals. All three organisations called for chemicals not to be used deliberately to harm.

However, chlorine is but one of the CW used in Syria. The much more lethal sarin has been used on a least two occasions, the first in the attack on Ghouta, east of Damascus, on 21 August 2013 and the second on Khan Shaykhun on 4 April 2017. Both attacks were investigated by OPCW experts, who before Syria's accession to the CWC assisted the UNSG's investigation. With investigators already in Syria at the time of the Ghouta attack, negotiations with the Syrian government and opposition forces proceeded rapidly to enable the expert teams to deploy for an onsite collection of evidence. Detailed interviews with survivors and treating clinicians, environmental sampling at the attack site together with extensive biomedical sampling provided clear and unequivocal evidence that sarin had been used in an attack which is estimated to have killed well over 1000 people. The report on the Ghouta attack describes what was found, without attributing blame. It was left to others, like the non-governmental organisation Human Rights Watch to review the evidence and conclude that the Syrian government was the perpetrator.

Circumstances were different when Khan Shaykhun was attacked. With Syria now a party to the CWC, the OPCW

conducted its own investigation. Attribution could now be determined by the JIM. The JIM considered evidence from many sources including that from the FFM where witnesses had been interviewed, and of the blood samples collected seven had sarin, or sarin-like agents present. Urine from three of these victims contained the metabolite specific to sarin, isopropyl methylphosphonate (IMPA) and analysis of autopsy samples from three victims confirmed the presence of sarin, or sarin-like substances in blood, brain, liver, lung and hair. Sarin and its degradation products were also found on vegetation, a rock and in dead birds.

On this occasion, the JIM's task was made easier because the OPCW had taken samples of precursor chemicals from Syrian stockpiles before their destruction in 2014. Five of these samples were of the sarin precursor methylphosphonyl difluoride (DF), and the JIM had these analysed for impurities.

Analysis of environmental samples collected at Khan Shaykhun confirmed that sarin was produced by the binary route, in which DF is combined with isopropanol in the presence of hexamine. The presence of impurities in these samples also matched those present in the former Syrian DF stockpiles including phosphorus hexafluoride, isopropyl phosphates and isopropyl phosphorofluoridates (the latter two produced when DF from the Syrian stockpile which contained the impurity phosphorous oxychloride was used in a binary process to make sarin). This (and much other evidence) led the JIM to conclude that the Syrian government was responsible for dropping a large bomb containing around 150 -250 litres of sarin, which resulted in the death of 100 people and 200 other casualties.

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# Strengthening the implementation of Biosafety and Biosecurity international instruments in Central Asian Countries

One of the most significant efforts of the European Union to help address the risks posed by activities involving chemical, biological, radiological and nuclear (CBRN) materials outside its borders was the launch of the European Union Chemical Biological Radiological and Nuclear Risk Mitigation Centres of Excellence Initiative (or EU CBRN CoE). The initiative aims to strengthen regional security through 65 completed and ongoing projects encompassing legal, regulatory, enforcement and technical issues, and currently covering 59 partner countries in eight regions. The CoE is financed by the EU through the European Commission, and a number of partner institutions are involved in the coordination and implementation of the projects, including the European Commission's Joint Research Centre (JRC), the United Nations Interregional Crime and Justice Research Institute (UNICRI) as well as other international, regional and national organisations and certain civil society organisations.

Among the risks addressed by EU CBRN CoE projects is the spread of transboundary pests and diseases, whether caused naturally, accidentally or deliberately, and potentially affecting human, animal and plant health, as well as food safety. Central Asia – albeit to varying extents depending on each country – is vulnerable to such threats: prone to natural hazards including droughts, earthquakes, river floods, and landslides, but also exposed to security challenges such as terrorism, poor sanitation and waste management systems, limited institutional and laboratory infrastructure and insufficient financial resources. This combination of factors creates a high-level risk of epidemics and pandemics of disease, increased by the presence in the region of human and animal pathogenic agents including the Crimean-Congo Haemorrhagic

fever virus, Foot and Mouth Disease virus, and Tuberculosis.

EU CBRN CoE Project 53 was developed in this context to strengthen the national legal framework and provide specialised training on biosafety and biosecurity in Afghanistan, Kazakhstan, the Kyrgyz Republic, Mongolia, Pakistan, Tajikistan and Uzbekistan. Biosafety addresses containment principles, technologies, and practices that are implemented to prevent unintentional exposure to pathogens and toxins, or their accidental release, while biosecurity focuses on measures designed to prevent the loss, theft, misuse, diversion, or intentional release of pathogens and toxins.

Project 53 comprises seven work packages implemented by a consortium including the International Science and Technology Center, Sustainable Criminal Justice Solutions, Public Health England, the Netherlands National Institute for Public Health and the Environment, and VERTIC. The objective of the project's Work Package 2 is to raise awareness and sensitise political and executive bodies from the participating countries to biosafety and biosecurity issues. The project's Work Packages 3 and 4 focus on the development of training infrastructure, training and equipment needs assessment, and equipment procurement, while Work Packages 5 and 6 consist of training activities. Work Package 7 aims to strengthen and formalise regional cooperation and integrate training programmes within the already existing national and educational programmes, notably at the level of universities.

VERTIC is the lead on the project's legislative matters and is implementing Work Package 1, which consists of the assessment and revision of national legislation in the area of

biosafety and biosecurity, and harmonisation with the appropriate international regulations such as the World Health Organization's 2005 International Health Regulations (IHR), 1972 Biological Weapons Convention (BWC) and Codex Alimentarius with the aim of coming to a 'One Health' system. This includes a number of activities including: analysing and identifying gaps in the national laws and regulations on biosafety and biosecurity, and formulating recommendations for each country for the upgrading of the legislative framework to international guidelines and standards. To do so, staff in VERTIC's National Implementation Measures (NIM) Programme and experts from the partner countries have been applying a methodology based on the development of analytical tools and tailored legislative analysis and advice (see 'A decade of implementation work' in this edition).

### Legislative gap analysis tools for the BWC, IHR and Codex Alimentarius

The international instruments covered by Project 53, namely the BWC, IHR and Codex Alimentarius all cover the biological domain and are relevant to biosafety and biosecurity, but they are not of the same nature and they differ in scope and objectives. However, they all need to be incorporated into national legislation through the adoption of specific measures. Before drafting new measures to give effect to these instruments, countries should first assess the status of implementation through a comprehensive review of existing legislative and regulatory measures, to identify gaps and areas requiring strengthening. This may, however, be a tedious task, complicated by the fact that multiple treaties are covered, with numerous obligations that are not always easy to identify. Legislative gap analysis tools can nevertheless facilitate a systematic and comprehensive assessment. Their development should be guided by the following principles: the tools should be complementary and not duplicate existing tools developed by other organisations, while enabling States to choose the most relevant approach to their specific needs and legal system specificities; they should be simple to use, and easy to understand, including for the identification of strengths and gaps; the tools should be tailored to the specific instruments whose

implementation they aim to review, and they should enable the most comprehensive analysis possible. At the same time, every tool necessarily has its limits and they should leave room for things that will not fit in, for instance, by inserting sections for comments and explanations.

