



December 2021

Bulletin

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NG (Angy) Migration



NG migration has always been a big concern in the munition safety world: we know it would occur one day or another, and there was no way to prevent it. But there was one major advantage: we knew exactly on what date it would happen and what we were going to do when the time came: have a farewell party!

Of course, you may have now understood that NG migration was the secret code for Angy, or Angeline Liekens, our information analyst, who has been with us from the very beginning of NIMIC/MSIAC, and who migrated... no, sorry, who retired at the end of November 2021, after almost 30 years at NATO. Nobody else lasted that long at NIMIC/MSIAC, she was literally "The Last ...Woman... Standing", the "Last of the Dinos...", sorry, the "Originals".

Angy was always present, always discrete, always reliable and efficient. She was the person who put the "information" in MSIAC. Without her, NIMIC/MSIAC would have been significantly less efficient at assisting the Munitions Safety Community. On top of that, Angy was always friendly, empathic, compassionate and helpful. She will be sorely missed at MSIAC.

Here are a few pictures from her farewell party. She was very touched by all the kind words she received from former and current MSIAC staff and the gifts she received and she cheerfully thanks everyone who contributed. Quoting her own words:

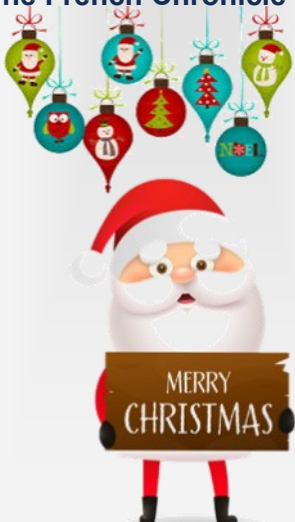
"I have been blessed with the most amazing colleagues over all the years that I worked for NIMIC/MSIAC. I cannot find all the words to thank you for everything, but I hope to see you back all very soon."



NATO gifted her the books of her choice.

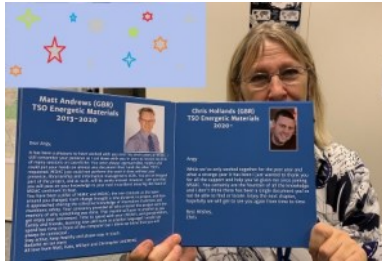


Her NATO certificate!





She was obviously flabbergasted by the gift from her current MSIAC colleagues and one former one, Matt Andrews.



Great food and a drink, what more does a party need ☺. One of MSIAC's former students from ENSTA Bretagne even made the journey to come over to be part of the celebration for Angy! Thank you Aurihona.



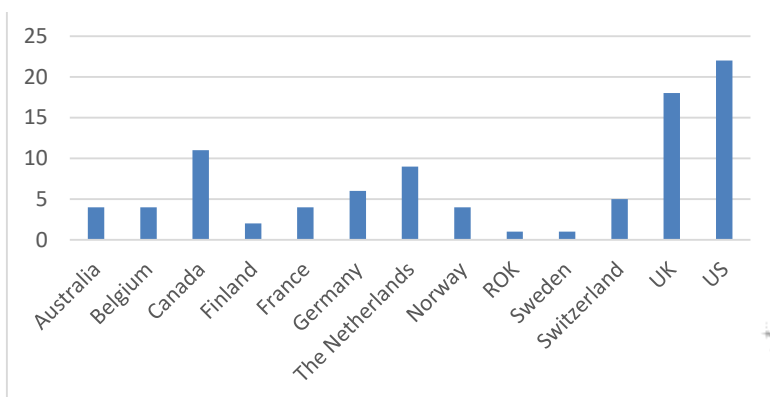
Our new information analyst is Mrs Trinh Vo (see the last edition of this newsletter for more details on her and her background). Please do not hesitate to interact with Trinh the same way you were doing with Angy.

The MSIAC Team

MSIAC Technical Meeting on HD 1.3 Issues

On 7 and 8 December, MSIAC held a virtual technical meeting to address a number of questions in relation to HD 1.3. These questions had arisen in recent years within AC/326 and followed US testing that highlighted the hazard of overpressurization of storage structures with high loading densities and insufficient venting. The meeting addressed a better distinction between Storage subdivision (SsD) 1.3.1 and 1.3.2, injury and lethality implied by HD 1.3 Quantity Distances (QD), and differences between QD in use by the US and the rest of NATO. Finally, the role of thermal effects in the assessment for Insensitive Munitions (IM) is of interest. The aims of the meeting were to improve related NATO standards and to harmonize them with national standards.

