



# Bulletin

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## MUNITIONS HEALTH MANAGEMENT INITIATIVE KICKS OFF

The NATO Smart Defence Initiative on the subject of Integrated Munitions Health Management (IMHM) officially began its work in April. The Initiative's first meeting, a workshop chaired by the UK and supported by MSIAC, convened around 30 representatives from 12 participating nations seeking to provide a definitive guide to the intelligent management of munitions' health.

A confluence of improved technologies in recent years, including sensors, batteries, data storage, networking, age modeling, and data analysis, has enabled a revolution in capability for Alliance Nations' munitions personnel. When applied to life-cycle management, logistics, ageing, safety assessment, and other activities in the munitions area, these new technologies are creating opportunities for cost savings, increased lifecycle, and improved safety. Hence personnel within the technical and policy communities of the participating Nations have partnered through NATO to assist in aligning activities with technology development, ensure compatibility with acquisition requirements, facilitate tight integration with logistics procedures, and increase the Alliance's capability and interoperability in the long term.

The workshop, chaired by Mr. Grant Milne of the UK Defence Ordnance Safety Group, was supported by MSIAC's Emmanuel Schultz (TSO Propulsion) and Wade Babcock (TSO Materials Science). Mr. Schultz and Mr. Babcock supported the technical content development for the workshop, and are documenting the results. Mr. Milne drove the technical contributions of the participants, and will organize their future contributions to meet the scope of the Smart Defence Initiative.

The primary output of this two-year Initiative will be a guide document that provides Nations interested in pursuing IMHM with examples, frameworks, and methods to implement the technologies. As facets of the technology are in various states of very rapid development, the intent is not to provide proscriptive standards. Instead, the initiative's output will assist National practitioners and policy makers to establish approaches that meet national needs, while taking advantage of international experience and ensuring interoperability.

National representatives spent the first day of this workshop sharing current practices in munitions health management across the participating nations, and identifying the common areas that require standardization and guidance. The second day was devoted to discussions of specific technical achievements, identifying national interests, and application of a standard cost/benefit analysis framework. The third day of the workshop was spent discussing the detailed goals of the initiative, and the work and roles required to achieve these goals.

June 2017

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The workshop achieved its goals of a thorough understanding of the scope for the IMHM Initiative, capturing national requirements and concerns, and defining participant Nations' roles and assigned tasks.

Further, the groundwork was laid to achieve the goals of the IMHM Smart Defence Initiative over the next two years.

The DOSG and MSIAC team want to extend our thanks to the participants in this workshop for their contributions of technical content, time to attend, and commitments to the completion and success of the IMHM Initiative. Specifically, we would like to thank **Mr. Albert Bouma** of the Netherlands Defence Ministry, for his efforts organizing the location and visit details for the participants. We would also like to extend our thanks generally to the Kromhout Kazerne Netherlands Military office complex in Utrecht, Netherlands. This was a very good location to host a meeting, with excellent meeting space and coffee to keep us going.

**Emmanuel Schultz & Wade Babcock**  
MSIAC Propulsion Specialist and Materials Specialist

## PM'S PERSPECTIVE

This month I want to bring to your attention MSIAC's plans for workshops and technical meetings coming up over the next five years. Workshops are a significant investment for our member nations and are a major undertaking for MSIAC, particularly with respect to preparation of technical reports to support discussion and to record the outcome. Therefore, it is important that the topics are deemed sufficiently important and address current issues faced by the Munition Safety or Insensitive Munitions communities. To help ensure that this is the case we are requesting your input on the plan.

The list below is split into workshops and technical meetings. Workshops are a larger undertaking and involve bringing about 60 subject matter experts together to address an issue, typically over the course of a week. The first workshop in the series has already been agreed in principal for 2018 and is covered in a separate article in this newsletter. A further three potential workshop topics are listed in no particular order of priority.

Technical meetings are often facilitated by MSIAC, are typically one to a few days in length, and are often arranged as meeting of opportunity on the back of other events. MSIAC is already committed to undertaking a number of technical meetings (as indicated) but the others are listed in no particular order of priority.

I would like to invite you to review the topics listed and to provide your thoughts on their importance and priority. To facilitate this we have established a web form where you can input this information. This website will remain active until the end of June 2017 so you have plenty of time to send us your [input](https://www.msiac.nato.int/survey-17501) (<https://www.msiac.nato.int/survey-17501>).