Guided by those principles and building on a well-established and successful methodology, VERTIC has been using existing tools and developing new ones in the context of Project 53 to facilitate the review and assessment of biosafety and biosecurity legislation with respect to the BWC, IHR and Codex Alimentarius.

### Legislation survey template for the BWC

With a view to exclude completely the possibility of biological agents and toxins being used as weapons against humans, animals or plants, the BWC prohibits the development, production, acquisition, transfer, retention, and stockpiling of such materials in types and in quantities that have no justification for prophylactic, protective or other peaceful purposes; and though not explicitly mentioned in the BWC text, the use of biological and toxin weapons is also effectively prohibited by means of the explicit prohibitions, and an understanding by the treaty's states parties. At the same time, the BWC promotes the use of biological agents and toxins for peaceful purposes. Article IV of the Convention requires each state party, in accordance with its constitutional processes, to take any necessary measures to prohibit and prevent the development, production, stockpiling, acquisition, or retention of biological and toxin weapons.

As noted in a 2016 VERTIC report on national implementing legislation for the BWC, VERTIC has been engaged in systematic analysis of states' BWC-related legislation for more than ten years. It had already developed a BWC legislation survey template before Project 53 started, and is making full use of it in the project's context. The survey template takes the form of a table addressing 95 distinct criteria relating to:

- definitions of material subject to regulation (i.e. 'bio-

- logical agent', 'biological weapons', 'toxins');
- offences and penalties for prohibited activities involving biological weapons and biological agents and toxins, including preparations to commit offences and other forms of alternative criminal liability;
  - jurisdiction of national courts over such offences;
  - measures to prevent prohibited activities involving biological weapons and biological agents and toxins and the misuse of dangerous biological agents and toxins, such as: the establishment and maintenance of control lists of dangerous biological agents and toxins, and related dual-use equipment and technology (with catch-all clauses); accounting, security and physical protection of dangerous biological agents and toxins;
  - transfer controls concerning dangerous biological agents and toxins; and
  - law enforcement.

The text of any legislative or regulatory provision which may serve to fulfil an implementation criterion is copied in the appropriate cell, referencing the relevant source. A survey overview template accompanies the survey template, to list the laws reviewed in the survey, additional laws identified as potentially relevant that could be added to complete the survey, and a summary of the survey with recommendations for strengthening the state's legislative framework.

The BWC survey and survey overview templates complement existing analytical tools including the matrix developed by the committee established pursuant to UN Security Council Resolution 1540 (2004). That matrix is used to collect information about the implementation of UNSCR 1540 by UN Member States. In line with the resolution's scope, it covers criminal activities and measures to establish domestic controls to prevent the proliferation of nuclear, chemical and biological weapons and their means of delivery including controls over related materials. Offences related to biological weapons, measures to account for, physically protect and secure biological agents and toxins as well as to control their transfers are therefore reviewed. The matrix, just like resolution 1540, is limited in its scope, however, and even though there is

overlap with the BWC, additional relevant measures for the implementation of the Convention such as definitions, jurisdiction, emergency preparedness and national regulatory inspections, are not included. The BWC survey template is complementary in this respect.

## Legislative survey template for the IHR

The purpose of the 2005 IHR is to prevent, protect against, control and provide a public health response to the international spread of disease. They define the rights and obligations of states to report public health events regardless of whether their origin is natural, accidental or deliberate.

Under Project 53, VERTIC, in cooperation with the project countries, developed a template for the analysis of IHR-related legislation, with 181 data points covering relevant IHR requirements including:

- definitions;
- principles to be followed in implementing the IHR; measures for surveillance, notification, information-sharing, consultation, verification and determination of public health emergencies of international concern;
- development of a prompt and effective public health response;
- control measures at points of entry;
- application of temporary recommendations issued by the WHO Director-General;
- health measures on arrival at and departure from the country; and
- measures for conveyance and conveyance operators.

As with the BWC survey template, the text of any legislative or regulatory provision fulfilling an implementation criterion is copied in the appropriate cell, referencing the relevant source. A survey overview template was also developed to summarise the findings and recommendations from the analysis.

In developing the template, VERTIC took into account the

comprehensive documentation prepared by the WHO to assist its Member States to implement the IHR in national legislation, including the 2009 'Toolkit for implementation in national legislation: Questions and answers, legislative reference and assessment tool and examples of national legislation'. The survey is intended to be a policy and guidance tool for use by states, and to complement their efforts with WHO to implement the IHR.

## Matrix template for Codex Alimentarius

The Codex Alimentarius is a collection of internationally-adopted food standards, guidelines and codes of practice presented in a uniform manner, with the aim of protecting consumers' health and ensuring fair practices in the food trade. As such, Codex Alimentarius is not legally binding and is a compilation of recommendations for voluntary application by states; however, it forms part of the international standards, guidelines and recommendations on which members of the World Trade Organization must base their sanitary or phytosanitary measures, including those related to food safety.

In co-operation with the Project 53 countries, VERTIC developed a matrix template to help assess the status of Codex-related legislation. Rather than a template to incorporate each treaty article and corresponding national implementing provision, a matrix-type model was foreseen as an appropriate tool given the complexity and sheer volume of the Codex Alimentarius rules. The relevant laws and regulations as well as responsible competent authorities are referenced in each cell corresponding to one of the more than 100 criteria including definitions; food safety-related offences and penalties; elements of national food control systems; measures for food hygiene and labelling; and import and export control systems. The matrix also covers feed, particular kinds of food (such as canned or frozen food), and commodities which are specific products and groups of products (for example cereals, pulses, legumes and vegetable proteins, fish and fishery products, etc.). In addition, 'comments' cells were added to clarify the status of legislation and content of relevant national laws and

regulations (for example whether a bill is under consideration or a law is being revised, etc.) as well as any qualitative analysis of such laws and regulations that would help in assessing the implementation of Codex Alimentarius texts in the state. The qualitative analysis can be completed by the use of a colour code in each 'comment' cell to highlight full implementation (in green) and partial implementation or non-implementation (in orange).

Relevant documents published by the Food and Agriculture Organization to assist states to strengthen their national food control systems and legislation were taken into account to develop the Codex matrix template, including 'Strengthening national food control systems: A quick guide to assess capacity building needs' (2007), 'Perspectives and guidelines on food legislation, with a new model food law' (2005), and 'Diagnostic tool for assessing status of national Codex programmes' (2016). None of these tools seemed to enable, however, a systematic and comprehensive review of Codex-related legislation, which the Codex matrix template now does. External food safety legislation experts provided comments on the draft matrix before it was finalised.

## Tailored legislative and regulatory analysis

The legislative gap analysis tools developed by VERTIC complement existing assessment tools not only with respect to their content, but also to the methodology applied to fill out the templates. Such a methodology is tailored to each country's legal system and specificities in the biological domain but also to their expertise and self-assessment capacities. VERTIC staff are fully involved in the exercise and participate in the review. In the context of Project 53, they are cooperating with the partner countries' legal and technical experts to research, collate and analyse relevant legislation, regulations, decrees, administrative acts and other pertinent official documents across a broad range of legislative measures, including penal laws; weapons- and treaty-specific laws; export control and strategic trade laws; public, animal and plant health and protection laws; biosecurity laws; and customs laws. Cross-reviews are being performed to ensure the analy-

ses are correct and complete. P53 project countries have confirmed the usefulness of the surveys in streamlining analysis of relevant and often fragmented legislation in one document (the BWC survey template, IHR survey template or Codex matrix respectively). In addition to conducting or reviewing surveys, VERTIC lawyers are also preparing memoranda on specific draft legislation and current laws at the request of the project countries.