The meeting had 91 registrations from 13 different nations. Presentations were provided by MSIAC TSOs Martijn van der Voort, Matt Ferran, and Christelle Collet, Dr Ming Liu (US, NAVFAC), Dr. Josephine Covino (US, DDES), Hans Øiom (Norway, NDEA), Yves Guengant (France, Ariane Group), Serge Bordachar (France, IPE), Hugo Dijkers (The Netherlands, TNO) and Peter Kummer (Switzerland, BK&P). An in-person follow-on meeting has been planned for 2022, in conjunction with the AC/326 SGC meeting.



With Switzerland now an MSIAC member nation, their first presentation at an MSIAC organized event was given by Peter Kummer. Special attention was given to Peter, as this is one of his last international meetings after retiring from a 4-decade long career in explosives safety and risk management. I personally enjoyed working with Peter for many years within AC/326 SGC, the Klotz Group and the AASTP-4 Risk Analysis Working Group. I wish him a great retirement!

Martijn van der Voort
TSO Munitions Transport and Storage Safety

Switzerland Joining MSIAC



MSIAC is proud to announce that Switzerland is now an MSIAC member nation. Switzerland is the 16th nation to join after, in chronological order:

- ⊕ Canada, France, The Netherlands, United Kingdom and United States: they are the initial signatory members of NIMIC in 1991
- ⊕ Australia, Finland, Italy, Norway, Spain, Sweden in 1992
- ⊕ Germany in 2005. At this time, NIMIC was reestablished as MSIAC
- ⊕ Belgium in 2015
- ⊕ Poland and South Korea in 2018

The MSIAC points of contact for Switzerland will be **Dr Philippe Mouchet**, head of ammunition management in the Swiss Armed Forces as the steering committee member, and **Dr. Patrick Folly**, head of specialized service explosives and ammunition surveillance at armasuisse as the National Focal Point Officer (NFPO).



Dr. Philippe Mouchet
 SC member



Dr. Patrick Folly
 NFPO

To mark this occasion, Dr. Folly writes:

"Switzerland is pleased to join MSIAC in order to make its knowledge available and especially to benefit from the exchanges with other international experts. We are confident that everyone will benefit from this future collaboration.

We look forward to the fruitful collaborations that MSIAC and Switzerland will build with each other.

We wish you a merry Christmas and all the best for the New Year."

It is a great pleasure for MSIAC to welcome onboard Switzerland and its representatives.

* Interesting fact: the Swiss flag has the particularity of being a square because it represents the four equal cultures and the four equal languages of Switzerland.

USA East Coast Country Visit

MSIAC conducted a USA east coast country visit during November 2021. The visit included the US Army Combat Capabilities Development Command Armaments Center (CCDC AC), the Department of Defense Explosives Safety Board (DDESB), the US Navy Naval Surface Warfare Center sites at Indian Head, MD (NSWC-IHD) and Dahlgren, VA (NSWC-DD), the US Naval Ordnance Safety and Security Activity (NOSSA), and the US Air Force Research Laboratory (AFRL). The MSIAC delegation consisted of Chuck Denham and Dr. Ernie Baker.

Dr. Brian Fuchs hosted Dr. Baker for a visit to the CCDC AC. The visit consisted of a new equipment tour of Explosives Test Facility, MSIAC presentations, and technical discussions. New equipment includes a Hopkinson bar, electric detonator characterization, and a setback actuator based on the NSWC IHD design.

Thierry Chiapello hosted the DDESB visit. Lori Nock hosted the delegation for a visit to NSWC IHD. Wade Babcock hosted the visit with NOSSA. Dr. David Hubble hosted the delegation for the NSWC-DD visit.

Stephan Struck hosted the visit to AFRL. The visit to AFRL included an overview of the AFRL Munitions Directorate history and munitions technology development, a meet and greet with the Munitions Directorate Chief Scientist (Dr. David Lambert), and a tour of the High Explosives Research and Development (HERD) Facility.

