



Bulletin

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SEPARATION DISTANCES AT NAVAL PORTS

MSIAC has been involved in a number of discussions over the years on the subject of Naval Ports.

A recent question inquired MSIAC to provide guidance on the layout of ports and the safety distances used between surface ships and submarines.

Two standard practices are provided here for comparison.

The first is a NATO Quantity Distance (QD) guideline that provides levels of protection to other vessels, facilities and personnel to both the general public and those working in the immediate vicinity. This was published in Part IV of AASTP-1. Chapter 6 of the guideline was recently re-written by the custodian [USA] for the new edition B to AASTP-1, therefore it serves as a good example.

The second practice is from the NATO Partner Nation Australia. Although the principles appear the same, the Australian Navy procedure permits an additional exception to QD at a Naval Port that will be described below. Both the NATO and Australian practices are outlined below.

NATO: In general, the guiding principle is to consider each vessel being loaded or unloaded at a berth as equivalent to a storage site for QD purposes, that is; a Potential Explosion Site (PES) or as an Exposed Site (ES) if it is at risk from a PES. These QD guidelines apply to the separation of vessels loaded with military explosives.

Examples of such vessels are Lighters, Barges, Small Coastal Craft, Cargo Ships, Transports, Auxiliary Vessels and Warships which presumably includes Submarines.

Warship Exception: warships are ignored for the purposes of QD separation distance provided the conditions below are met (Note: for the purposes of AASTP-1, the definition of warship does not include bulk ammunition carriers).

- All ammunition is stowed in the designated magazines and/or explosives lockers.
- All explosive storage areas are secure.
- No movement of explosives takes place on board the warship.*
- National and impacted nations' authorities have accepted this "warship" exception from explosives safety criteria.

* *The Warship exception does not apply to the loading, off-loading, or handling of such military explosives on the warship.*

The tables below and notes that follow are published in chapter 6 to Part IV of AASTP-1.

The intersection of the PES and ES combination is then applied to the following table, 6-2.

(Continued on page 2)



ES	PES			
	Vessels loaded with explosives		Vessels loading / unloading explosives	
	Barricaded	Unbarricaded	Barricaded	Unbarricaded
Vessels loaded with explosives	SD3	SD3 (135 m minimum)	SD4 ^b	SD4 ^b
Vessels loading or unloading explosives	SD4 ^b	SD4 ^b	SD4 ^b	SD4 ^b
Other cargo vessels	SD4 ^b	SD4 ^b (180 m minimum)	SD4 ^b	SD4 ^b (180 m minimum)
Port facilities	c	c	c	c
Inhabited buildings	c	c	c	c
Public traffic routes and main shipping routes	c	c	c	c
Explosives workshops	c	c	c	c
Holding areas	SD3	SD3	SD3	SD3
POL jetties	SD4 ^b	SD4 ^b	SD4 ^b	SD4 ^b

Table 6-1.: Summary of QD to be Observed for Vessels Loaded with or Loading or Unloading Military Explosives HD 1.1 in Naval Ports.

Notes:

- a. Ships moored in tandem may use SD2-distances.
- b. May be reduced to SD3 provided the exposed vessels are under military control and the controlling authority determines the exposure to be operationally necessary.
- c. QD in AASTP-1 Part I.

Net Explosives Quantity Q (kg)	Quantity-Distances (m)			
	SD1	SD2	SD3	SD4
500	60	39	135	130
600	60	41	135	135
700	60	43	135	145
800	60	45	135	150
900	60	47	135	155
1 000	60	48	135	160
1 200	60	52	135	175
1 400	60	54	135	180
1 600	60	57	135	190
1 800	60	59	135	195
2 000	60	61	135	205
2 500	60	66	135	220
3 000	60	70	135	235
3 500	60	73	135	245
4 000	60	77	135	255
5 000	60	83	140	275
6 000	60	88	150	295
7 000	62	92	155	310
8 000	64	96	160	320
9 000	67	100	170	335
10 000	69	105	175	345
12 000	74	110	185	370
14 000	78	120	195	390
16 000	81	125	203	405
18 000	84	130	210	420
20 000	87	135	218	435
25 000	94	145	235	470
30 000	100	150	250	500
35 000	105	160	265	530
40 000	110	165	275	550
50 000	120	180	295	590
60 000	130	190	315	630
70 000	135	200	330	660
80 000	140	210	345	690
90 000	145	220	360	720
100 000	150	225	375	750
130 000	160	245	395	790
140 000	170	250	420	840
160 000	175	265	435	870
180 000	185	275	455	910
200 000	190	285	470	940
250 000	205	305	510	1 020
300 000	215	325	540	1 080
350 000	230	340	570	1 140
400 000	240	355	590	1 180
500 000	255	380	640	1 280
1 000 000	320	480	800	1 600
Distance functions	SD1=3.2Q ^{1/3}	SD2=4.8Q ^{1/3}	SD3=8.0Q ^{1/3}	SD4=16.0Q ^{1/3}

Table 6-2.: HD 1.1 QD for Vessels.

