Joint Insensitive Munitions Technology Program Overview

Mr. Anthony Di Stasio
Program Manager
US Army ARDEC
973-724-4547
Anthony.r.distasio.civ@mail.mil
OUSD(AT&L)/TWS/LW&M
Mission - Develop, mature and transition Joint Insensitive Munition science and technologies to improve the response of the DoD munitions portfolio to threats from combat, terrorists, and accidents.

Purpose – to provide a Science and Technology base to support the Secretary of Defense in ensuring that munitions under development or procurement are safe throughout their lifecycle when subjected to unplanned stimuli to the maximum extent practicable.

This is accomplished by working toward the technology gaps identified in PEO Insensitive Munition Strategic Plans, and continuous communication between the JIMTP, the Joint Service Insensitive Munitions Technical Panel (JSIMTP), Service IM boards, and the acquisition community.
NATO STANAG 4439 DEFINITION

Insensitive Munitions are: Munitions which reliably fulfill their performance, readiness and operational requirements on demand and which minimize the probability of inadvertent initiation and severity of subsequent collateral damage to weapon platforms, logistical systems and personnel when subjected to unplanned stimuli.

USC, Title 10, Chapter 141, Section 2389 December 2001

“§ 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.”
U.S. DoD IM Requirements

U.S. Law
USC, Title 10, Chapter 141, Section 2389 December 2001: “§ 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.”

Department of Defense Policy
DoDD 5000.01, May 12, 2003: E1.1.23. Safety. “… All systems containing energetics shall comply with insensitive munitions criteria.”

Joint Chiefs Policy
Joint Capabilities Integration and Development System: 23 Jan 15 Appendix J
Enclosure D “Standardized IM test protocols used in assessing a weapon’s response to unplanned threats are established in references ccccccc and dddddd.”

cccccc – JROCM 235-06, 6 November 2006, “Insensitive Munitions Standards and Passing Criteria”
Objective: Enable improved munitions response for the benefit of the warfighter

- Invest mostly in tangible IM technology and integrated technology demos
- IM not an independent requirement – rather part of an overall desired capability

Advocate/support key enablers
- Modeling and simulation
- Alternative munition concepts
- Key studies to guide investment decisions

Continually clarify and improve metrics

Expect and require high-quality archived technical work

Leverage other available technology and funding (and capability)
- An avenue for demonstration/maturation of non-JIMTP generated technology
- Exploit other dual-use technology investments (e.g., armor materials)
- But, not a substitute for other IM investment
**JIMTP Organization**

**Acquisition and S&T Senior Leadership Oversight**
- DoD IM IPT
  - Land Warfare & Munitions
    - Jose Gonzalez (Lead)
  - PEOs Responsible for IMSPs
  - Senior DoD Lab Managers
  - DoD/NNSA/DP JMP TAC Co-chair
    - Robert Hanrahan
    - and Senior DOE Lab Managers

**Navy**
- Jeff Brock (C), Deputy PM
- Financial Management
  - Inna Nisimov (C)

**Air Force**
- Program Manager
  - Anthony Di Stasio
  - ARDEC

**Army**
- JSIMTP
  - Environmental Liaison
  - EOD "Technical Liaison"
  - Kathryn Hunt, LW&M

**Working Level Acquisition and S&T Collaboration**
- MATG I
  - High Performance Propulsion
- MATG II
  - Minimum Signature Propulsion
- MATG III
  - Blast/Fragment Warheads
- MATG IV
  - Anti Armor Warheads
- MATG V
  - Gun Propulsion

**Performers:** DOD labs, DOE Labs, Industry

**MATG – Munition Area Technology Group**
DoD Portfolio contains five primary areas where Non-compliant munitions are identified for procurement.
Insensitive Munitions Research

technology development
• basic formulations
• scale-up
• case technology
• materials technology

technology demonstration
• sub-system demo
• integrated technology demos
• materials demonstration

full-scale development
• system integration

system/subsystem development

technology readiness level (TRL)

joint munitions program

jimtp 6.2
applied research

jimtp 6.3
advanced technology demonstration

navy 6.4 im technology transition and advanced development programs

peo ammo im
technology focus area program

jftp 6.2 & 6.3

muri

service laboratory tech base

peo & pm im programs

small business innovative research

industry internal research and development

our focus
6.2/6.3 Technology Roadmaps

- Each MATG has a technology roadmap package identifying:
  - Feeder technologies
  - Current Projects
  - Potential transition opportunities
  - Technology needs/gaps

Roadmaps updated and Technology Gaps identified in preparation for the Annual Call for Ideas

- Roadmaps presented to TAC for approval
FY16 Joint Munitions Technology
- Performers -

JIMTP is strengthening government-industry partnerships
## JIMTP Goals

### MATG I

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2023</th>
<th>2028</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow Cook-off</td>
<td>III (2)</td>
<td>IV w/active mitigation (2)</td>
<td>V w/active mitigation (3)</td>
</tr>
<tr>
<td>Fragment Impact *</td>
<td>V (1)</td>
<td>IV (2)</td>
<td>VI (1)</td>
</tr>
<tr>
<td>Bullet Impact *</td>
<td>IV (1,2)</td>
<td>V (1,2)</td>
<td>VI (1,2,3)</td>
</tr>
<tr>
<td>Fast Cook-off</td>
<td>IV (2)</td>
<td>V w/active venting (2,4)</td>
<td>V w/active venting (3)</td>
</tr>
</tbody>
</table>