Project 53 documents are translated into the pertinent national language, including Dari, English, Mongolian and Russian. The project partners hold regular conference calls and meetings to discuss progress made, potential difficulties and next steps. This cooperative approach is in line with the core principles of the EU CBRN CoE initiative: to develop and consolidate local expertise and ownership to help ensure the long-term sustainability of efforts to strengthen—in the context of Project 53—biosafety and biosecurity legislation.

## Strengthened treaty regimes towards a One Health system

By identifying legislative gaps, formulating recommendations to strengthen biosafety and biosecurity legislation, and providing tailored legal advice to the national teams of experts, Work Package 1 supports the 2016 BWC Eighth Review Conference's call on 'States Parties to adopt, in accordance with their constitutional processes, legislative, administrative, judicial and other measures, including penal legislation ...' while also ensuring '... the safety and security of microbial or other biological agents or toxins in laboratories, facilities, and during transportation, to prevent unauthorized access to and removal of such agents or toxins.' These activities also contribute to project countries' obligations to implement the IHR at the national level in line with Article 3 of the IHR and pursuant to World Health Assembly Resolution 58.3 (2005). Finally, they foster the project countries' implementation of Codex Alimentarius standards, as envisioned by United Nations General Assembly Resolution 39/248 of 16 April 1985 requiring states' national policies and plans with regard to food to 'support and, as far as possible, adopt stand-

ards from the Food and Agriculture Organization of the United Nations and the World Health Organization Codex Alimentarius'.

While the BWC, IHR and Codex Alimentarius analyses are conducted separately, they form part of the same project and effort to strengthen the biosafety and biosecurity treaty regimes towards a One Health System in Central Asia. The latter recognises that the health of humans, animal, ecosystems, and food safety, are interconnected, and require a coordinated, collaborative, multidisciplinary and cross-sectoral approach to address potential or existing risks. Legislative activities carried out under Project 53 follow this global approach by identifying gaps in legislation and areas requiring additional measures in a holistic and harmonised manner. Once fully completed and compiled together into a final report, the BWC, IHR and Codex analyses will provide a comprehensive picture of the existing framework to ensure human, animal, plant health and food safety, and facilitate the adoption of additional measures to strengthen this framework.

## SONIA DROBYSZ

Acting Programme Director for National Implementation



### Salisbury: Involvement of the OPCW

Noel Stott

On 4 March 2018, Sergei Skripal, and his daughter, Yulia, became victims of a nerve agent attack in Salisbury, United Kingdom; a police officer who assisted the pair also fell ill. On the same day, the government of the United Kingdom informed the Organisation for the Prohibition of Chemical Weapons' (OPCW) Executive Council that a chemical weapon had been used in the incident. It also issued a formal invitation to the Director-General of the OPCW to send a team of experts to the site 'to assist in the technical evaluation of unscheduled chemicals' under Article VIII.38 (e) of the 1993 Chemical Weapons Convention (CWC). This article empowers the Technical Secretariat to 'provide technical assistance ... to States Parties' including 'evaluation of scheduled and unscheduled chemicals.'

The purpose of the Technical Assistance Visit was, in effect, to independently verify the analysis being carried out by the UK's Defence Science and Technology Laboratory (DSTL) at Porton Down. The OPCW agreed to the visit in the week commencing 19 March 2018, and on that date, the Technical Secretariat team was able to obtain environmental and biomedical samples for onward despatch to OPCW designated labs. On 3 April 2018, Porton Down informed that the poison had been identified as a Novichok nerve agent, but made no finding on where it could have been manufactured. On 12 April 2018, the OPCW confirmed 'the findings of the United Kingdom relating to the identity of the toxic chemical that was used in Salisbury and severely injured three people' (see OPCW note S/1612/2018).

The United Kingdom and several other states have determined that the Russian Federation bears responsibility for the incident, describing the nerve agent identified in Salisbury as of 'a type developed by Russia'. Russia has denied involvement—with the Russian President even alleging that there are about 20 countries capable of

producing such neuro-paralytic substances, including the UK (at its Porton Down facility), Sweden and the US. According to Dr Ralf Trapp, a former senior official at the OPCW, while there is compelling evidence that Russia has in the past run a secret research programme to create Novichok-type nerve agents, there is no conclusive evidence at this stage that Russia was the source of the nerve agent used in Salisbury.

The CWC – under which each state party has undertaken to never, under any circumstances, develop or use chemical weapons or to assist anyone to engage in any activity prohibited to a state party under the Convention – also sets up a verification regime. This regime consists of three distinct types of inspections: routine inspections, challenge inspections and investigations of alleged use of chemical weapons. However, the OPCW's mandate does not extend to attribution of the source in its investigations; rather, it must focus on identifying the agent, what method of synthesis was used, how the material was administered and what kind of chemical signatures were involved. (See 'Chemical challenges in Syria' in this edition).

There are strict guidelines and procedures for the OPCW's conduct of an investigation of alleged use (IAU) of chemical weapons which includes objective criteria and standard questionnaires, for the epidemiological determination of cause and effect, there must:

1. be a biologically-plausible link between the exposure and the outcome;
2. be a temporal relationship between the exposure and the outcome, and
3. not be any likely alternative explanation for the symptoms.

Any CWC state party (including Russia and the UK), may choose to trigger a challenge inspection under the Convention. Challenge inspections are designed to clarify and resolve any questions concerning possible non-compliance with the CWC. Under Article IX of the Convention, any state party can request the Secretariat to conduct an on-site challenge

inspection anywhere in the territory (or under the jurisdiction or control) of any other state party. Importantly, states cannot refuse a challenge inspection. No such inspection has ever been requested to date.

The OPCW's Director-General would have to dispatch a team at the earliest opportunity following a request for a challenge inspection (within 24 hours) and inform the Executive Council and all other States Parties of this. It may, however, be more useful for a state to invoke the same article's provision on consultation and cooperation. The consultation could be strictly bilateral or carried out through the OPCW or the United Nations. It can be held on any matter which may be raised relating to the object and purpose, or the implementation of the provisions, of the Convention.

## **DPRK talks unlikely to make progress on verification**

Alberto Muti

In an unprecedented development, US President Donald Trump and North Korean leader Kim Jong-un may sit down in May 2018 to discuss—among many other matters—the DPRK's nuclear programme. The talks, if they happen, would be the first-ever high-level meeting between the two countries. The summit would also be the first diplomatic engagement between the two states since the April 2009 collapse of the so-called six-party talks.

Progress on denuclearising the Korean peninsula has been stymied for almost a decade. Over this period, the DPRK has conducted five nuclear tests, and more than 80 missile tests. The US administration under President Obama preferred to keep the issue at arms-length. Throughout 2017, the Trump administration engaged in fiery rhetoric and heated exchanges with Pyongyang. The return to diplomacy may come as a relief to many regional governments, but it also comes with dangers.