Workshops	
<p><b>1 Improved Explosives and Munitions Risk Management</b></p> <p>This workshop seeks to exploit our improved understanding of munitions vulnerability and consequences to deliver improvements in munitions risk management based on an updated understanding of vulnerability and consequences.</p> <p>A secondary aim of the workshop is to initiate changes that will help realise the benefits of IM particularly during transportation and storage.</p>	<p style="text-align: center;"><b><i>Committed to holding in 2018</i></b></p> <p>Goals:</p> <ul style="list-style-type: none"> <li>● Support the IM and HC harmonization initiative</li> <li>● Exploit scaled testing and modelling to facilitate quantitative assessment methodologies</li> <li>● Develop improved methodologies to allow risk to be managed with sufficient granularity</li> <li>● Benefits from IM can be realised whilst munitions presenting greatest hazard can be more efficiently managed</li> <li>● Review and make recommendations with respect to updating standards used to manage explosive and munitions risk               <ul style="list-style-type: none"> <li>○ Ensuring they reflect the changing nature of the munitions stockpile</li> <li>○ Balancing ease of user application vs. complexity of the problem</li> </ul> </li> </ul>



Proposed Workshop for 2019-2023 – in no particular order	
2	<p><b>Understanding Mechanical Damage and Violence of Response</b></p> <p>This workshop seeks to understand the relationship between mechanical damage in insensitive munitions and the violence of response. This would be achieved by sharing knowledge and understanding in the following key areas:</p> <ul style="list-style-type: none"> <li>• High strain rate properties and prediction</li> <li>• BVR and DDT</li> <li>• Improved understanding of XDT (mainly for rocket motors)</li> </ul>
3	<p><b>Defect Methodologies</b></p> <p>Develop methodologies to determine acceptability of defects and design tolerance on safety. This would include:</p> <ul style="list-style-type: none"> <li>• Physical Characteristics <ul style="list-style-type: none"> <li>○ Manufacturing defects</li> <li>○ Gun Launch Defects – ignition hazard</li> </ul> </li> <li>• Chemical Defects</li> <li>• Ageing – Role of environmental stresses <ul style="list-style-type: none"> <li>○ Thermal Damage mechanisms</li> <li>○ Mechanical Damage Mechanisms</li> </ul> </li> <li>• Simulation of Defect Effects</li> </ul>
4	<p><b>Safety of New Processing Technology</b></p> <p>Introduction of New Processing Technology and the Potential Impact on Safety. Areas to address would include:</p> <ul style="list-style-type: none"> <li>• Introducing new processing technologies safely</li> <li>• Understanding impact on qualification and assessment</li> <li>• Develop recommendations for safe use and assessment</li> </ul>

Technical Meetings	
5	<p><b>Integrated Munitions Health Management (IMHM)</b></p> <p>MSIAC continue to support the NATO Smart Defence Initiative to develop policy and standards to facilitate the implementation of technologies to improve life assessment and management.</p> <p>A series of mini workshop are planned to progress this work on behalf of NATO AC/326 (first already held in April 2017).</p>
6	<p><b>IM/HC Harmonisation</b></p> <p>MSIAC are facilitating this activity on behalf of the NATO ammunition safety group AC/326. The aim is to standardize, harmonize and streamline IM and HC policy on requirements and assessment and enshrine this in UN international policy (legislated). A number of experts working groups will be organised to progress this effort.</p>
7	<p><b>Continuation of Science of Cook-off work</b></p> <p>This effort will assess a hierarchy based methodology to predict cook off response using current tools and a shared data set. The intent is to provide an opportunity for participants in this exercise to present and discuss results.</p>



