U.S. Navy Insensitive Munitions Handbook

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Acknowledgements

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BLUF

- To inform the international IM and Munitions Safety communities that NOSSA is developing a U.S. Navy Handbook as a source of information tailored for the Navy IM community, specifically for the munitions Program Offices (POs) that are required to develop and conduct IM programs for their munitions.
- This paper is intended as an advance introduction to the Handbook and provides selected summary discussions of the Handbook contents.
- Upon completion of the Handbook, NOSSA plans are to issue and maintain the Handbook on its secure website.

Navy Goals for IM Program

- **IM Technology** – Identify IM Technology shortfalls and conduct Science & Technology (S&T) program to develop solutions.
- **IM Improvements** – All Navy munitions are to be designed/improved to meet IM requirements. Operational capabilities and performance are to be attained without compromising system and platform safety.
- **IM Compliance** – A munition is certified to be IM compliant when it is assessed/scored by the Navy Munitions Response Evaluation Board (MREB) or by another appropriate Service Review authority, to pass all required IM tests. Navy Munitions POs are to conduct coordinated IM/Hazard Classification (IM/HC) testing.

Handbook Objectives

- Brief history of IM program
- Current IM policy/guidance as implemented by the Navy
- Description of the Navy's IM development process
- Guidance on how to implement the Joint IMSP/POA&Ms process
- Information on sources of Navy, Joint, and other Service IM technology solutions and developments that address IM technology shortfalls
- Guidance on preparing IM Threat Hazard Assessments (THAs)
- Guidance on complying with Qualification and Final (Type) Qualification for Navy explosives
- Guidance on complying with harmonized IM/HC testing and analysis requirements
- Guidance on evaluation results of the harmonized IM/HC test results to assess a munition's compliance with IM criteria