The HERD Facility is undergoing a very large increase in energetics testing and characterization capability including new synthesis, formulation, processing, loading, testing chambers and gun testing capabilities.

MSIAC provided informational briefings including MSIAC Overview; MSIAC Tools, Products and Website; Physical Effects from Detonations and Less Violent Munitions Response; Understanding Gun Launch Setback; MSIAC JAGUAR Web Application; and Recent Improvements to the MSIAC Gap Test Computational Tool and Database.

Attendance was good at all sites engaged with the MSIAC briefings which were done with a combination of in-person and virtual attendance. The participating personnel represented the key areas of the laboratories that have interest in MSIAC's products, services, and programs.



US AFRL the High Explosives Research and Development (HERD) Facility

Ernie Baker
MSIAC Warheads



MSIAC Participation to EURENCO R&D Day



The EURENCO R&D Day that was held in Avignon, France, on the 2nd of December 2021, represents the first in-person international conference in which MSIAC has participated since the beginning of the pandemic in early 2020. The presentations focused on the recent R&D activities conducted by all EURENCO sites and their partners: ArianeGroup, CEA, FOI, LMU, IFTH, and others. The first session was dedicated to a presentation of the European Defence Agency (EDA) and EDA-funded projects in which EURENCO takes part: AMTEM on additive manufacturing for energetic materials, FPNEM on formulation & production of new energetic materials, EMTEEC on Energetic Materials towards an Enhanced European Capability and the latest one on energetic materials production, obsolescence and formulation or EMPOF. The second session was on new ingredients and formulations showing better performance and insensitivity, followed by a third session on innovative manufacturing processes such as additive manufacturing. The way these R&D innovations are implemented into munitions systems was developed in the last session. In addition to the great quality of the presentations, the fact that this event was attended by around 180 people allowed very fruitful discussions between participants in such a way that cannot be done in a virtual conference. Hopefully, this event was the first of a long series and we hope to meet you soon in person in the near future.

Christelle Collet & Chris Hollands
TSOs Propulsion Technology and Energetic Materials

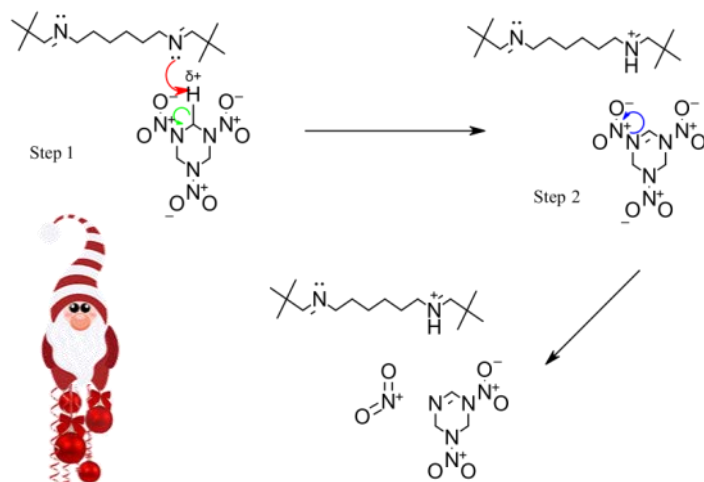


RDX Diamine Incompatibilities

MSIAC recently received a technical question regarding the incompatibility of diamine compounds and RDX. Specifically, the question requested details of the chemical reaction mechanisms resulting in the excessive reactivity demonstrated when amines (or diamines) are mixed with RDX. After conducting a significant search through the available literature, it became apparent that no answer to this question was readily available.

Compatibility information regarding RDX and a range of materials can be found in the literature; however, these are limited to the traditional energetic material compatibility tests such as DSC and vacuum stability testing. When materials are identified as incompatible, no further analysis is typically conducted. Researching the generic reactions that amines can undergo such as addition and substitution

reactions, MSIAC proposed the following reaction mechanism as a plausible explanation for the observed incompatibility.