Proposed Technical Meetings for 2017-2023 – in no particular order		
8	<p><b>Energetic Material Binders</b></p> <p>An opportunity to take stock of progress on energetic material binders:</p> <ul style="list-style-type: none"> <li>• Exploit developments in the wider polymer community</li> <li>• Review application of new technology (Group Interaction Modelling)</li> </ul>	<p>Goals:</p> <ul style="list-style-type: none"> <li>• Improved toolset for polymer development (especially Energetic Binders)</li> </ul>
9	<p><b>Autonomous Systems</b></p> <p>The introduction of an increasing number of such systems presents challenges with respect to managing post launch safety. Areas for consideration include:</p> <ul style="list-style-type: none"> <li>• Definition</li> <li>• Legislation/Conventions</li> <li>• Safety Requirements</li> <li>• Testing</li> </ul>	<p>Goals:</p> <ul style="list-style-type: none"> <li>• Recommendation on S3 policy</li> <li>• Software safety addressed</li> </ul>
10	<p><b>Qualification of Energetic Materials</b></p> <p>Optimising the introduction of new EM into service. The technical meeting will review:</p> <ul style="list-style-type: none"> <li>• What makes a useable EM</li> <li>• How the Qualification process (AOP-7) can be optimised.</li> </ul>	<p>Goals:</p> <ul style="list-style-type: none"> <li>• Revised Qualification requirements (including modelling and simulation parameters)</li> </ul>
11	<p><b>Reactive Materials</b></p> <p>Impact of Reactive Materials (RM) on Performance/Safety Trade Space. This co-sponsored technical meeting/workshop will review current efforts amongst the MSIAC nations to develop and field reactive materials.</p>	<p>Goals:</p> <ul style="list-style-type: none"> <li>• Assess RM change to scope of munition design parameters</li> <li>• Available materials (enhance blast effects and/or effects on target)</li> <li>• Effect on qualification procedure</li> <li>• Effect on quantity distance and Storage safety</li> </ul>
12	<p><b>AC/326 Stocktake</b></p> <p>An opportunity for AC/326 stakeholders to review:</p> <ul style="list-style-type: none"> <li>• Overview of evolving priorities, challenges and direction</li> <li>• Process &amp; Responsibilities</li> <li>• Cross Sub Group coherency and structure</li> </ul>	<p>Goals:</p> <p>Custodian allocation, gaps, overlaps and realignment</p>
13	<p><b>Probabilistic Aspects of Accidental Initiation</b></p> <p>Probabilistic Aspects of Accidental Initiation and Ignition of Energetic Materials (EM) and Munitions. An MSIAC work element in 2017. Discussion on use of probabilistic tools to guide experimental design and data analysis.</p>	<p>Goals:</p> <ul style="list-style-type: none"> <li>• Methodology to make best use of available data</li> <li>• Provide input on probabilities for Quantitative Risk Assessment of specific Scenarios</li> </ul>

**Dr Michael Sharp**  
MSIAC Project Manager



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# EARLY ANNOUNCEMENT MSIAC 2018 WORKSHOP: IMPROVED EXPLOSIVES AND MUNITIONS RISKS MANAGEMENT

MSIAC staff have started to put together the details of a workshop on “Improved Explosives and Munitions Risk Management” for 2018. This article describes the aim and goals of the workshop, which will be refined in the coming months. A key part of the preparation process is to gain input from the community on the proposal as well as to gauge the level of interest. Therefore, we would be grateful if after reading the article you would provide comments via the workshop and technical meetings questionnaire or directly to Martijn Van der Voort ([m.vandervoort@msiac.nato.int](mailto:m.vandervoort@msiac.nato.int)).

## Introduction

MSIAC is proposing a workshop in 2018 titled “Improved Explosives and Munitions Risk Management”.

***This workshop seeks to exploit our improved understanding of munitions vulnerability and consequences to deliver improvements in munitions risk management.***

The workshop will bring together stakeholders from the Hazard Classification (HC), Insensitive Munitions (IM), and explosives (storage) safety communities to develop a coordinated and optimised approach to managing explosives and munitions risk.

A secondary aim of the workshop is to initiate changes that will help realise the benefits of IM particularly during transportation and storage. The date and location are currently being determined.

## Goals

The workshop will seek to achieve the following goals:

- ⊕ Provide output to support the IM and HC harmonization initiative which seeks to standardize assignment procedures and institutionalise HC/IM harmonization
- ⊕ Exploit scaled testing and modelling to facilitate quantitative assessment methodologies
- ⊕ Develop improved methodologies to allow risk to be managed with sufficient granularity so that benefits from IM can be realised whilst munitions presenting greatest hazard can be more efficiently managed
- ⊕ Review and make recommendations with respect to updating standards used to manage explosive and munitions risk
  - Ensuring they reflect the changing nature of the munitions stockpile.
  - Balancing ease of application for the users vs. the complexity

A review of the appropriateness of current policy and standards managing risk will be a major benefit of this workshop.