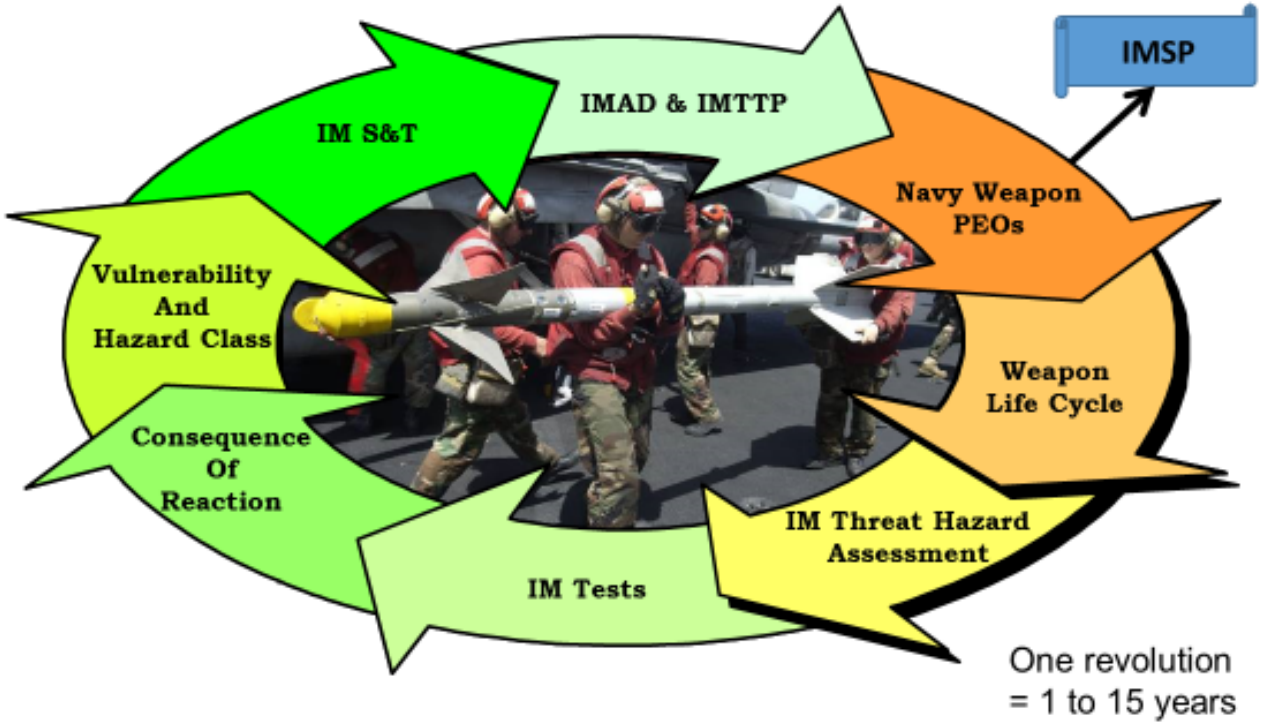
IM Policy and Guidance

- **USC, Title 10, Chapter 141, Section 2389 December 2001 – *§ 2389.*** *Ensuring safety regarding insensitive munitions*
- **DoDD 5000.01**, The Defense Acquisition System and **DoDI 5000.02**, Operation of the Defense Acquisition System, Encl. 3, System Engineering
- **CJCSI 3170.01I**, Joint Capabilities Integration and Development System
- **MIL-STD-882E**, Department of Defense Standard Practice, System Safety
- **MIL-STD-2105D**, Hazard Assessment Tests for Non-Nuclear Munitions (Appendix C in Handbook)

IM Policy and Guidance

- **OPNAVINST 8010.13E**, Department of Navy (DON) Policy on Insensitive Munitions (Appendix D in Handbook)
- **NAVSEAINST 8010.5C**, Insensitive Munitions Program Planning and Execution, (Appendix E in Handbook)
- **NOSSAINST 8010.1A**, Munitions Reaction Evaluation Board (MREB) (Appendix F in Handbook)
- **NAVSEAINST 8020.5C**, Qualification and Final (Type) Qualification Procedures for Navy Explosives (High Explosives, Propellants, Pyrotechnics, and Blasting Agents) (Appendix I in Handbook)
- **NAVSEAINST 8020.8C**, (TB 700-2/TO 11A-1-47, Joint Technical Bulletin), Department of Defense Ammunition and Explosives Hazard Classification Procedures

Navy IM Development Process



Joint IMSP/POA&Ms Process

- The Department of Defense (DoD) Standard Operating Procedure (SOP) for IMSP and POA&Ms provides the policy and mandatory guidance for the Joint IMSP/POA&Ms process.
- The U.S. Navy Handbook provides the Navy Munitions Program Executive Officers/Program Managers (PEOs/PMs) and their munitions development teams with a tailored (Navy specific) summary of the DoD SOP.
  - Schedule
  - Approval process
  - Policy and mandatory guidance for IMSP/POA&Ms preparation

IM Technology

- NAVSEAINST 8010.5C (IM Program Planning and Execution) – Munitions PMs are to seek every window of opportunity to incorporate appropriate technologies to provide IM-compliant munitions for the Naval Fleet.
- The Handbook addresses:
  - IM technology programs
    - Joint Munitions Program (JMP)
    - Joint IM Technical Panel (JIMTP)
    - IM Advanced Development (IMAD) Program
    - IM Technology Transfer Program (IMTTP)
    - Other PM/Service/Agency/Combatant Command Programs
  - Web-based repositories/portals for data generated by IM technology programs
  - Partnering agreements.

IM Compliance

- The requirement - USC, Title 10, Chapter 141, Section 2389 December 2001 states *"§ 2389. Ensuring safety regarding insensitive munitions. The Secretary of Defense shall ensure, to the extent practicable, that insensitive munitions under development or procurement are safe throughout development and fielding when subject to unplanned stimuli."*
- The Handbook summarizes the procedure for ensuring IM compliance:
  - The Munitions PO develops/obtains a MREB/Joint Hazard Classifiers (JHC)/DoD Explosives Safety Board (DDESB)) approved Harmonized IM/HC test plan
  - The Munitions PO conducts the IM/HC tests
  - The MREB scores the IM tests and the JHC/DDESB assesses the IM/HC test results and determines the munition Final HC (FHC)
  - The Munitions PO reports the status of their program to achieve IM compliance in their required biennial munition-specific POA&Ms.

IM Threats, Standard Tests and Reaction Types

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CLASSES OF IM THREATS ARE RELEVANT

STANDARD TESTS ARE REPRESENTATIVE AND ONE METRIC OF MUNITION RESPONSE AND TECHNOLOGY MATURITY

PASSING CRITERIA

REACTION CONSEQUENCE AFFECTS MUNITION & TECHNOLOGY PRIORITIZATION AND INVESTMENT STRATEGY

	FUEL FIRE	NEARBY HEAT	BULLETS	FRAGMENTS	SYMPATHETIC REACTION	SHAPED CHARGE JET
Threats	Such as a truck or an aircraft on a flight deck	Such as fire in adjacent magazine, store or vehicle.	Such as small arms from terrorists or combat	Such as from bombs, artillery, or IEDs	Such as detonation of adjacent stores	RPG, Bomblets, ATGMs: Combat or terrorists
						