AUSTRALIA:

Overall the guideline is the same as Chapter 6 of AASTP -1, that is all Royal Australian Navy ships are regarded as a Potential Explosion Site (PES). However the big difference is the additional QD exemption permitted for support vessels that carry bulk ammunition such as tankers or amphibious transport ships. The Australian policy exempts Warships and Explosive Ordnance (EO) carrying vessels from QD separation distances if the EO is stored in a certified magazine, and not handled or moved while at berth. If the Explosive Ordnance is not in the ship's magazine, but stored in general cargo areas, then QD separation rules apply and it must be treated as a PES.

The Australian rationale for the additional exemption was based on an assessment of risk, specifically a comparison between the quantity of ordnance loaded on a Nimitz Class Carrier to those stowed on bulk ammunition carriers. They cite that the quantity of aircraft bombs loaded on a Nimitz Class Carrier will be greater than more High Explosives on board to those stowed on an amphibious ship. Therefore if EO remains stowed and not moved or handled – the same exemption applies.

Another difference in the Australian guideline is the addition of several paragraphs that describe the three Levels of Protection for Hazard Division 1.1. These paragraphs provide the expected effects from Propagation, Damage, and Casualties that would suffer at Protection Levels A, B or C. This is an excellent addition and useful when assessing the likelihood of propagation, probable damage to an Exposed Site and probable number of casualties that will suffer if an accidental event were to occur.

Conclusion:

Many more details about computing the NEQ, the definition of a barricade while on board a ship, separation guidance between vessels and separation guidance from explosives loaded vessels to other exposed targets such as workshops, marshalling areas, general public etcetera are all included in chapter 6 of Part IV to AASTP-1.

This 10-page document that was originally a US contribution has served as a guideline for NATO Nations for many years. The referenced Australian procedure that reflects their specific needs, particularly the added exemption and description of Protection Levels is worthy to consider when developing a national standard.

References:

- ⊕ AASTP-1, Part IV, Chapter 6, Naval and Military Ports, DRAFT March 2014 (encl 1).
- ⊕ Australian DEOP 101, Annex G, Quantity Distances for Transfer of Explosive Ordnance in Naval Ports (encl 2)

Thomas N. Taylor
MSIAC Transport & Storage Specialist



THE PM'S PERSPECTIVE

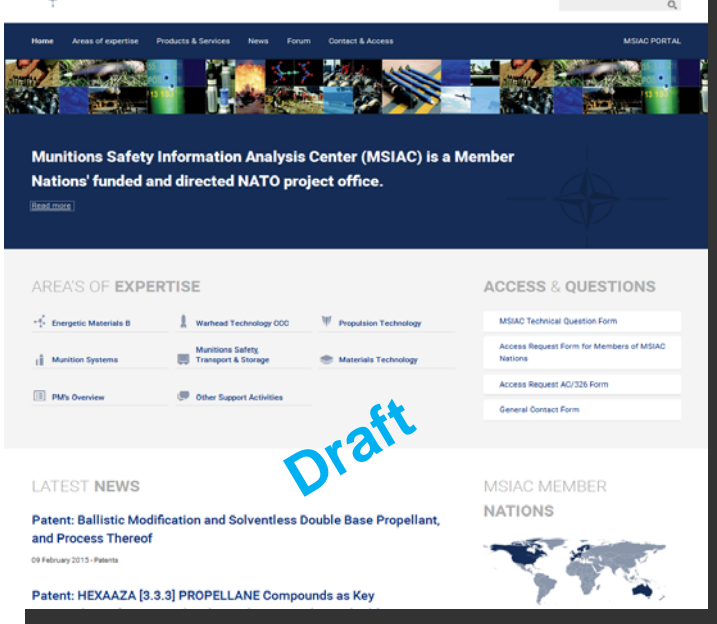


Early Announcement. We are looking for a **Warhead Technology Technical Specialist Officer** to join the MSIAC team. Unfortunately, Fred Becker will be