## Areas to be addressed

We plan to address the following five areas in the workshop:

### 1. Improved HC and IM Assessment: Exploitation of All Available Evidence

HC and IM assessment often involves a limited number of tests and small quantities of ammunition. Storage of ammunition and explosives typically takes place at a larger scale and possibly with more confinement. The workshop offers an opportunity to expand the assessment to include all available evidence and update the methodology used to assign the Hazard Classification.

#### IM / HC



#### Storage



Scaling  
Confinement

### 2. Improved HC and IM Assessment: Revised Criteria for HD Assignment

The current system used to assign HC for explosives and munitions loosely defines explosive effects (e.g. thermal, projection/explosion, mass explosion) which can lead to differences in assignment of HD between nations. This will be addressed as part of the effort to harmonize HC and IM. It is proposed that criteria used to assign HD to military explosive articles make use of the response descriptors referred to in AOP-39 and UN TS7.

### 3. Improved HC and IM Assessment: Revised Hazard (sub) Divisions

The current HC system with its Hazard (sub) Divisions may not be ideally representing the risk posed by the changing nature of the munitions stockpile.

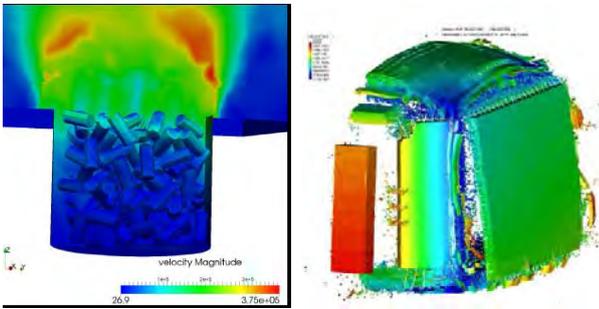
The workshop offers the opportunity to discuss a possible revision of Hazard (sub) Divisions, compatibility groups and aggregation rules. This could allow a better representation of the risk, thereby introducing additional options and flexibilities, particularly for storage at operational levels.

### 4. Improved Quantification of Consequences and Risk

Current standards for Quantity Distances (QDs) and risk analysis (AASTP-1, AASTP-4 and AASTP-5) have their limitations. They are primarily based on experimental data and models for (mass) detonations and thermal effects. As a result there is a mismatch with the finer granularity offered by response descriptors used for HC and IM assessment. This disconnect makes it difficult to recognize the benefits of IM in many cases.

The workshop offers the opportunity to determine what experimental data and models would be required to quantify the consequences and risks based on the response descriptors, in particular for munitions responses “deflagration”, and “explosion”. It is essential to include the effects of scaling, confinement and venting in the discussion. Some modelling efforts are shown below.





US research effort 2017: Modelling of propellant combustion (left) and detonation in ammunition magazine (right) by Applied Simulations, Inc (ASI). Presented by R. Conway and Dr. J. Covino at the AASTP-4 Working Group meeting, Kolsas, Norway, 25-27 April 2017.

## 5. Improved Explosives and Munitions Risk Management

The workshop will offer the opportunity for a reappraisal on how risk should be managed during storage, transport and operations, taking into account the changes discussed and proposed in the above areas. It presents an opportunity to develop best practices for managing munitions safety throughout the lifecycle; where a simplistic approach should be complimented or replaced by more quantitative tools an assessment. Areas and issues to be addressed would include:

- ⊕ An increased granularity and detail in the quantification of consequences and risk could lead to more complex QD tables and risk methods. As a result the introduction of computer-based tools into the standards could be considered.
- ⊕ In some cases assumptions made in standards prohibit more detailed risk assessment. Currently AASTP-5 requires that all munitions are to be aggregated as HD1.1 in order to keep its application simple. This assumption should be changed to enable recognition of the benefits of IM and focus efforts on munitions which present the highest risk.
- ⊕ Consequence and risk analysis could not only become more complex but also more munitions specific. The possibility to address risk at the munitions level will be discussed.
- ⊕ Development of a holistic approach considering the cost and benefits of using more quantitative assessment methods vs. simplistic conservative assessment methods.