Many experts agree that the DPRK in 2017 and 2018 demonstrated the ability to produce thermonuclear weapons and

(separately) inter-continental ballistic missiles able to reach the United States. While the country's ability to mate an explosive device to a means of delivery is mainly unknown, the emerging consensus is that they are close to being able to produce and deploy a credible nuclear arsenal. The DPRK has invested heavily in its nuclear capabilities and is not likely to give them up for anything but the steepest of prices. The country's statements so far would not indicate a willingness to disarm unilaterally.

Even if they were willing to do so, one issue that negotiators will need to deal with is verification. How to verify that the DPRK is denuclearised, or even meets interim disarmament objectives, were stumbling blocks in the last round of the six-party talks. Disagreement centred on two issues: the time frame for verification, with North Korea insisting that it take place later in the process; and allowed procedures, with the US requesting the right to access locations outside the Yongbyon nuclear complex, and insisting on the use of environmental sampling. While specific rights of access and procedures will undoubtedly be subject to negotiation, one lesson that can be learned from past efforts is to clearly and unequivocally include verification at the early stages of any implementation timeline.

IAEA safeguards have covered parts of the North Korean nuclear fuel cycle in the past. However, it is assumed that the DPRK possesses undeclared facilities, such as a second uranium enrichment plant complementing the pilot facility built at Yongbyon. Any verification scheme introduced under the new talks would need to take into account the possibility of hidden facilities and undeclared material if it is to provide any confidence to the parties, especially given the failure of past efforts. A verification regime would need to have authority to investigate locations outside of Yongbyon where other parties believe nuclear activities may be taking place, conduct inspections, take measurements and collect samples for off-site analysis. Environmental sampling, already at the centre of controversy in 2008-2009, represents a particularly powerful tool, as it would identify what type of nuclear material—if any—is or has been handled at a specific location.

Should a cessation of nuclear activities be agreed on, a priority would be to ensure that violations are detected early and reliably, and that evading the letter of the agreement is costly (in both time and resources). North Korea's 'breakout time' (to borrow a phrase from the Joint Comprehensive Plan of Action agreed with Iran) would need to be long. How to ensure long reconstitution times will require some careful thinking, given North Korea's significant nuclear fuel cycle and proven weaponisation capabilities.

The best way to achieve this goal is to approach the North Korean fuel cycle as a whole, seeking comprehensive information—and ongoing monitoring—of all facilities, from Uranium mines through to reprocessed spent fuel. This network-mapping method—known to the IAEA as the state level approach—would help to identify 'choke points' in the fuel cycle that could be removed, and would help find indications of undeclared or hidden facilities. Undeniably, it would need to be supplemented by other means of monitoring and verification—designed to ensure that weaponised material is removed. In turn, this would require access to the most sensitive parts of North Korea's military-industrial complex. Getting this access will require much political horse-trading and is likely to take a long time.



### *Implementation Watch*

## **Vermont retiree indicted for unlawful possession of ricin**

Benjamin Reedman

On 30 November 2017, the US Federal Bureau of Investigation (FBI) announced that it had arrested a 70-year-old Vermont retiree for possession of the toxin ricin. On 13 December 2017, she was issued a one-count indictment for 'knowingly possessing an unregistered select agent, namely ricin'.

The case was brought to the attention of the authorities when the defendant told health care providers that she had manu-

factured ricin. According to a search warrant subsequently filed by an FBI agent trained in investigating offences involving biological, chemical and nuclear material, the defendant told investigators that 'she had become interested in plant-based poisons during the past summer'. Based on her online research, she had 'manufactured a total of between 2 and 3 tablespoons of ricin on two separate occasions in the kitchen of her retirement home residence'. To extract the ricin, she used castor beans from plants that were growing in her retirement home's grounds. At an arraignment on 15 December 2017, it became known she had a bachelor's degree in occupational medicine.

Ricin is a toxin derived from the beans (seeds) of a castor plant. According to Interpol, these beans can be purchased in garden centres and are available online. Ricin poisoning can occur in various ways, including breathing in ricin mist or powder, via injection or by swallowing contaminated food or water. Less than a pinpoint can kill an adult. As accidental exposure is very unlikely, most cases of ricin poisoning are the result of a deliberate act. Death from ricin exposure could occur within 36-72 hours, and there is no known cure.

During an interview, the defendant indicated that her goal had been to injure herself, but that she had wanted to 'test the effectiveness of the ricin on others'. She claimed to have exposed other residents to ricin on at least three occasions by placing it on food or beverages, which she thought they might ingest. The defendant appeared to have a history of mental illness, which had to be taken into account according to the judge at her arraignment.

The US has implemented the Biological Weapons Convention (BWC) in its national legislation, as required by Article IV of the Convention. (The US ratified the BWC on 26 March 1975). In the US, ricin is listed as a so-called 'select toxin'; a toxin which is restricted for public health reasons (42 United States Code (USC) section 262a on 'enhanced control of dangerous biological agents and toxins' and 42 Code of Federal Regulations (CFR) section 73(3) on 'select agents and toxins'). Individuals and entities that intend 'to possess, use



or transfer any select agent or toxin' have to be registered to do so, provided that they meet the appropriate criteria. The possession of a select toxin without having obtained the necessary registration is an offence and can result in a fine and/or imprisonment of up to 5 years (18 USC 175b(c) on unregistered possession).

At the level of international law, there is some overlap between the BWC and the Chemical Weapons Convention (CWC), as both cover toxins. Ricin is listed as a controlled toxic chemical under Schedule 1 of the CWC, which the US ratified on 24 April 1997. Schedule 1 chemicals are those that have very limited peaceful purposes and can be employed as weapons. They must be subject to strict restrictions. In the US, the export of ricin is controlled under the Export Administration Regulations, its production under the Chemical Weapons Convention Regulations, and its possession, use and domestic transfer under the Public Health Service Regulations (42 CFR 73). It is the latter that applies to the defendant's case.

Despite the defendant's statements at the time of her arrest, no resident at her retirement home had reported symptoms consistent with ricin poisoning. If there had been evidence of the defendant deliberately exposing others to ricin, that could have qualified as a use of a toxin weapon under US law (18 USC 175 on prohibitions regarding biological weapons). Instead, the defendant was charged with unregistered possession of a toxin (18 USC 175b(c)), given that ricin was found in her home and the Department of Health and Human Services confirmed that the defendant did not hold a registration for that toxin. However, the defendant has pleaded not guilty to this charge and is presumed innocent until proven guilty.

## Salisbury and the 1996 Chemical Weapons Act

Yasemin Balci

The use of a nerve agent against Mr Sergei Skripal, a former Russian double-agent, and his daughter Yulia Skripal in Salisbury on 4 March 2018 has led to much discussion in the media and diplomatic circles. Apart from the question as to who is behind the attack, the debate has focused on the relevant rules and procedures at the international level, primarily those of the Organisation for the Prohibition of Chemical Weapons (OPCW) (see 'Salisbury: Involvement of the OPCW' in this edition). Less attention has been given to the United Kingdom's (UK) national rules and procedures; in particular, its implementing legislation for the Chemical Weapons Convention (CWC).

