PM CAS Organization

PM Combat Ammunition Systems
PM, COL Scott Turner
DPM, Mr. Rene Kiebler
973 724-2003
973 724-2110

PM Excalibur
PM, LTC Mike Milner
DPM, Mr. Matt Butler
973 724-3152

- Block 1a-1
- Block 1a-2
- Block 1b
- EPIAFS/PEFCS

PM Mortars
PM, LTC Norman Hilton
DPM, Mr. Pete Burke
(acting)
973 724-2003

- Weapons and Fire Control
- Precision Effects
  - APMI
  - PGK

Conventional Ammunition
Mr. Martin Moratz
973 724-2245

- Artillery Ammunition
- Mortar Ammunition
- Energetics
- JMC Commodity Team

Advanced Systems
Mr. Paul Manz
973 724-2245

- Tech Base Transition

Business Management
Ms. Maryellen Lukac
973 724-7106

- RDTE/OPA/WTCV Branch
- PAA Branch
- Acquisition Planning Team
- Program Control Cell

PM CAS conducts operations in participation with PEO Ammo, ARDEC, JMC, and our partners in industry.
PM CAS Family of Products

**Precision Munitions**
- Excalibur
- PGK
- APMI (3 candidates in competition)

**Artillery Ammunition 105/155mm**
- HE
- Illum
- Smoke
- HERA
- Practice

**Mortar Platforms & Fire Control**
- LHMBC
- Dismounted MFCS
- Quick Stow on M1101 Trailer

**Mortar Ammunition 60/81/120mm**
- HE
- Illum
- Smoke
- FRPC

**Other Items**
- MFCS V5
- Software Pointing Device
- Gunner's Display
- SINCGARS Radio
- Squad Leader Computer
- M252A1 Lightweight 81mm Mortar System
- M224A1 Lightweight 60mm Mortar System
FY09 Contracting Summary

- Contracts Executed
  - 19 New Contracts ($91.6M) and 420 Modifications ($581.8M)
  - 113 Active Contracts and 80 Solicitations & Modifications

- Conventional Munitions Delivered
  - 283,000 60mm Mortar Ctg.
  - 324,000 81mm Mortar Ctg.
  - 188,000 120mm Mortar Ctg.
  - 599,000 105/155mm Artillery Projectiles
  - 52,400 Artillery Fuzes
  - 971,420 155mm Artillery Prop Chg Increments

- Precision Munitions – 132 Excalibur Rounds

Executed 439 Awards Valued at ~$750M
Delivered ~$1 Billion in Ammunition
FY10 Contracting Projections

- Anticipate ~25% Increase in Modifications
- Anticipate ~100% Increase in New Contracts (~$600M)
- Major FY10 Projected Awards:
  - SBSA IDIQ (Pica)
  - APMI UMR Production
  - 60/81mm HE/FRPC LAP
  - 60/81mm FRPC Fuzes & 120mm fins IDIQ
  - Mortar Ignition Cartridge & Burster LAP IDIQ
  - Supplemental Charges & Primer IDIQ
  - Large Cal Metal Parts IDIQ
  - MACS Ball Powder
  - M31A2 Propellant
  - M67 Prop Charges
  - Excalibur Engineering Services
  - Excalibur Production
  - PGK Production

Reflects Change to IDIQ Contracting Strategy
FY09/10 Completed

- M1155A1 Enhanced Portable Inductive Artillery Fuze Setter (EPIAFS) - FMR
- M95 Mortar Fire Control System (MFCS) Version 4.1 Software Block 2 - FMR
- M915 Cartridge, 105mm DPICM (< 1% UXO) - FMR
- XM1066 Infrared Illum Projectile - UMR & Follow-on
- M821A2 81MM, High Explosive Cartridges - FMR
- M889A2, 81MM, High Explosive Cartridges – FMR
- M1155A1 EPIAFS (integrated on a Paladin) – CMR
- M1066 155mm IR Ilum – TC-STD
- M150/ M151 MFCS (Mortar Fire Control System)/ MFCS-D Software v 5.0 – FMR
- M326 (Quick Stow) – TC-STD & FMR