Tests	Fast Cookoff	Slow Cookoff	Bullet Impact	Fragment Impact	Sympathetic Reaction	Shaped Charge Jet
	FCO	SCO	BI	FI	SR	SCJ
						
	Burning	Burning	Burning	Burning	Explosion	Explosion

Reactions	Detonation/ Partial Detonation	Explosion	Deflagration/ Propulsion	Burn	No Sustained Reaction
	Type I/II	Type III	Type IV	Type V	Type VI
					

(V) - Assessed by the PEO/PM [V] – Assessed by Service IM Board/Agency V – Tested and scored by Service Board/Agency

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Concluding Remarks

This paper is an advance introduction to the Handbook, which, upon completion, will be issued by NOSSA on its secure website. NOSSA plans to update the Handbook on its secure website, as necessary.

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Backup Slides

THA

- A THA is an evaluation of the life cycle environmental profile of a munition to determine the threats and hazards to which it may be exposed throughout its entire life cycle.
- The THA provides rationale for which of the standard tests should be conducted on the munition, and which tests may be deleted, as unnecessary. The THA may also propose additional testing.
- The preparation of a THA is a required step in the development of an IM Program.
- To support the Navy Munitions PEOs/PMs and their teams in preparing THAs, NOSSA IMO (N855) is preparing a THA Template to be maintained on the NOSSA Secure Website. The THA Template will be summarized in the Handbook.

IM Qualification

- The Handbook summaries the requirements/guidance from:
  - NAVSEAINST 8010.5C (IM Program Planning and Execution):
    - “IM must be successfully integrated into a total system safety program” per MIL-STD-882E (DoD System Safety)
    - Qualification and Final (Type) Qualification of all energetic material in Navy munitions per NAVSEAINST 8020.5C is essential to the Navy IM program.
  - OPNAVINST 8010.13E (DON Policy on IM):
    - Lists the Joint Requirements Oversight Council (JROC)/Office of the Under Secretary of Defense (OUSD) approved set of standardized IM tests and the additional two HC (only) required tests and their passing criteria.
  - IM/HC Test Plan Template developed by NOSSA IMO (N855) to be tool for the Navy IM and HC communities to prepare coordinated / standardized IM/HC test plans.

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Table 10-1 Joint Standard IM Tests (2017)

TESTS	REFERENCES	# OF TESTS	TEST CONFIGURATIONS
LF/EF (FCO)	STANAG 4240, E2 (Revision in process)	2	1 Test Logistical 1 Test Operational
SLOW HEATING (SCO)	STANAG 4382,E2, Procedure 1	2	2 Tests Logistical
BI	STANAG 4241, E2, Procedure 1 (HD1.2.3/ 1.6) (Revision in process)	2(3)	1(2) Logistical 1 Test Operational
FI	STANAG 4496, E1, Standard Procedure	2	1 Test Logistical 1 Test Operational
SR	STANAG 4396, E2	2	2 Tests Logistical (1 Test w/confinement, 1 Test w/o confinement)
SCJ	STANAG 4526, E2, Procedure 2 (Revision in process)	2	1 Test Logistical 1 Test Operational
THERMAL STABILITY ARTICLES	NAVSEAINST 8020.8C	1	1 Test Logistical
40 FT DROP	NAVSEAINST 8020.8C	3	3 Tests Logistical

Table 11-1 IM Reaction Table (Example)

	FCO	SCO	BI	FI	SR	SCJ	HC	FY	Remaining IM Investment ($K)
Baseline									
XXX	III	III	I	I	[F]	[F]	1.1E	FY02	
XXX	IV	V	V	III	P	[F]	1.2.1E	FY02	
XXX	[III]	III	IV	III	[P]	[P]	1.2.2H	FY02	
Current									
XXX	III	III	I	I	[F]	[F]	1.1E	FY09	
XXX	IV	V	V	III	P	[F]	1.2.1E	FY09	
XXX	[III]	III	IV	III	[P]	[P]	1.2.2H	FY09	
Alternative Configurations									
XXX	IV	V	V	III	P	II	1.1E	FY12	
XXX	III	III	[IV]	[III]	P	P	1.1E	FY12	
Projected									
XXX	(III)	(III)	(I)	(I)	(F)	(F)	1.1E	FY15	
XXX	(V)	V	V	(IV)	P	(P)	1.2.1E	FY15	
XXX	(IV)	(V)	IV	(IV)	(P)	(P)	1.2.2H	FY15	