Possible addition reaction of amines and RDX

In this mechanism, the lone pair of electrons from an amine group abstracts a hydrogen from the RDX ring. This addition reaction mimics the strong reaction between amines and traditional acids. With RDX now in a less stable state, it is most likely that, through a number of bond rearrangements, NO₂⁺ is liberated and propagates the further decomposition of RDX.

MSIAC are looking for your help! If you have any other suggested reaction mechanisms, data, or further information regarding the possible reactions between amine, diamines and RDX, then please contact us.

Chris Hollands
TSO Energetic Materials



Welcome to Dr. Georgios Zografakis

While I was born and raised on the Greek Mediterranean island of Crete, for the last several years, I have been working as a scientist for the Defence Equipment & Support (DE&S) organisation of the UK MoD.

It was on the sunny island of Crete where I earned my BSc in Applied Mathematics with a main focus on computational simulations and methodologies. My interest in automotive engineering brought me to the UK and, at the Brunel University of West London, I earned my MSc degree in Automotive Engineering. The area of work during this course was again focused on the development of computational tools and methods for the aerodynamics of vehicles. This work helped me to acquire a position as a postgraduate student and then as a postgraduate assistant at the University of Liverpool. My research work was in the area of rotorcraft, developing models and methods to be used on wind turbines, helicopters, and aircraft. During this period, I



worked for the first time on complex weapons, investigating their aerodynamics, an impressive area with a lot of complex phenomena.

In 2016, I joined the Defence Ordnance and Safety Group (DOSG) within the UK MoD and started working on the investigation of blast and fragmentation in the event of accidental explosions. By attending a number of courses, both national and international (some of them provided by MSIAC), I acquired knowledge on risk and safeguarding. Furthermore, I am an active member of international consortia and groups (like the Klotz Group and NATO AASTP-4). My interest in modelling and research has driven me to pursue a project under the MSIAC Benjamin Stokes Fellowship. I believe that the fellowship is a great opportunity to enhance my knowledge on risk assessment of ammunition storage, in particular on debris hazards, and to collaborate with international subject matter experts.

As part of my Stokes fellowship, I am going to work on the development of a source function (SF) for debris from masonry structures under high explosive loading. This project wouldn't have materialised without the help and supervision of Martijn van de Voort (TSO Munitions Transport and Storage Safety). The aim of the project is to gather and analyse information from trials on masonry buildings under high explosive loading and identify potential mathematical relations for the distribution of debris mass, launch velocity and angle. The end goal is to provide the scientific community and the military forces a mathematical model that will simulate the dispersion of debris during such an event. This model will be used to support the future development of AASTP-1 Quantity Distance (QD) tables and will improve the existing UK consequence and risk assessment tools after my return to DOSG.

While the current global pandemic adds extra difficulties to the project, I am looking forward to the outcome of the project and I hope that my time in Brussels at NATO HQ will be a success.

Dr Georgios Zografakis



AASTP-1 & AASTP-5 course

After a number of webinar versions of the course in late 2020 and early 2021, the time had finally come to conduct an in-person course. This happened at Ramstein Airbase in Germany between 15 and 19 November. The course was organized with local hosts Jason Harre, Ben Bruce, and Jason Wright.

The course was delivered by Mr. Johnny de Roos and myself for an audience of 25 participants from the US, Germany, Belgium, The Netherlands, Luxemburg, Lithuania, Albania and Bulgaria. Also, my MSIAC colleague Matt Ferran joined the class. The class was held at USAFE's Nuclear University. Special thanks go out to Education Director Mr. Drew Hood, who took care of the facilities and gave us a tour of their weapon vault system. Although previous webinars had already highlighted the upcoming changes in AASTP-1 Edition C Version 1, this course was the first time that thorough exercises were carried out with the new standard. Positive feedback was

received about these exercises, as well as about the recent development of the Standard Related Document (SRD) AASTP-1.1 on Explosives Safety Site Plans (ESSP) and a calculator version of the new QD tables. After the final risk analysis exercise for a field camp, all participants received their certificate.



As always, the most recent course materials are available for download on the MSIAC secure website. For this, please logon to MSIAC weblink and click your way to MSIAC member nations and courses. Please note that recordings are also available from a previously held webinar.