FY10 Planned

- XM1064 105mm IR Illum – FMR
- XM1122 155mm Affordable Training (M483 Reuse) – TC-STD
- XM1156 Precisions Guidance Kit – TC-STD
- XM395 Accelerated Precision Mortar Initiative (APMI) – UMR
- XM982 Excalibur 1a2 - FMR
XM982 Excalibur
- Ia-1 Production Re-Start (Aug 09) – Produced 132 Projectiles / 116 Delivered to Theater (To Date)
- Ia-2
  - SET-S & SET-P Completed
  - Reliability Assessment is 86%-93% (86% is "most-likely")
  - Operational Test Readiness Review (OTRR) – 2 Completed (Dec 09)
  - Configuration Steering Board (CSB) Completed (Dec 09)
  - OTRR – 3 Completed (5 Feb 10)/ IOTE (48 Rounds) in Progress (6 Feb 10 Start)
- 1b Upcoming Demonstration Test and Down Select (July 10)

XM395 Accelerated Precision Mortar Initiative
- ONS Approved (8 Jan 09)
- Demos Completed with Candidate Systems (May 09)
- AR2B GOSC UMR Approval Received (Jun 09)
- Three Competitive Contracts Awarded (Oct 09)
- Completed Kick-offs & CDRs
- Fired (200 each) Inert Rounds at Yuma Proving Grounds for Firing Table Development
- Shoot-off (25 each live rounds) in Progress (2-17 Feb 10)

XM1156 Precision Guidance Kit (Increment 1)
- Completed Critical Design Reviews and Interoperability Demonstrations
- Demonstrated 50m Circular Error Probable (CEP) in Contractor Development Firings
- Successful Electromagnetic Environmental Effects (E3) Testing (Feb 10)
- On Track for Government Qualification Testing (May-June 10)
- Milestone C (July 10)
12 Sep 09
Specialist Ng was travelling in a Mine Resistant Ambush Protected (MRAP) vehicle when it was hit by a very powerful Improvised Explosive Device (IED). The IED ruptured the vehicle’s hull and fuel tank, which engulfed the vehicle interior in flames—to include sixteen M768 60mm mortar cartridges that were carried inside the cabin with the seven-man crew. Although several soldiers were seriously injured in the ambush, all survived. Specialist Ng credited the Inensitive Munitions (IM) features of the M768 cartridges with averting a much greater disaster.

SPC Alan Ng visits on 5 Oct 09
Insensitive Munitions

Fielded

IM Features of MACS Worked effectively as designed to minimize overall reaction

Exterior of building that remained standing after Fire

OEF IED attack on a MRAP carrying 16 60mm High Explosive M768 Mortar Cartridges. The IM design features resulted in the fuze separating from the shell body preventing high order detonations thus saving the lives of the Soldiers.

Problems, Challenges & Risk

- Negating the Affects of Unplanned Stimuli During the Life Cycle of Munitions
- Developing IM Solutions to Meet Legacy Form/Fit/Function
- Passing IM Tests and Meeting Ballistic and Performance Requirements
- Developing Affordable Novel Technologies, Without Creating Single Point Failures, within the NTIB
- Integration with PM Program Schedules to Timely Field IM Enhanced Munitions

Future/Emerging

Common Low-cost IM Explosive
- TNT Replacement – FY10
- Comp B Replacement – FY11

Passed Sympathetic Reaction without Barriers

<table>
<thead>
<tr>
<th>IM Test</th>
<th>FCO</th>
<th>SCO</th>
<th>BI</th>
<th>FI</th>
<th>SD</th>
<th>SCJI</th>
</tr>
</thead>
<tbody>
<tr>
<td>TNT Baseline (M795)</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
</tr>
<tr>
<td>IMX-101 (M795)</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
</tr>
<tr>
<td>Comp B Baseline (81mm)</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
</tr>
<tr>
<td>IMX-104 (81mm)</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
</tr>
</tbody>
</table>

M795 IM IMX-101 TNT Replacement Results

81mm IMX-104 Comp B Results

**Threats**

- FUEL FIRE Such as a truck or an aircraft on a flight deck
- NEARBY HEAT Such as fire in adjacent magazine store or vehicle.
- BULLETS Such as small arms from terrorists or combat
- FRAGMENTS Such as from bombs, artillery, or IEDs
- SYMPATHETIC REACTION Such as detonation of adjacent stores
- SHAPED CHARGE JET RPG, Bomblets, ATGMs: Combat or terrorists