National implementation of the CWC, as required under Article VII of the Convention, involves legislative changes in a country's domestic system. These include adopting definitions for specific terms such as 'chemical weapon' and 'toxic chemical' and criminal measures such as prohibiting the use of chemical weapons.

In the UK, the CWC is implemented through the Chemical Weapons Act of 1996 (and its regulations). In line with the CWC, any toxic chemical or precursor is a chemical weapon according to this Act, unless there is a 'permitted purpose' for the use of such a chemical. Permitted purposes include peaceful purposes such as industrial or medical purposes, protective purposes (e.g. research on protection against toxic chemicals), certain military purposes that do not depend on the toxic properties of chemicals, and law enforcement purposes.

Since a nerve agent is a toxic chemical, the use of a nerve agent to harm persons could qualify as use of a chemical weapon under the UK's Chemical Weapons Act. Such use is an offence under section 2 (1)(a). However, while UK law enforcement authorities refer to the use of a nerve agent, they do not seem to be treating the attack against the Skripals as 'use of a chemical weapon'. On 7 March, Mr Mark Rowley, head of Counter Terrorism Policing, stated: 'we are now treating this

Counter Terrorism Policing, stated: ‘we are now treating this as a major incident involving an attempted murder by the administration of a nerve agent’. The Home Secretary Amber Rudd echoed this in the House of Commons on 8 March, when she called the attack ‘attempted murder in the most cruel and public way’. The latest press release from the Metropolitan Police, dated 29 March, continues to refer to the investigation of ‘attempted murders’. The Metropolitan Police are not referring specifically to Novichok either, even though the UK’s Defence Science and Technology Laboratory confirmed that the nerve agent in question belongs to that family.

While attempted murder is an offence that captures the criminal behaviour of almost succeeding in taking the Skripals’ lives, the question remains why the offence of using a chemical weapon is not mentioned by the law enforcement authorities, especially since it is the choice of weapon that stands out in this high-profile crime. Apart from the Skripals, it put the life of the police officer who responded to the scene in danger and posed an exposure risk to 130 people. Moreover, at the international level, the UK permanent representative to the United Nations did refer to ‘one of the most comprehensive and complex investigations into the use of chemical weapons ever, involving 250 police detectives’.

The UK law enforcement authorities may wish to be less vocal than politicians and diplomats to protect the investigation. If, as a result of the investigation, one or more suspects are identified, it is, in any case, possible for them to be charged with the use of a chemical weapon as well as attempted murder. This will depend on the discretion of the prosecutor. Both offences carry the penalty of life imprisonment. As for the victims, they are fortunately recovering: Mr Skripal is no longer in a critical condition, and Ms Skripal has been discharged from the hospital; the police officer has also been released from hospital.



## A Decade of Implementation Work

Scott Spence

VERTIC’s National Implementation Measures or NIM Programme reached a significant milestone this Spring, celebrating its 10th year advising states around the world on implementation of their obligations in the Biological Weapons Convention (BWC); Chemical Weapons Convention (CWC); Convention on the Physical Protection of Nuclear Material and Amendment (CPPNM/A); International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT); Code of Conduct on the Safety and Security of Radioactive Sources and other instruments for the security of nuclear and other radioactive material; as well as UN Security Council Resolution 1540 (2004) (UNSCR 1540). More recently, the NIM Programme has begun assisting states with national implementation of the International Health Regulations (IHR), Codex Alimentarius and several international treaties for the management of chemicals and chemical waste.

### History

The NIM Programme had its beginnings in scoping work carried out by VERTIC in 2003, funded by the Ploughshares Fund, which resulted in the first ever study of how states were implementing the BWC through national legislation: ‘Time to lay down the law – National legislation to enforce the BWC’. The report, written by current Deputy Executive Director Angela Woodward, was presented to the BWC Meeting of States Parties held in Geneva from 10-14 November 2003. Having identified that there were significant gaps in national legal frameworks for the BWC, Angela and former Executive Director Trevor Findlay followed up in 2004 with Publication No. 23 for the Weapons of Mass Destruction Commission ‘Enhancing BWC Implementation: A Modular Approach’. Among the proposed modules was the establishment of a Legal Advisors Network to assist states in developing laws and regulations to fill gaps such as those identified

in the 2003 report.

In 2005, VERTIC produced Report No. 32 for the Weapons of Mass Destruction Commission ‘National measures to implement WMD treaties and norms: the need for international standards and technical assistance’, written by Angela and current Executive Director Andreas Persbo, which expanded our understanding of how to implement the BWC to other international non-proliferation instruments covering chemical, radiological and nuclear weapons and materials. VERTIC also recognised in 2005 that states may need model legislation to jumpstart the implementation process and developed ‘A Model Law: The Biological and Toxin Weapons Crimes Act’, in co-operation with the International Committee of the Red Cross. This model was supplemented in 2006 with the ‘Sample Act for National Implementation of the 1972 Biological and Toxin Weapons Convention and Related Requirements of UN Security Council Resolution 1540’, developed by Angela and Scott Spence, INTERPOL’s Biocriminalisation Project Manager at the time, to include preventive measures, such as accountability, security and transfers control, required by UNSCR 1540.

In 2008, VERTIC was awarded its largest single grant to date, by the UK’s Strategic Programme Fund (Counter Proliferation), for a National Implementation Measures project on ‘Legislative assistance to ensure non-proliferation of NBC weapons’. The multi-year project was staffed by Executive Director Angela Woodward, Senior Legal Officer Scott Spence and Legal Officer Rocío Escauriaza Leal. In 2009, taking into account the scoping work carried out since 2003, and the success of the first year of the UK project in 2008, the Board of Trustees officially established the National Implementation Measures Programme, alongside the existing Arms Control and Disarmament (now Verification and Monitoring) and Environment Programmes.

## Staffing

A number of talented lawyers and legal specialists have worked with the NIM Programme since its inception including:

- Angela Woodward: Programme Director (2009-14);
- Scott Spence: Senior Legal Officer (2008-14) and Programme Director (2014-18);
- Rocío Escauriaza Leal: Research Assistant (2007-08) and Legal Officer (2008-12);
- Sonia Drobysz: Legal Officer (2013-15), Senior Legal Officer (2015-18) and Acting Programme Director (2018);
- Yasemin Balci: Programme Assistant (2010-11), Associate Legal Officer (2011-12), Legal Officer (2012-14) and Senior Legal Officer (2014-15, 2018);
- Bilkees Esmail: Legal Officer (2013-14);
- Giuseppe Di Luccia: Associate Legal Officer (2015-16); and
- Cédric Apercé: Legal Officer (2017-18).

Former NIM Programme staff have gone on to careers in private practice, government and international organisations including the International Committee of the Red Cross, UK Ministry of Justice and Netherlands Ministry of Foreign Affairs. This April, former Programme Director Scott Spence took up a position with the UN Security Council as an Expert to the Committee established pursuant to UNSCR 1540.

## Funding and government support

The NIM Programme has been generously funded from the start and remains grateful to all of the governments that have supported our work, financially of course, but also through public acknowledgements and appreciation of our activities at international meetings, conferences and other fora. Since 2008, the Programme has received funding of more than £4.3 million from the UK Foreign and Commonwealth Office’s Counter Proliferation Programme, Canada’s Global Partnership Programme, the EU CBRN Centres of Excellence Risk Mitigation Initiative, the US Department of State, the Netherlands Ministry of Foreign Affairs, the Swedish Ministry of Foreign Affairs and the Swiss Department of Foreign Affairs.