leaving us in September this year and we are looking to recruit a replacement. At the moment, I can tell you that we are looking for someone with a background in design and safety of warheads; someone who is knowledgeable in detonics and munitions response mechanisms (to accidental and combat threats). The areas of safety testing and modelling are also important. The post is responsible for TEMPER, hence programming and model development skills would be an advantage. You will have to wait to read the full job description, once approved by our Steering Committee, to determine whether this may be an opportunity for you. Expect an announcement in the near future with details of the application process. More information will eventually be posted on our website and the NATO recruitment page <http://www.nato.int/cps/en/natolive/recruit-wide.htm>.

This quarter, I want to bring to your attention some of the changes that we are making to the IT systems here in MSIAC, which will improve the level of service that we are offering.

We are developing a new Website and expect this to go live at the end of March 2015. The new site will improve access to information and user experience. It will also be easier for MSIAC staff to post news and upload content, helping to keep the community informed on a more regular basis. Currently, we are uploading information and optimising the look and feel. Below you see a screenshot to give an idea of how the new website will look. We would be very grateful if you could let us know what you think about the new site when it goes live. As always, if you have any news that you want to contribute please feel free to get in touch.



We are also upgrading the MSIAC Document Management System (DMS), Laserfiche. Those of you who are familiar with the secure web environment,

should be familiar with Weblink which is the public Web portal of Laserfiche. MSIAC has used this DMS very successfully over the last 8 years and it continues to be state-of-the-art with respect to functionality and document security (meets DOD standard 5015.2). You should notice a few changes in the coming months to the Weblink pages, which will improve ease of use, allowing you to access information more quickly. A combination of investment in new servers and optimised deployment of the software should speed up searches.

This tool helps enable MSIAC achieve its goal of sharing Munition Safety and Insensitive Munitions related information. I would like to encourage you to make use of this and to contribute information when you are able (why not add us to your document distribution).

Our database has been a major asset of MSIAC from the beginning and now holds a staggering 120,000 (unclassified) documents, or 2.9M pages of fully searchable information. Mostly this is available for MSIAC staff, but some 17,000 documents are now available to secure web environment users from MSIAC Nations (though this depends on what you have been authorised to see). Don't forget that the MSIAC staff can search the entire contents on your behalf, and regularly do so when answering technical question. <http://www.msiac.nato.int/questions>

A further benefits of the update is the ability for MSIAC to easily host unclassified data archives and make them available via a public web portal to authorised users. We are currently discussing whether this might be possible for a technical group.

**120,000 Docs
(2.9M pages)
Accessible by MSIAC
Staff on your behalf**

MSIAC DMS Laserfiche®



**17,000 Docs
Directly Accessible via
Secure Web Environment
<https://www.msiac.nato.int/Weblink/>**

Finally, MSIAC SERVERS have reached the end of their useful life (are between 6-8 years old) and will be replaced in the coming months. For those of you who are into your IT, here are some fascinating facts on our new equipment:

MSIAC will replace equipment with two Dell PowerEdge R-430 production servers each running Intel Xeon E5-2630 2.20GHz CPUs (12 cores) with 96 GB of RAM, useable storage is approximately 21 Terabytes.



Compare this with the SPARCstation 10 (with up to 4 processors) running at 36 MHz with 256 MB RAM that used to power the office in the 90s! But it did come with a screen!



**Dr Michael W. Sharp
MSIAC Project Manager**



UPDATE OF MSIAC TOOLS FOR THE IM COMMUNITY

AIMS (Advanced Insensitive Munitions Search)

AIMS is the MSIAC web based application that gathers results from IM tests. Results are arranged by threats and are fully searchable. Recently, 25 new results were added, making the total number of results:

Number of results in AIMS by threat

203 FCO	1807 FI
180 SCO	709 SR
810 BI	336 SCJ

The new results are mainly linked to the integration of the following explosives in several types of munitions:

- XF-11585 (31% TNT, 27% RDX, 21% NTO, 13.5% Al, 7.5% Wax)
- IMX-101 (43.5% DNAN, 36.8% NQ, 19.7% NTO)
- B-2268 B (HTPB, NTO, Al, RDX)

Have a look and find out in which munitions they were tested and what IM signature to expect.