### Workshop Results

The envisaged results of the workshop are:

- ⊕ Revised approach to munitions hazards and risks in light of development and introduction of IM.
- ⊕ Improved Quantitative Risk Assessment.
- ⊕ Improved understanding of the true nature of hazards and risks and how this can improve ownership and associated costs.

### The MSIAC Team

## SLOW HEATING CUSTODIAL WORKING GROUP MEETING

The STANAG 4382 Slow Heating Custodial Working Group, SH CWG Meeting was held on 10-11 April 2017

at the Kromhout Kazerne, Utrecht, Netherlands.

The USA is the custodian, with Stephen Struck overseeing the process. Mr. Albert Bouma (Dutch MOD), was the host for this meeting. This was the first meeting of the group held in order to review STANAG 4382, make recommendations and provide a draft STANAG update for review by the NATO AC326 CNAD Ammunition Safety Group.

The meeting was attended by 24 subject matter experts representing France, USA, UK, Norway, Sweden, and Turkey. Ernie Baker has been providing technical support to the group, and he provided a presentation of results from the recent MSIAC Slow Heating Survey. It was distributed to member nations and 34 responses were received from government (62%) and commercial (32%) test centers from 11 nations. The major items listed in the survey were the principal topics for discussion. They included, test purpose, heating rate, oven design, oven standardization, temperature pre-conditioning, energetics melting, reaction temperature, test item restraints, test item orientation, instrumentation, and number of tests. National positions were presented by the French, USA and UK representatives. Lively technical discussions resulted in significant consensus, as well as a requirement for gathering of further information especially on historical information regarding real-life slow heating events. It was agreed that dialog among nations present & others interested in this subject matter must continue. It was recognized that there was a need for a future meeting to resolve all technical issues associated with slow heating testing described in STANAG 4382 and AOP-4382 for IM and HC assessments.

The next Slow Heating Custodian Working Group Meeting (SH CWG II) was planned to take advantage of the occasion of the Fall Subgroup B meeting where many of the national representatives participate in both meetings. The follow-up meeting for this Working Group will precede the AC/326 Subgroup B meeting and is planned for 18-19 September 2017 at the Belgian government facility in Brussels, Belgium.

**Dr Ernie Baker**

**MSIAC Warhead Technology Specialist**

## FRAGMENT IMPACT CUSTODIAL WORKING GROUP MEETING

The STANAG 4496 Fragment Impact Custodial Working Group, FI CWG Meeting was held on 12-13 April 2017 at the Kromhout Kazerne in Utrecht, the Netherlands. France is the custodian, with Florian Péchoux overseeing the process. This was the 2nd and last planned meeting of the group held in order to review STANAG 4496, complete recommendations and provide a final draft STANAG update for review by the NATO AC326 CNAD Ammunition Safety Group. The meeting was attended by 24 subject matter experts representing France, USA, UK, Norway, Sweden, and Turkey. Ernie Baker is providing MSIAC technical support to the group. Ernie took over the support from Emmanuel Schultz, who previously provided technical support including his



conducting the MSIAC Fragment Impact Survey (Report O-159 edition 2).

The Agenda topics for this 2nd meeting were based on the unresolved issues cited in the survey results and other related topics brought forth by the subject matter experts. In particular, topics reviewed and discussed included historical information, the number of required tests required, threat fragment physical properties and orientation, impact point, velocity measurement, pressure measurement, launch system calibration and requirements/guidance for protective equipment. Lively technical discussions resulted in significant consensus.

The plan of action for the participating nations in this Working Group will be to support the document custodian by offering feedback during the review process for AOP-4496 leading up to its introduction at the next Subgroup B meeting.

**Dr Ernie Baker**  
**MSIAC Warhead Technology Specialist**

## WHAT'S GOING ON IN AC/326 AND ITS SUB-GROUPS

### ***SG/A(IST) – Initiation Systems***

The most recent meeting of the Sub Group was held in the week starting 3 April and was hosted by Germany and the Fraunhofer Institute in Freiburg. The Sub Group followed the normal format of detailed discussion on Standards and Terminology as a Working Group from 3 to 5 April followed by the formal Sub Group meetings for NATO, PfP and Partner nations on the 6 and 7 April.