## Outcomes

The NIM Programme has changed the face of how national implementation is carried out for the BWC; CWC; CPPNM/A; ICSANT; Code of Conduct on the Safety and Security of Radioactive Sources and other instruments for the security of nuclear and other radioactive material; as well as UNSCR 1540. For example, since 2008, our staff have:

Developed model laws and regulatory guidelines for national implementation of the BWC and certain legal instruments to secure nuclear and other radioactive material including the:

- Legislative Guide to National Implementation of UN Security Council Resolution 1540 (2004)
- Sample Act for National Implementation of the 1972 Biological and Toxin Weapons Convention and Related Requirements of UN Security Council Resolution 1540
- Regulatory Guidelines for National Implementation of the 1972 Biological and Toxin Weapons Convention and Related Requirements of UN Security Council Resolution 1540
- National Legislation Implementation Kit on Nuclear Security

Developed a BWC Legislation Drafting Assistant, an online tool designed to support States to develop a tailored draft bill for the implementation of the BWC and related provisions of UNSCR 1540; and

- completed over 180 legislation surveys to analyse how States are implementing the BWC, CWC and international legal instruments for nuclear security;
  - provided drafting assistance to states in all regions of the world to prepare implementing legislation for the BWC, CWC and certain legal instruments to secure nuclear and other radioactive material;
  - worked with states to review or prepare a UNSCR 1540 national action plan; and
- supplied information on request concerning the establishment

of a National Authority, developing control lists and defining prohibited materials to many states; and given information and support to several states concerning BWC accession or ratification; CWC accession; and CPPNM Amendment and ICSANT ratification or accession.

It is worth highlighting that VERTIC's National Legislation Implementation Kit on Nuclear Security, developed by former Programme Director Scott Spence, was presented by Vice-President Boediono of the Republic of Indonesia to the Nuclear Security Summit in March 2014, and supported by 29 participating nations. Additionally, in 2015, the NIM Programme's model laws and regulations were submitted by the UK Mission to the UN in New York to the Security Council's 1540 Committee as examples of effective practices for implementation.

## International co-operation

The NIM Programme has always viewed co-operation with international partners as key to the success of our work. Accordingly, our staff regularly liaise and co-operate with the UNSCR 1540 Committee and its expert group; the UN Office for Disarmament Affairs (and its regional offices); the OPCW, IAEA, BWC Implementation Support Unit, International Committee of the Red Cross and World Health Organization; as well as other regional and sub-regional organisations such as the European Union, Organisation for Security and Cooperation in Europe, and the Caribbean Community.

We have also recognised that funders are particularly interested in projects that have multiple partners and, accordingly, the NIM Programme has joined successful consortia for projects funded by the European Union (with partners Sustainable Criminal Justice Solutions, Public Health England and the National Institute for Public Health and the Environment of the Netherlands) and Canada (with partner Stimson Center).

## New Directions

In the past two years, the NIM Programme has leveraged its proven methodology—legal analyses using comprehensive templates with multiple assessment criteria, combined with legislative gap-filling using our robust model legislation—to expand our activities into new areas. Most notably, we have been working with seven states in Central Asia since 2016 on national implementation of the BWC, IHR and Codex Alimentarius and added new legislative analysis tools for the IHR and Codex to our offer along with the existing BWC template. More recently, we have started working with ten project countries in Southeast Asia on national implementation of a number of international instruments for the management of chemicals and chemical waste, and will be developing an omnibus legislative analysis template to assess how these countries are implementing this complex legal framework. Both projects are funded by the EU's CBRN Risk Mitigation Centres of Excellence Initiative.

## Conclusion

The NIM Programme has persevered for ten years due to a number of factors, including its talented and committed staff; a reliable stream of funding every financial year; positive engagement with governments and international, regional and sub-regional organisations; and methodologies that have been elegant in their simplicity yet powerful in their application, namely our legislative analysis approach accompanied by gap-filling activities with model laws and regulations. The path has not been easy, however, and it remains a challenge to push the needle towards greater implementation of the CBRN international legal instruments, the IHR and Codex Alimentarius into national law, whether for lack of political will, limited national technical expertise or slow legislative processes that are beyond VERTIC's control. Nevertheless, if the NIM Programme's well-calibrated mix of staff, funding and methodologies endures, it will continue to provide its valuable services to the global community for another ten years to come.



## Staff over the years

Row 1: Cédric Apercé and Sonia Drobysz

Row 2: Bilqees Esmail and Yasemin Balci

Row 3: Giuseppe Di Luccia and Rocío Escauriaza

Row 4: Scott Spence and Angela Woodward



## Novichok: Portrait of a binary killer

Andreas Persbo

On 4 March 2018, British police found Mr Sergei Skripal, 66, and his daughter Yulia, 33, unconscious on a public bench in the small city of Salisbury in south-western England. In a speech to Parliament on 12 March, Prime Minister Theresa May told the assembly that the Skripals ‘were poisoned with a military-grade nerve agent of a type developed by Russia.’ She added that this ‘is part of a group of nerve agents known as “Novichok”’. An investigation of the poisoning is on-going (see ‘Salisbury: Involvement of the OPCW’ and ‘Salisbury and the 1996 Chemical Weapons Act’ in this edition). According to open sources, Novichok can be produced in binary form using acetonitrile (a colourless liquid) and an organic phosphate compound. The agent belongs to a family of chemicals called ‘organophosphate thioesters/oxoesters’ (or OP). These are usually pesticides and have some other uses in drugs (such as Echothiophate used to treat chronic glaucoma) or as a flame retardant in plastics and rubbers (Tricresyl phosphate). According to some sources, the Novichok family (some five different substances have been floated in literature) is the most lethal chemical agent produced to date. Many observers note that it is between five to eight times more potent than VX gas. However, the exact chemical structure is unknown.

The agent is likely to be an inhibitor of cholinesterases and penetrates through the skin, and which affects the victim’s respiratory and nervous system. It is thought to inhibit an esterase (an enzyme) in nerve tissue known as ‘neuropathy target esterase’ or NTE; this esterase is also found in muscle and blood cells. However, there is little information available in the public domain regarding the agent’s neurotoxicity or cardiac toxicity. It is believed to cause permanent neuropathy, which makes it difficult to treat the poisoning with conventional antidotes.

The information in the open domain is scant, as it relies mostly on a single source, Mr Vil Mirzayanov, a chemist who claims to have been involved in the development of the nerve agent. Mr Mirzayanov was first arrested by Russian security forces on 22 October 1992 after having published a description of the development process in the newspaper Moscow News. In a peculiar twist, since Novichok was not listed as a state secret, he broke no laws and was subsequently released from custody.