In addition, to improve your experience, the application is currently being upgraded to facilitate its use with tablets and smartphones.

Mitigation Techniques for Munitions

During the year, as was done with AIMS, M3 (Mitigation Methods for Munitions), a compendium of mitigation methods will be migrated into a web based application.

This new application will improve the user experience by adding several features. The product will be updated online by the administrator, which will allow an increase of the number of techniques available. The searching feature will be improved, allowing the user to make complex queries and searching for more data than currently possible. This product will be accessible via the MSIAC portal (<https://portal.msiac.nato.int>) later in the year. The main functionalities will be presented in a poster at the next IMEMTS in Rome.

Emmanuel Schultz
MSIAC Propulsion Technology Specialist

 All **PUBLICATIONS** on can be found in the **Technical Reports** section on our Website via this [hyperlink](#) .

 You can find the **LATEST PATENTS OF INTEREST** on our **MSIAC Website** via this [hyperlink](#) .

RESODYN ACOUSTIC MIXER (RAM) SURVEY

YOUR HELP IS NEEDED!

Resonant acoustic mixing, such as the Resodyn Acoustic Mixer (RAM), has attracted a lot of attention in several fields of research and manufacturing including pharmaceuticals, cosmetics and, for our interest, energetic materials. The use of any new technology to process energetic material will always come under close scrutiny to ensure that users are not unduly exposed to an unnecessary risk.

When generating safety cases for new technology, to support risk assessments, experience has to be either gained through trials or shared from other users in the community. It is this latter point that has prompted MSIAC to gather and report the current status of the RAM technology.

The MSIAC steering committee (2014) requested MSIAC to engage the nations in their current research using the RAM. We have therefore generated a questionnaire to gather data relating to the safe operation of the RAM with energetic materials. Inert materials relating to the field are also of interest.

Should you be currently using a RAM, or similar technology, and are you willing to discuss the approach you have taken please download this [questionnaire](#).

The information you provide us will remain restricted to MSIAC nations. The output of the survey/questionnaire will form the basis of a report with the aim of improving the current understanding of safety requirements for the RAM with nation members. It is understood that this is a snap shot in time but will aid new players in the field of acoustic mixing.

We would like to hear from as many users from all MSIAC nations as possible, covering all areas of energetics technology. Please point people in the direction of either our website to find the questionnaire or contact the Energetic Materials TSO directly (m.andrews@msiac.nato.int).



WE NEED YOUR HELP!

Dr Matthew Andrews
MSIAC Energetic Material Specialist



INDUSTRY & TECHNOLOGY PRESS REVIEW

If you have information that you consider of relevance to this section, contact **Manfred Becker** at [MSIAC m.becker@msiac.nato.int](mailto:m.becker@msiac.nato.int).

This issue of Procurements, Science and Technology begins with a number of mergers and agreements within the Munitions industries and then mentions some of the recent munitions related procurements awarded.

The technology section begins with a "small" 3D printed propulsion system the size of a coffee cup followed by a "large" motor (154 ft x 12 ft) to be ground tested next month. As always, we hope you find the topics, and the associated links, worthwhile and interesting.

 [Click here to read more.](#)

Manfred Becker
MSIAC Warhead Technology Specialist

THE STORY OF A 'FELLOW' ENGINEER

Introduction

The fellowship programs aim is to provide opportunities for junior to mid-level Insensitive Munitions (IM) or Munitions Safety (MS) engineers or scientists to participate in MSIAC activities and gain first-hand information, training and technical experience.

Benjamin B Stokes, III, was a propulsion design TSO at NIMIC from 1992 until his untimely death in 1997. He was an internationally known US member of the munitions community and the fellowship program was founded in his name to further his efforts in achieving munitions safety through insensitive munitions initiatives.

Background

Rebecca Stonhill did a Electromechanical Engineering degree before joining the UK MoD's graduate scheme. After a couple of placements Rebecca was sent full time to The Defence Academy, Shrivenham to complete a Masters in Explosive Ordnance Engineering. Her Masters thesis focused on the potential for 2,4-dinitroanisole (DNAN) and its compositions to contaminate ground water. This project was submitted to the EOE course by MSIAC due to international interest in the environmental effects of DNAN.

With this base knowledge Rebecca was accepted as a Stokes Fellow to complete a 6 month placement at MSIAC, located at NATO HQ in Brussels. Under the watchful eye of Dr Matthew Andrews, she joined a project investigating environmental issues associated with energetic materials. Upon completion of her time at MSIAC, Rebecca will return to the UK MoD as part of Defence Equipment and Support, Special Projects team to finish the graduate scheme.