### MATG II

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2023</th>
<th>2028</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cast Cure (2,4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extruded (1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extruded (1)/ Cast Cure (3,4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extruded (1)/ Cast Cure (5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fragment Impact</td>
<td>IV</td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Slow Cook-off</td>
<td>V</td>
<td>IV</td>
<td>V</td>
</tr>
<tr>
<td>Shape Charge Jet</td>
<td></td>
<td></td>
<td>PASS (40mm)</td>
</tr>
</tbody>
</table>

### MATG III

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2023</th>
<th>2028</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape Charge Jet</td>
<td></td>
<td></td>
<td>PASS 40mm (1)</td>
</tr>
<tr>
<td>Sympathetic Reaction</td>
<td>PASS (1a,1b)</td>
<td>PASS (1c, 2a)</td>
<td>PASS (2b)</td>
</tr>
<tr>
<td>Fragment/Bullet Impact</td>
<td>IV (1)</td>
<td>V (1, 2a)</td>
<td>V (2b, 2c)</td>
</tr>
<tr>
<td>Slow Cook-off</td>
<td>IV (1a,1b)</td>
<td>III (1c)</td>
<td>V (1a, 1b)</td>
</tr>
</tbody>
</table>

### MATG IV

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2023</th>
<th>2028</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fragment Impact</td>
<td>IV (1)</td>
<td>III (2)</td>
<td>IV (1,3)</td>
</tr>
<tr>
<td>Slow Cook-off</td>
<td>III (2)</td>
<td>V (1,3)</td>
<td>V (2,3)</td>
</tr>
</tbody>
</table>

### MATG V

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2023</th>
<th>2028</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fragment Impact</td>
<td>IV (1,3)</td>
<td>V (2)</td>
<td>V (1,2,3)</td>
</tr>
<tr>
<td>Slow/Fast Cook-off</td>
<td>IV (1,3)</td>
<td>V (2)</td>
<td>V (1,2,3)</td>
</tr>
</tbody>
</table>

*Note: PASS indicates material passed the specified test.*
Challenges

- Lack of data and characterization for large Dcrit (non-ideal) explosives
  - Directed Study to address
- Understanding of relationship between short duration shock vs long duration shock (HJ criteria vs wedge test)
  - Directed Study to address
- Understanding defects in “pristine” materials and the effect on sensitivity
- Understanding “damage” (cracks, voids, porosity, thermal) generation and propagation during insult
- Understanding the science behind SCO/FCO challenges
  - MSIAC workshop (JIMTP participation)
FY17 Portfolio

- **Applied Research (6.2) Areas**
  - General Purpose Bomb Boosters
  - Propellants for tank ammunition
  - Mixing and coating technologies
  - Novel ingredient formulations
  - Sensors for Slow Cookoff mitigation
  - Rocket motor propellants for SCO/FCO and BI/FI

- **Advanced Technology Development (6.3) Areas**
  - General Purpose Bomb fill formulations and venting
  - Rocket motor propellant demonstrations
  - Medium caliber ammunition FI and SCO
  - Shoulder launched weapon warhead and propellants
JIMTP FY18 Planning and FY17 Execution Cycle

**Plan**

- **RDTE Community Coordination**
- **Continuous GOTChA**
- **Acquisition Community Coordination (IMSPs, POA&M, TTA, TAA)**

**Program**

- New Idea White Papers
- New Idea Proposals
- Continuing Project Plans
- Refine Selected Project Plans

- Release Govt Call & ROTI 12 Oct 16
- New Idea Submission Deadline 14 Dec 16
- New Idea Selections 31 Jan - 2 Feb 17
- New Idea Proposal Due 20 Mar 17
- New Idea Proposal Briefs 29-31 Mar 17
- ALL Proposals Due 25 May 17
- Project Selections 27-29 Jun 17
- PIs Consult MATGs on NI
- PIs Consult MATGs on Proposals/Plans

**Review**

- Fall Meeting 18-21 Oct 16
- Spring Meeting 4 - 7 Apr 17
- Annual Report
- TAC Review LANL, NM ~22-24 Aug 17

MONTHLY INTERNAL MATG PROGRESS REVIEWS
Transitions to Acquisition Community are happening

Revised 2018, 2023 and 2028 goals

New capabilities drive new technologies to be investigated for IM improvement
  - Smaller/smart warheads with same or increased lethality
  - Extended range for access limited munitions
  - Extended range for cannons and mortars
  - MOOUT/FFE

Fundamental understanding gaps remain broad and complex but narrowing

Joint program with exceptional technologists working tough problems – always looking for new PIs to propose great ideas!
Transitions have been plentiful and trickle down technology is working!

JIMTP focus has begun to incorporate “tools” and “processing” where required

Large increase in funded efforts involving
  - Explosive processing
  - Small scale test development
  - Modeling and simulation