The Sub Group has a challenging programme of work and is currently working on an update of the following Standards:

- ⊕ STANAG 2818 – Demolition Systems and supporting AOPs 31 and 32.
- ⊕ STANAG 4326 – NATO Fuze Characteristics Data and supporting AOP-8.
- ⊕ STAANG 4187 – Fuzing Systems: Safety Design Requirements.

The Sub Group is also developing a new Standard to address the safety requirements for Remotely Controlled SAF Systems (Custodian - USA), this Standard will be STANAG 4809 with supporting AOP-67.

The Sub Group is also reviewing STANAG 4547 - Design Requirements of Inductive Setting of Medium Calibre Electronic Projectile Fuzes. The status of this is still subject to ongoing national considerations with a decision to follow at a future meeting.

Terminology continues to be a key aspect of the work of the Sub Group. Time did not allow significant progress to be made during the meetings but work continues out of committee.

The following Standards were also confirmed as being promulgated since the last Sub group meeting:

- ⊕ STANAG 4157 - Fuzing Systems: Test Requirements for the Assessment of Safety and Suitability for

Service Edition 3, in the ratification process.

- ⊕ STANAG 4363 - Initiation Systems: Testing for the Assessment of Detonating Explosive Components - AOP-21 Edition 3, now promulgated on 24 November 2016.
- ⊕ STANAG 4497, Hand Emplaced Munitions, Principles for Safe Design, Edition 2, now promulgated on 16 November 2016.
- ⊕ STANAG 4560, Electro-Explosive Devices, Assessment and Test Methods for Characterization – AOP-43, Edition 3, now promulgated on 21 November 2016.

STANAG 4369 Design Requirements for Inductive Setting of Large Calibre Projectile Fuzes - AOP-4369 Edition 2, currently in the ratification process pending completion of the French version.

The Fraunhofer Institute were excellent hosts throughout the meeting and took the opportunity to show the delegates their test facilities and operations.

The next round of meetings will be held in the USA over the period 11-15 September.

### ***SG/A - Energetic Materials***

Since the spring meeting, held in March 2017, AC/326 Sub Group A (Energetic Materials Team) continue to work on the update of both the STANAGs and AOPs relating to energetic materials.

A major achievement was the successful 'nitrocellulose-based propellant & stabilizer content' workshop (16<sup>th</sup>-17<sup>th</sup> February 2017) held in Switzerland. A pre-workshop questionnaire was sent to the nations and the results provided plentiful discussions, and set the platform for the next update of AOP-48 & STANAG-4620.

A significant body of work is nearing completion with STANAG-4717 & AOP-4717 on the mechanical analysis test methods for energetic materials. This program of work has updated and consolidated previously separate STANAGs associated with mechanical testing. A round robin using the updated methods has been carried out simultaneously, the results of which will be published in the near future. MSIAC continues to support the sub-group with a new custodial working group on set back being approved. Dr Ernie Baker will be the point of contact within MSIAC for this work element."

### ***SG/B – Ammunition Systems Design and Assessment***

The Spring 2017 meeting of the Subgroup was held at the Netherlands Centre of Excellence Weapon Systems and Munitions in Utrecht over the period 6-7 April 2017.

The opportunity was taken to hold a number of other Working Group meetings around the Sub Group meeting also in Utrecht:

- ⊕ 3-5 April – 1<sup>st</sup> Integrated Munitions Health Management (IMHM) workshop.
- ⊕ 10-11 April – 1<sup>st</sup> Custodian Working Group review of STANAG 4382, (Slow Heating)
- ⊕ 12-13 April – 1<sup>st</sup> Custodian Working Group review of STANAG 4496. (Fragment Impact)

A number of reports were made, in particular the outcome of the IMHM workshop which is a Tier 1 NATO



Smart Defence project was discussed. A more detailed report will be distributed later and the workshop was well attended. The next workshop will be held over the 19<sup>th</sup> to 20<sup>th</sup> September supported by MSIAC, further details to follow.

An update was also given on the review of STANAG 4439, AOP-39 and SRD AOP-39.1. The opportunity was also taken with the majority of document Custodians present to confirm the alignment of content between current drafts of the Test STANAGs.