**Passing Criteria**

- 50F/hr
- 6,000 ft/s

**Passed Sympathetic Reaction without Barriers**

- IMX-101 (M795)
- Comp B Baseline (81mm)
- IMX-104 (81mm)

**TNT Replacement**

- FY10

**Comp B Replacement**

- FY11

**Passed Sympathetic Reaction without Barriers**

- IMX-101 (M795)
- Comp B Baseline (81mm)
- IMX-104 (81mm)
How Can Industry Help?

- **Development**
  - Don’t Bid Beyond Capacity to Execute
  - Provide Realistic Proposals (Cost & Technical Maturity)
  - Understand Increased Data Rights Sensitivity
  - Don’t Promote ‘Technology’ over ‘Program of Record’
  - Be Prepared for Developmental Competition
  - Better APUC Fidelity
  - Improved Vendor Accountability/Interface Control

- **Production**
  - Don’t Bid Beyond Capacity to Execute
  - Improved Control of “Critical Processes” – Too Many Shutdowns
  - Must Improve Critical Defect Responsiveness – Average is ~20 Days
  - Improve Focus on Vendor Quality
  - Continued Pursuit of Six Sigma Quality
  - Support Government Quality Audits and Resolve Findings
  - Aggressively Pursue Reduced O/H Rates
Summary

- Supporting Overseas Contingency Operations (OCO)
  - Respond to Operational Needs from Theater
  - No shortages on either operational and training ammo
  - Supporting needs of Coalition Partners and Allied Nations

- Exceptional Customer Satisfaction

- Capability Improvements
  - Continually drive to improve our ammunition/equipment and provide the Warfighter with better capabilities

- Outstanding People/Develop Great Teams

Forging the Future of Indirect Fire
PM CAS Mission

MISSION

Perform Life-Cycle Management of Tube-Launched Indirect Fire Munitions, Mortar Weapons, and Mortar Fire-Control Systems
GOALS

- Supporting the OCO
  - Respond to Operational Needs from Theater
  - No shortages on either operational and training ammo
  - Supporting need of Coalition Partners and Allied Nations
- Exceptional Customer Satisfaction
- Capability Improvements
  - Continually driving to improve our ammo/equipment and provide the Warfighter with better capabilities
- Outstanding People/Develop Great Teams
The TDP scrub is a complete review & update of the TDP at the top drawing/round level, ending with a certification. It includes a review/update of all drawings & specifications, including all components of the TDP, to ensure that they are complete, correct, current, concise and properly marked with the appropriate distribution code. TDP components to be reviewed/updated as part of the detailed scrub include:

- Product, Packaging and Inspection Drawings/Documents
- Specifications and Standards
- Hazardous Component Safety Data Statements
- Outstanding Approved Engineering Changes
- Identification of any risks associated with the TDP, such as Single Point Failures (SPFs) and any equipment/materials that may be difficult to procure
- Development of 3-D Models
- Reduction/elimination of dimension & tolerance stack up
- Safety Critical Characteristics Review (SCC)
- Key Performance Characteristics (KPC)

**Ongoing Scrub:**
(completion Dec 2009)

- 155mm M549A1 HE RAP
- 81mm M821A2 HE
- 81mm M816 IR Illum
- 60mm M888 HE
- 60mm M769 FRPC
- 60mm M721 Illum

**Completed Scrub:**

- 60mm HE M720A1
- 81mm HE M889A1
- 120mm HE M933A1
- 120mm VL Illum M930
- M1 New Production with TNT

Continuously improved cyclical process including a training program to improve TD for all PM-CAS items
Post Award - Clarification of contract requirements

- Government expectations
- Education and training needed
- Critical Characteristic Control requirements
- Flow down of SCC requirements to subs
- Material certification requirements
- Audits of Suppliers, both prime and subs

Fully comprehend and comply with Contract requirements.