Environmental Project

The aim of the project for Rebecca while training at MSIAC, was to provide MSIAC member nations with an understanding of the environmental issues which can arise when using munitions. The scope of the report looks at the high explosive, not including any metal, plastic components or casings/containers.

Through extensive research and engagement with stakeholders and specialists she looked at key areas for consideration regarding environmental effects when choosing a warhead, to produce through life evaluation of two materials; PBXN-109 and Composition B. The main areas for consideration were the components ability to transform, transport through soil, and possible toxic detonation/burning products. A key number of parameters were identified which can help evaluate the environmental impact of a composition through life, such as half life, soil organic carbon-water partitioning coefficient and vapour pressure. By using these values and understanding the environment in which a compound is going to be used, one can estimate the environmental impact a munition will have prior to using it.

The detonation products were evaluated using literature sources and also calculated values from Cheetah. From this a cross-reference of the toxicity of materials and their long term/short term effects could be evaluated. Areas of concern which are not well documented were also identified such as particulates. A full report on the finding has been written and will be published as a MSIAC report. A summary of the findings will be presented at the next IMEMTS in Rome.

Intern/Fellowship Opportunities

The fellowships and internships are relatively un-tapped resources for member nations to develop junior to mid-level chemists and engineers. Interactions with MSIAC staff can provide interns/fellows with a way of developing knowledge and skills. This can be a route to help produce Suitably Qualified and Experienced Personnel (SQEP). Whilst at MSIAC Rebecca undertook the task of identifying projects which interns/fellows could undertake. An article was developed to promote the opportunities available for both interns and fellows. Full details of the article can be found at:

<http://www.msiac.nato.int/news/interns-fellow>.

Summary

Whilst at MSIAC, Rebecca not only developed her knowledge on munitions but also had the opportunity to interact with the international munitions community. Noteworthy examples include giving a presentation of a paper she wrote based on her MSc Thesis at a NATO Applied Vehicle Technology Specialists meeting, and attending several of the AC/326 sub-group and main group meetings at the NATO HQ in Brussels. This enabled her to develop her interpersonal and presenting skills as well as increasing her international network of contacts. Her Environmental report is part of a larger environmental project and will be continued by MSIAC. The MSIAC fellowship is a great opportunity to develop junior engineers and chemists, and has set Rebecca up to complete her graduate scheme upon returning to the MoD.



MSIAC TEAM RAISE MONEY FOR MEN'S HEALTH



In November 2014 the TSO's and the PM all decided that they would grow moustaches to raise awareness of men's health as part of **Movember**.

It seemed a long time ago but all the guys in office stuck to their job and grew their moustaches. At the end of the 30 days it was clear that not all of us suit a moustache so we returned to clean shaven or the 'five o'clock shadow' look. Martin and Fred though have chosen to keep theirs, but we're unsure as to the price they are paying out side of work. Importantly we did raise money and hopefully some discussion on men's health.

This year we raised a total of **€430** with kind donations coming from colleagues, family and friends. So a big THANK YOU to you all.

This year's funds go towards a total of €189,000 raised in Belgium and €66.7M worldwide. The projects that were supported in Belgium include research into Testicular and Prostate cancer. You can find out more information at the following site (<http://be.movember.com/report-cards/>) including how much money was raised in your country and the types of projects being supported.

All that goes to say we'll try again this year (2015), maybe with some different styles, and hope to raise a little more mirth, money and Movember awareness.

ON THE AGENDA IN 2015...



IM&EM: Real Warfighter Advantage and Cost Effective Solutions Throughout the Lifecycle

IMEMTS

Insensitive Munitions & Energetics Materials Technology Symposium

18-21 May 2015 - Rome, Italy



This symposium will address innovative IM and EM solutions being developed for deployment through all stages of the lifecycle. This is only the fourth time the symposium has come to Europe and the first time it is to be held in Italy, from 18 to 21 May 2015. The European location reflects the greater international cooperation and collaboration which is taking place within the global defence community.

For more information and to register, visit the website <http://www.imemts2015.com/> !



PARARI 2015
Sydney, Australia
9 to 12 November 2015

Further information on the symposium will be updated as it becomes available.
To contact the Directorate of Ordnance Safety, email: jlcdos.parari@defence.gov.au