An update was given on progress of the AAS3P Working Group whose meeting was running concurrently with the Sub Group. An update on the status of their Standards is as follows:

- ⊕ STANAG 4757 and AAS3P-10 Edn B Shoulder Launched Munitions – circulated for ratification.
- ⊕ STANAG 4758 and AAS3P-11 Surface and Underwater Launched Munitions – promulgated.
- ⊕ STANAG 4759 and AAS3P-12 Air Launched Munitions – promulgated.
- ⊕ STANAG 4761 and AAS3P-20 Large Calibre Munitions – covering STANAG 4761 issued for ratification.
- ⊕ STANAG 4762 and AAS3P-21 Medium Calibre Munitions – expect delivery to SG/B for silence procedure by Fall 2017.
- ⊕ STANAG 4763 and AAS3P-22 Small Calibre Munitions – plan to deliver to SG/B for silence procedure Spring 2017
- ⊕ STANAG 4764 and AAS3P-23 Land Forces Munitions (i.e. mortars) - expect delivery to SG/B for silence procedure by Fall 2017.
- ⊕ STANAG 4768 and AAS3P-30 Aircraft Ancillary Devices Containing Energetic Materials – expect delivery for silence procedure by Fall 2017.

The new AAS3P series of Allied Standards include Design Safety and Design Testing requirements currently held in separate NATO Standards, for example ratification of AAS3P-23 will result in STANAGs 4225 and 4433 being cancelled. There will be a lot of change in long established NATO Standards and which will ultimately be reflected in National policy and requirements. MSIAC standards repository, MSAS, will be updated as and when the status of documents change so it remains a reliable source for reviewing the latest Standards. Click [HERE](#) to open MSAS.

The next Sub Group meeting is scheduled to be held in Brussels over the period 21-22 September 2017.

### ***SG/C – In-service and operational safety management***

The AC/326 SG/C is responsible for developing and maintaining standards in the field of In-Service & Operational Safety Management. These are published in AASTP-1 and AASTP-5 for safe storage in the home nation and on deployed missions respectively (AASTP-1 should be applied overseas whenever possible). AASTP-3 deals with hazard classification (HC) of ammunition, and AASTP-4 provides a detailed description of explosives safety risk analysis and related engineering models for explosion effects, damage and injury. There are a number of active technical working groups that aim

to further develop the aforementioned standards, and keep the technical content up to date with the latest experimental results and insights.

With respect to AASTP-1 there is a focus on improvements of Quantity Distance (QD) criteria (Part I) and updated criteria for airfields (Part IV). Two technical working group meetings were held 13 and 14 March prior to the SG/C spring meeting (15-17 March, Prince Club Albert, Brussels):

- ⊕ For AASTP-1 Part I a start has been made to restructure all QD tables and make them more comprehensive and consistent. Included in this work are the QDs for storage of Small Quantities (<500 kg NEQ HD1.1), also referred to as SQQD. The SQQD also have an impact on QDs for other hazard divisions that can exhibit (partial) detonation reactions. Also included in this work is a review of the 400 m minimum Inhabited Building Distance (IBD) for HD1.1. Recent debris data generated in full scale tests has suggested that in some cases a significantly larger distance may be required.
- ⊕ For AASTP-1 Part IV work continues to update the airfield criteria chapter. Part of that work is to investigate the basis of some of the existing Airfield Distances (AD), and to include adjustments were necessary.

The AASTP-4 WG meeting met from 25 – 27 April, at the Kolsås military base near Oslo. Discussions focused on a possible future restructuring of the document and new models to be included. Various interesting topics were presented, e.g. the behavior of HD1.3 under confinement, debris and blast generated due to internal detonations in Hardened Aircraft Shelters (HAS), updates to various nations' risk models, blast loading of buildings, probabilistic aspects of initiation, and various accident reports.

The AASTP-5 WG will review recommendations from the last Exercise Capable Logistician and update AASTP-5 accordingly.

The standards are also continuously updated based on feedback from the AASTP-1 and AASTP-5 lecture series, where Explosives Safety Officers (ESO) learn how to apply the standards. This course has been developed by MSIAC. Other relevant topics in which MSIAC plays a role are the maintenance of databases related to hazard classification, accidents and nationally approved structures.