The course program for 2022 is shaping up well. The following five courses are now confirmed:

- ⊕ Wrocław (14-18 March)
- ⊕ Versailles (21-25 March)
- ⊕ UK (9-13 May)
- ⊕ Italy (date TBD)
- ⊕ Spain (16-20 May)



A limited number of students from other nations may join these courses. Please send us a request ASAP if you are interested. Participation is free of charge for MSIAC member nations, and 1,000 EUR per person for non-MSIAC member nations.

We are looking for new instructors to secure the future of the course. Please let us know in case you or colleagues are interested. Contact with potential future instructors from Belgium, Germany and Canada has already been established.

After returning from Ramstein, we did an analysis of all the AASTP courses provided since 2012. We conducted 34 courses with 890 students from 25 different countries. We hope that this has contributed to the safety in our member nations and that we will be able to carry out this activity for many years to come.

Martijn van der Voort
TSO Munitions Transport and Storage Safety



Farewell to Eric Deschambault

MSIAC has been working with Eric Deschambault since 2017 to deliver the AASTP-1 and 5 course in numerous nations. With his extraordinary experience and knowledge, he made a substantial contribution to the quality of the course and kept it current as standards were updated.

Many of you will know Eric as the first MSIAC TSO for Munitions Transport and Storage Safety between 2005 and 2008, as the US representative to AC/326 SGC, or from the many explosives safety related roles he has had within the US.

Eric has now definitely retired from all his international adventures and will enjoy the other great things in life! It has been such a great pleasure to work with Eric over the years and I have learned a lot from him. For this reason, we have collected testimonials from many of his former colleagues. These give a good overview of all Eric's activities and, to me, they leave a very consistent and also touching impression. Two examples are shown below, while all other testimonials can be read here: https://www.msiac.nato.int/sites/default/files/media/Newsletter/2021-12/eric_deschambault_testimonials.pdf

Eric, we wish you all the best!

Martijn van der Voort
TSO Munitions Transport and Storage Safety



Lea Ann Cotton (US, formerly at DDESB)

"Eric will be sorely missed in the US and international explosives safety community. His background and experience crossed several explosives safety disciplines in a unique way that, combined with his intellect, common sense and seemingly limitless energy, allowed him to resolve many intractable explosives safety problems. I will forever be in awe of all that he accomplished in his career!"

Bob Conway (US, NAVFAC EXWC)

"I will be forever appreciative of the kindness of Eric and the time he spent acting as a mentor and guide to me during my early involvement within the NATO explosives safety community. He was extremely dedicated to his profession and was a walking encyclopedia of historical knowledge, but it was really his warmth and caring for those he worked with that stood out above all."



Wayne Haggart and Eric stranded in a Munich beer hall.

The MSIAC AASTP-1 and 5 course instructor team in 2018: Matt Wingrave, Eric, Martijn van der Voort, and Johnny de Roos.



Accident reporting

With every newsletter we gather open media information about significant ammunition accidents that took place in the preceding timeframe. For the period between May and December 2021 nine notable accidents were identified. This includes four accidents at ammunition depots in Serbia, Russia and Kazakhstan, transportation accidents in the Netherlands and the US, and a fireworks disposal accident in Los Angeles.

<https://www.msiac.nato.int/news/accident-reporting-may-2021-december-2021>

Martijn van der Voort
TSO Munitions Transport and Storage Safety

The French Chronicle Animals in French Expressions

In France we love animals so much that we use them in many of our favorite expressions. As an example, the cow ("la vache" in French) is very inspiring. When we are stunned or overly surprised, we say: "la vache!". When we want to exaggerate an adjective, we say "vachement" (the literal translation would be "cowly"), like in "les membres du MSIAC sont vachement sympas", meaning "MSIAC members are awesomely nice". And if it is pouring rain, the cow is still there: "il pleut comme vache qui pisse", which can be translated by "it is raining like peeing cow". I personally find this latter one much more meaningful than the English version "it's raining cats and dogs"! As Belgium is usually blessed by rain, there are plenty of opportunities to use illustrative expressions, with or without animals in them and I encourage you to send me the ones that you use in your own nation (c.collet@msiac.nato.int). If I receive enough of them, they will probably end up in a future French (or rather international) chronicle. Holy cow, I "cowly" look forward to hearing from you!



Christelle Collet
TSO Propulsion Technology