The OPCW Scientific Advisory Board has discussed Novichok agents on some occasions. It notes that, based on published, but not peer-reviewed, information some Novichoks may, under certain circumstances, ‘meet the criteria for Schedule 2 B4.’ If so, the existence of this compound should have been reported, and the chemical slated for destruction. However, board members emphasise that ‘to date, there has been no confirmation of the author’s claims, nor has any peer review been undertaken in regard to the information on these chemicals in the scientific literature on this subject’. (see Report of the Sixteenth Session of the Scientific Advisory Board, OPCW SAB-16/1, 6 April 2011, paragraphs 11.1 and 11.2.).

The repercussions of the poisoning of the Skripals will have consequences for many more months, as it throws into doubt the completeness of Russia’s declaration of its chemical weapons stockpile. Mr Paul Walker, of Green Cross International, mused, in the *New York Times*, ‘with the Novichok situation, it is a new day at the OPCW.’ He continued, ‘people will ask, is this inspection system intrusive enough? In the Executive Council in particular, people are raising questions about secret stockpiles.’ (Ellen Barry, ‘Russia, Praised for Scrapping Chemical Weapons, Now Under Watchdog’s Gaze,’ *New York Times*, 20 March 2018).

**Further reading** Gupta, Ramesh Chandra. *Handbook of Toxicology of Chemical Warfare Agents*. Amsterdam: Elsevier, 2015. Tucker, Jonathan B. ‘Viewpoint: Converting Former Soviet Chemical Weapons Plants’, *The Nonproliferation Review* vol. 4, no. 1 (1996): 78-89. See also ‘Novichok on Trial’, *New York Times*, 12 March 1994.

## Investigative Science and Technology

Andreas Persbo

Efforts are underway in The Hague to learn lessons from the Organisation for the Prohibition of Chemical Weapons' (OPCW) verification and monitoring activities in recent years. During 12-14 February, a Temporary Working Group (TWG) on Investigative Science and Technology (reporting to the organisation's Scientific Advisory Board) met to discuss its upcoming work. Its mission is to 'review the science and technology relevant to investigations such as those mandated under Articles IX and X of the Chemical Weapons Convention.' The OPCW's recent work has, in the words of the working group, 'increasingly required investigations, analysis, and fact-finding, with collection and evaluation of oral, material, and digital evidence of the use of chemical agents'. One method that surfaced several times in the TWG's deliberations was 'impurity profiling'. Here, trace impurities detected in a synthesised nerve agent by gas chromatography/mass spectrometry can be matched to a precursor source. In Syria, impurities in collected samples 'became chemical markers.' These markers then informed the conclusions reported by the OPCW-United Nations Joint Investigative Mechanism (JIM).

The TWG discussed the need to have multi-disciplinary investigation teams. It noted that the work of entities such as the JIM could be politicised (and although the group does not touch on it, this was also a lesson learned during the operation of the United Nations Special Commission and the United Nations Monitoring, Verification and Inspection Commission in the run-up to the Second Gulf War). Therefore, the TWG notes that reports 'cannot be written without substantive legal expertise'. Moreover, 'the standard of evidence must remain at the highest level, such that information which cannot be corroborated, cannot be used to draw conclusions'. Other areas of interest to the TWG are data and sample management, confidentiality, and the authentication of documents and digital evidence. The TWG will meet again on 14 November 2018.



## New Publications

### **'Information-sharing in nuclear security: current initiatives, challenges and the proposal for a Consolidated National Nuclear Security Report', Alberto Muti, Senior Researcher, VERTIC Brief No. 30, January 2018**

VERTIC Brief No.30, released in the first quarter of this year, provides an overview of the state of international reporting on nuclear security. The brief argues that international reporting on nuclear security has only played a limited role in the field so far but has the potential to contribute more in the future. The paper identifies a number of issues that lie behind its current limited role and that present challenges to increasing it. In this context, the paper examines a key proposal to strengthen reporting; the Consolidated National Nuclear Security Report, offered as a gift basket by the Netherlands and other states at the 2016 Nuclear Security Summit. This brief has been supported with funds from the Nuclear Threat Initiative and the Netherlands Ministry of Foreign Affairs. Its contents represent the views, findings and opinions of the author, and are not necessarily those of either the Netherlands Ministry of Foreign Affairs or the Nuclear Threat Initiative.

### **'Defining Remote Warfare: Cyber', Oxford Research Group Remote Warfare Programme, Katherine Tajer, VERTIC Researcher (former), January 2018**

This report, launched earlier this year, focuses on the increasingly important role of cyberspace in military doctrine and strategy. It discusses how cyber issues are now treated in the doctrines of P5 states and examines the opportunities and barriers posed by the integration of cyber capabilities into national deterrence strategies. The paper was prepared by former VERTIC Researcher Katherine Tajer for the Remote Warfare Programme to help investigate how cyber might fit with their work on changes in military engagement. The paper was a commissioned piece of research that does not necessarily reflect the views of the Remote Warfare Programme.



### National Implementation

Scott Spence, (former) Programme Director

For the National Implementation Measures (NIM) team, the New Year started in Myanmar and Cambodia as part of EU CBRN Risk Mitigation Centres of Excellence Project 61's first Fact Finding Visit to these countries during 12-21 January. Programme Director Scott Spence spoke with officials from both countries on the state of their legislation for the sound management of chemicals.

In January, Yasemin Balci rejoined the NIM programme as a Senior Legal Officer following her work at the Ministry of Foreign Affairs of the Kingdom of the Netherlands and in the private legal sector in London. Scott Spence took part in the Wilton Park conference 'The CWC: the fourth Review Conference and beyond' during 22-24 January. The conference, with 40 invitation-only participants, had the objective of furthering preparations for the fourth CWC Review Conference in December 2018.

On 23-25 January, Senior Legal Officer Sonia Drobysz participated in an ad hoc group on veterinary legislation at the World Organisation for Animal Health's (OIE) headquarters in Paris. The group met in the context of the OIE Veterinary Legislation Support Programme established in 2008 to help OIE Member Countries recognise and address their needs for modern, comprehensive veterinary legislation.

On 24-25 January, Legal Officer Cédric Apercé participated in EU CBRN Risk Mitigation Centres of Excellence Project 53's Steering Committee meeting in Brussels, Belgium. Sonia Drobysz participated in the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction Working Group meetings in Ottawa, Canada on 31 January-2 February and in the International Nuclear Law Association's Board of Management meeting in Paris, France on 12-13 February.

Sonia Drobysz joined the OIE's Veterinary Legislation Identification Mission to Guatemala on 19-23 February as a bio-

threats observer, to analyse, assess and make recommendations on Guatemala's veterinary legislation to prevent, detect and respond to biological threats. Scott Spence returned to South-east Asia during 29 January-2 February as part of EU CBRN Risk Mitigation Centres of Excellence Project 61's first Fact Finding visit to Viet Nam and Lao PDR.

During 6-7 February, Yasemin Balci participated in a regional conference on the prevention of and fight against terrorism and the proliferation of WMD and their means of financing, organised by the Government of Panama and the Organization of American States. Participants discussed the main risks and challenges that these threats represent for the region, as well as the current status of national implementation of the relevant UN Security Council resolutions. Scott Spence participated in a workshop titled 'UNSCR 1540 Assistance Database: Use, Lessons Learned and Next Steps', during 26-27 February, at the Stimson Center in Washington, DC. The Stimson Center has developed an online database of assistance programmes and projects related to the prevention of proliferation of WMD.