## **AASTP-1 AND 5 LECTURE SERIES**

It was already the fourth AASTP-1 and 5 lecture series of the year that was held in Versailles, 24-28 April.

Instructor Johnny de Roos was accompanied this time by Eric Deschambault. Eric is a former member of the US DDESB and he was the US delegate of AC/326 SGC from 2008 to 2016. The training was well hosted by Capitaine Lionel Perez from Echelon Central du SIMu. Positive feedback was received from the students. Besides French students there was also participation from Estonia, Austria and the UK.





AASTP-1 and 5 Lecture Series held in Versailles, 24 to 28 April 2016

The fifth and last AASTP-1 and 5 lecture series of the year will follow 2-6 October in Kineton in the UK. This event is however already fully booked. Fortunately there are new chances in 2018! Canada and Belgium have requested the lecture series and discussions are currently going on with two other nations.

The MSIAC steering committee has decided to also allow students from non-MSIAC member NATO nations on the AASTP-1 and AASTP-5 lecture series at a cost of 400 Eur p.p. Another interesting development is that the lecture series has recently been registered in the Education and Training Opportunities Catalogue (ETOC) from the Allied Command Transformation (ACT). This makes the AASTP-1 and AASTP-5 Lecture Series an official NATO course.

<https://e-itep.act.nato.int/Guest/ETOCindex.aspx>

**Martijn van der Voort**  
MSIAC Safety of Storage and Transport Specialist

## HAZARD CLASSIFICATION TRAINEE PROJECT

MSIAC maintains a Hazard Classification (HC) database with 14 contributing nations. The database is accessible through the MSIAC weblink.

Starting June 12, **Adrien Leroy** from ENSTA Bretagne will start a 3 month trainee project at MSIAC on the topic of HC. Together with TSOs Martijn van der Voort and Martin Pope, Adrien will make comparisons between the HC data from the various nations. The results should provide insight in differences between nations and how HC has changed over the years.

Adrien will also look at cases where nations classify the same ammunition in a different way. Differences in the analysis of test results, packaging issues, or the use of analogy will be investigated. Finally he will make recommendations for a future automated HC database. If readers of this newsletter are aware of interesting cases with HC differences between nations please contact **Martijn van der Voort** ([m.vandervoort@msiac.nato.int](mailto:m.vandervoort@msiac.nato.int)) or **Martin Pope** ([m.pope@msiac.nato.int](mailto:m.pope@msiac.nato.int)).

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# In Memoriam

It is with great sadness that we report the death of NIMIC's first project manager Gen. Marc Défournieux who passed away on the 30<sup>th</sup> of May 2017. Marc Défournieux was the first project manager of NIMIC when the project was established in 1992 at NATO head quarters. This was a key time for the project; those early years having a significant influence on the direction that the project would take.

*"As Chairman of the NIMIC Steering Committee in 1991, it was my responsibility to interview candidates for the first Program Manager of NIMIC. Among the candidates for the position, Dr. Marc Defournieux displayed a unique interest in the subject of Insensitive Munitions and a strong desire to manage the group of experts that were being selecting for the project. Based on his interview, Marc was the clear choice for the NIMIC Project manner.*

*From the beginning, Marc was dedicated to the success of NIMIC and gave his total attention and emotion to all aspects of the developing project office. Without a doubt, Marc was a major factor for NIMIC's early success.*

*Marc not only managed the experts, he made significant technical contributions that led to establishing databases that have evolved into some of the basic tools used in MSIAC today. Prophetically, Marc predicted that NIMIC should transition to a Munitions Safety in the future.*

*Marc's contribution went far beyond expectations and were a significant reason NIMIC would lead to a successful MSIAC. "*

*Dr. Ron Derr*

Marc was an extraordinary individual, he held a Doctor of Science, published a number of papers in shock physics, was an engineer-general at the DGA, deputy general of the First Army and deputy UN Special Coordinator in Sarajevo in 1995-96.

In addition to this, he wrote a number of books on science and on parachuting. On the latter it is reported he completed some 4000 Jumps. Our condolences go to his wife, Michelle, and his family.



Marc Defournieux, Pictured Bottom right, with the original NIMIC staff members.