16 Post-Awards since March 2007

SCC – Safety Critical Characteristic    CCCP – Critical Characteristic Control Plan    CPOA – Critical Plan of Action
### Independent Audit Status

#### Supplier Ratings

<table>
<thead>
<tr>
<th>Satisfactory</th>
<th>No findings</th>
<th>22</th>
<th>Met or Exceeded Quality Management System controls for prevention of SCCs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfactory</td>
<td>Minor findings</td>
<td>4</td>
<td>Isolated lapses in Quality Management System controls. Not likely to introduce non-conforming material into the supply chain.</td>
</tr>
<tr>
<td>Un-Satisfactory</td>
<td>Major findings</td>
<td>5</td>
<td>Complete absence of a Quality Management System control.</td>
</tr>
<tr>
<td>Not yet Audited</td>
<td>8</td>
<td>Will audit [Some] out of [Total] this quarter</td>
<td></td>
</tr>
<tr>
<td>New Suppliers</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Planned Audits

<table>
<thead>
<tr>
<th>Crane AAA</th>
<th>IMT</th>
<th>GDOTS-Scranton</th>
<th>GDOTS-LeGardeur</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Crane, IN)</td>
<td>(Ingersoll, Ontario-CAN) M931 120mm FRPC</td>
<td>(Scranton, PA) Artillery/Mortar Bodies</td>
<td>(LeGardeur, Quebec-CAN) Mortar LAP</td>
</tr>
<tr>
<td>Visible, IR Candles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bluegrass AAD</td>
<td>Gayston</td>
<td>GDOTS-Valleyfield</td>
<td>Raytheon-NAPI</td>
</tr>
<tr>
<td>(Richmond, KY)</td>
<td>(Springboro, OH) Mortar Fins</td>
<td>(Valleyfield, Quebec-CAN) MACS Energetics</td>
<td>(Farmington, NM) XM982 EXCALIBUR</td>
</tr>
<tr>
<td>Mortar Fins</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 71 Audit events as of December 3, 2009

- 17%
- 12%
- 10%
- 10%
- 51%

**Producer’s Quality Systems verified at the factory floor.**
Quality in the Supply Chain

SCC Shutdowns

- Quantified risk to vendor base
- Identified preferred risk mitigation tool (CPOA)

Shutdown Cycle Time
80% Re-Start w/in 20 Calendar Days
Government Review
96% Complete w/in 3 days

Production Lapses & Re-Start Review Times in Calendar Days

| Number of Safety Critical Characteristic Shutdowns or Re-start Request Reviews |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Under 3 days | Under 5 days | Under 10 days | Under 15 days | Under 20 days | Under 25 days | Under 30 days | Under 60 days | Under 90 days | Over 180 Days |
| Closed Shutdowns | Re-start Reviews | Open Shutdowns |
FAT Acceptance

- Quantified pass rate (73%), and reasons for failure
- Better paperwork addresses around two-thirds of all conditionals or rejections

**Conditional/Rejection Causes for FATs**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Issues with Material Certification</td>
</tr>
<tr>
<td>A</td>
<td>Incorrect FA quantity</td>
</tr>
<tr>
<td>C</td>
<td>Non-destructive test failure (including environmental conditioning)</td>
</tr>
<tr>
<td>E</td>
<td>Ballistic Test Pending (for conditional approval only)</td>
</tr>
<tr>
<td>D</td>
<td>Destructive test failure</td>
</tr>
<tr>
<td>G</td>
<td>AIE not Approved</td>
</tr>
<tr>
<td>J</td>
<td>Missing or incorrect inspection or test data</td>
</tr>
<tr>
<td>B</td>
<td>Dimensional Inspection deficiency</td>
</tr>
<tr>
<td>F</td>
<td>Ballistic Test failure</td>
</tr>
<tr>
<td>H</td>
<td>Material or Material Properties deficiency</td>
</tr>
</tbody>
</table>

![Bar Chart](image)
PM CAS Vendor Quality Day

First Annual Meeting

Robust Agenda

- Lagging vs. Leading Quality Indicators
- Technical Data Package Improvement Effort
- Critical Characteristics Clause Implementation
- CPOA Development Primer
- Post Award Conferences (what to expect)
- Automated Inspection Equipment Procedure Review
- Quality Audit Process/Findings
- First Article Test Procedure Checklist
- Quality Metrics Review
- MIL-STD-1168 Implementation Guidance

Government panel to Address Questions/Concerns