Legal Officer Cédric Apercé participated in the Regional Seminar 'UNSCR 1540: Enhancing Strategic Trade and Border Controls in Latin America and the Caribbean' organised by UNLIREC from 7-8 March in Santo Domingo, Dominican Republic. The seminar sought to foster a better understanding of the border and export controls outlined in UNSC Resolution 1540 (2004), in order to facilitate national and regional efforts to advance full implementation of the resolution and to address the risks associated with non-state actors obtaining, proliferating and/or using weapons of mass destruction, in particular for terrorist purposes.

Sonia Drobysz and Cédric Apercé participated in a legislative drafting workshop for the implementation of the Biological Weapons Convention (BWC) in Yaoundé, Cameroon, during 13-15 March. Similarly, Yasemin Balci and Cédric Apercé participated in a legislative drafting workshop for the implementation of the BWC in Lilongwe, Malawi, during 21-23 March.

Both workshops formed part of the assistance provided under Project 3 of the EU Council Decision 2016/51 in support of



the BWC, implemented by the United Nations Office for Disarmament Affairs (UNODA)/BWC Implementation Support Unit and supported by VERTIC's expert legal advice.

## Verification and Monitoring

Larry MacFaul, Programme Director

From 24–26 January 2018, Andreas Persbo, Executive Director, attended a Wilton Park meeting on 'Verification in multilateral nuclear disarmament: preparing for the UN Group of Governmental experts'. The aim of this meeting was to bring together members of the UN Group of Governmental Experts (GGE) established by the UN Secretary-General to consider the role of verification in advancing nuclear disarmament under resolution UNGA/RES/71/67 of 5 December 2016. The meeting also provided an opportunity to consider VERTIC's project exploring views on a Group of Scientific or Technical Experts on Nuclear Disarmament Verification.

Shortly after this, VERTIC ran a workshop at the Vienna Centre for Disarmament and Nonproliferation under our project on 'Strengthening the Open Skies Treaty: A Technical, Legal and Policy Analysis' supported by the US Department of State Key Verification Assets Fund. We were pleased to host representatives from several governments and international organisations at the meeting. Participants heard updates on acquisition programmes under the treaty, a discussion of imagery analysis, and how the IAEA uses imagery analysis in its nuclear safeguards work. Larry MacFaul, Programme Director for Verification & Monitoring, project partner Professor Hartwig Spitzer of Hamburg University, and Andreas Persbo also provided presentations on technical and policy aspects of the treaty.

Between 12-16 February, Noel Stott participated in the ES-ARDA Regional Training Course on Nuclear Safeguards and Non-Proliferation for the southern African region in Pretoria, South Africa. The VM team had assisted the Director of the Radiation and Health Physics Unit at the University of the Witwatersrand, who co-hosted the event, in identifying suitable African participants and speakers.

In early March, Alberto Muti, assisted in a US National

Nuclear Security Administration-led workshop on nuclear safeguards in Cambodia. This mission was conducted under our nuclear safeguards assistance programme, supported by the UK FCO. Later that month Noel Stott, assisted JEYAX Development and Training, an organisation based in South Africa, to provide a course on nuclear energy and radiation protection law for a delegation of national prosecutors in the Republic of Botswana.

On 22 March, Larry MacFaul and Hartwig Spitzer travelled to the Department of State in Washington DC to present on preliminary conclusions from the project on the Open Skies Treaty. The 'Key Verification Assets Fund Program Review' meeting also involved presentations on a wide range of innovative technical initiatives for monitoring and verification purposes across the arms control area. Shortly after, on 26 March, Larry attended a Satellite Evidence Workshop hosted at All Souls College, Oxford, United Kingdom. The meeting brought together lawyers, judges, regulators, academics and private sector satellite imagery experts. The group discussed trends, benefits and challenges of using overhead imagery in a variety of contexts.

Since December, the programme has released two publications: 'Information-sharing in nuclear security: current initiatives, challenges and the proposal for a Consolidated National Nuclear Security Report', by Alberto Muti, Senior Researcher, VERTIC Brief No. 30, January 2018 and 'Defining Remote Warfare: Cyber', Oxford Research Group Remote Warfare Programme, Katherine Tajer, VERTIC Researcher (former), January 2018.

Throughout the period, the team carried out research and analytical work including reviewing materials to assist countries in Asia under its nuclear safeguards project; investigating sensor technologies and their wider context for the Open Skies Treaty; and methodological and comparative reviews for our project supported by the US Department of State on 'Examining technology and associated procedural needs for international bio-forensic investigations strengthening biological weapons investigations.'

## Grants and administration

Helen Cummins

In April VERTIC says goodbye to Scott Spence, following his appointment to the Group of Experts to the United Nations 1540 Committee, which was confirmed in December 2017. Scott has been with VERTIC for ten years and for the last four years he served as the Programme Director for the National Implementation Measures (NIM) Programme. His technical expertise and his work on leading and developing the Programme has been invaluable and everyone at VERTIC wishes him every success in his new role. Sonia Drobysz, Senior Legal Officer on the NIM Programme will serve as Acting Programme Director of the NIM Programme following Scott's departure.

Angela Woodward, Deputy Executive Director, is the VERTIC lead on a new project providing assistance to states to strengthen national enforcement of the United Nations Security Council maritime sanctions against the DPRK. VERTIC is implementing the project in a consortium with the James Martin Center for Nonproliferation Studies and King's College London; the project is funded by the US Department of State. VERTIC will employ two additional researchers to assist on the project. VERTIC is pleased to welcome a new intern, Benjamin Reedman, who joined the organisation in April. Benjamin has a Bachelor of Laws degree from the University of York and a Master of Laws degree from King's College London. He is providing research assistance to the NIM Programme. VERTIC also warmly welcomes Sylvia Barnett as a volunteer for the period April to November 2018. Sylvia is in the fourth year of her Bachelor of Laws and Bachelor of Arts (majoring in Political Science and Spanish) degrees at the University of Canterbury in Christchurch, New Zealand.

VERTIC is an independent, not-for-profit, nongovernmental organisation. Our mission is to support the development, implementation and effectiveness of international agreements and related regional and national initiatives, with particular attention to issues of monitoring, review, legislation and verification. We conduct research, analysis and provide expert advice and information to governments and other stakeholders. We also provide support for capacity building, training, legislative assistance and cooperation.

#### PERSONNEL

Mr Andreas Persbo, Executive Director (Sweden); Ms Angela Woodward, Deputy Executive Director (New Zealand/United Kingdom); Mr Larry MacFaul, Programme Director (United Kingdom); Mr Scott Spence, Programme Director (United States/New Zealand) (until 16 April 2018); Dr Sonia Drobysz, Acting Programme Director (France) (from 1 March 2018); Ms Yasemin Balci, Senior Legal Officer (the Netherlands); Mr Alberto Muti, Senior Researcher (Italy); Mr Noel Stott, Senior Researcher (South Africa); Mr Cédric Apercé, Legal Officer (France); Ms Helen Cummins (United Kingdom); Mr Tom Hobson, Science Fellow (United Kingdom); Mr Benjamin Reedman, Intern (Iceland); Ms Sylvia Barnett, Volunteer (New Zealand).

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