ARDEC Overview - 54th Annual NDIA Fuze Conference
12 May 2010
Dr. Joseph A. Lannon
Director, ARDEC
**Vision:**
Innovative Armaments Solutions for Today and Tomorrow

**Mission:**
To develop and maintain a customer focused, world-class workforce that will execute, manage and continuously improve integrated life cycle engineering processes required for the research, development, production, field support and demilitarization of munitions, weapons, fire control and associated items.

**Advanced Weapons** – line of sight/beyond line of sight fire; non line of sight fire; scalable effects; non-lethal; directed energy; autonomous weapons

**Ammunition** – small, medium, large caliber; propellants; explosives; pyrotechnics; warheads; insensitive munitions; logistics; packaging; fuzes; environmental technologies and explosive ordnance disposal

**Fire Control** – battlefield digitization; embedded system software; aero ballistics and telemetry

**ARDEC provides the Technology for Over 90% of the Army’s lethality; Significant support to other services’ lethality**
ARDEC Supports Two LCMCs

Headquarters, Department of the Army

Army Materiel Command, AMC
Gen. Ann E. Dunwoody

Joint Munitions & Lethality LCMC
BG Larry Wyche

PEO Ammo
BG Jonathan A. Maddux

Research, Development and Engineering Command, RDECOM
MG Nickolas G. Justice

Armament Research, Development and Engineering Center, ARDEC
Dr. Joseph A. Lannon

Assigned/Direct Support Coordination

TACOM LCMC
MG Kurt J. Stein

• Program Executive Office Combat Support and Combat Service Support
• Program Executive Office Ground Combat Systems
• Program Executive Office Soldier

• Project Manager Close Combat Systems (PM CCS)
• Project Manager Combat Ammunition Systems (PM CAS)
• Project Manager Maneuver Ammunition Systems (PM MAS)
• Project Manager for Joint Services (PM Joint Services)
ARDEC at a Glance

- Established “Center of Mass” for Armament Systems and Munitions for Joint Services
- ARDEC is the largest tenant at Picatinny Arsenal
  - Over 500 Buildings/64 Laboratories
- Proven track-record supporting transition of technologies to the field;

<table>
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<th>14 Materiel Releases (MR) in FY 08</th>
<th>18 MR in FY 09</th>
<th>2 MR in FY10</th>
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<tr>
<td>13 Urgent Materiel Releases (UMR) FY 08</td>
<td>22 UMR in FY09</td>
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- A total of 186 New Weapons and Equipment fielded since 9/11
- ARDEC Gov’t Personnel* ~ 3570; 1340 new hires since FY99
  - Picatinny Site = 3095  Benet (Watervliet Arsenal) = 258
  - Rock Island Arsenal = 157  Adelphi & APG = 59
- >$200M invested in “World Class” experimental R&D facilities since mid-90’s; Additional $75M planned
- Strong partnerships with Industry, Academia, and other Government agencies - Growth and Success through Cooperative Research and Development Agreements (CRADAs) = 118
- Intellectual Property*:
  - Invention Disclosures – 85
  - Patent Applications – 183
  - Patents Issued – 9
- Patent License Agreements = 16
- In-house rapid prototyping initiatives demonstrating new desired capabilities, supporting production prove-out and initial fielding demands
- > $100M Tech Base portfolio addressing Joint needs (Core Tech Base/ManTech only; does not include SBIR or Congressional Plus-ups)
  - $160M in Congressional in FY10

* = as of 31 March 2010
ARDEC Core Competencies

**Advanced Weapon Systems**
- Direct Fire weapons
- Indirect Fire weapons
- Scalable lethal Effects
- Non-Lethal Systems
- Small/Medium/Large Caliber Ammunition
- Directed Energy
- Remote Armaments
-Insensitive Munitions
-Fuzes

- Telemetry
- Precision Armaments
- Grenades
- Maneuver Support Munitions
- Demolitions
- Weapons & Munitions Manufacturing technology
- Detonators
- Explosive ordnance devices

**Fire Control**
- Battlefield Digitization
  - Software Applications
- Embedded Systems
Software
- Firing Tables
  - Aeroballistics
  - Automated Test Systems
- Optics for Fire Control

- Smart Sight
- Projectile Tracking and Control
- Vehicle Health Management System
- Software Acquisition Support
- Software Engineering Processes
- Fire Control Technologies

**Collaboration Mechanisms**
- ATOs/Tech Base
- Defense Ordnance Technology Consortium
- National Small Arms Consortium
- International

- Agreements
- Test & service Agreements
- CRADAs
- Rapid Prototyping

**Advanced Energetics and Warheads**

- Propellants
- Explosives
- Pyrotechnics
- Warheads
  - Kinetic Energy
  - Chemical Energy
  - Shaped Charges
  - EFPs
  - Fragmentation
  - Thermo baric
  - Multi purpose & Scalable
  - Non lethal
- Environmental Technologies
- Demil technologies

**Emerging Technologies**
- Networked Lethality
- Defense Against Unmanned Systems
- Counter Terrorism Technologies
- Homeland Defense Technologies
- Advanced Materials / Nanotechnologies
- Novel Power & Energy Systems for weapons and munitions
- Armaments Manufacturing Science Technologies
- Reliability & Predictability Technology
- Modeling & Simulation of Armament systems
- System Engineering
Weapons and Ammunition
Fielded Since 9/11

186* successful fieldings since 09/11/2001

* = as of 15th March 2010

Army's Greatest Inventions
21 of 70 Soldier Choice Awards

* = unique systems approved for fielding (e.g. MR) since 9/11/01
Advance Fuze Technologies

MEMS Safe & Arm (S&A)

Excalibur XM 982

Affordable Precision Munitions
- Scalable Technology for Adaptive Response (STAR)
- Affordable Precision Technologies

Force Protection

EPIAFS

Non-Lethal Munitions

40mm LV Airburst Non-Lethal Munitions

Innovation

Lethal UAV

Kinetic Energy Active Protection System
ARDEC Fuzing
Technology Initiatives

• Scalable Technology for Adaptive Response (STAR) ATO
  – 250 mm GMLRS, 105 mm Precision, 30 mm Airburst

• Kinetic Energy-Active Protection System Target Detection Device (KE-APS TDD) ATO

• Cluster Munitions Replacement ATO

• DoD Joint Fuze Technology Program

• Affordable Precision Components ATO

KE-Active Protection System Interceptor

Practice Concept Cluster Munitions Replacement
Technology Insertion To Current Munition Items
• Addresses Industrial Base Single Point Failure Issues
  • Risk Mitigation:
    • Battery Aging
    • M734A1 Digital Signal Processor (Alternative Design)
  • Block Upgrades:
    • Standardization of Hand Grenade Fuzes
    • 30mm Increased sensitivity M759 Fuze
    • Mortar S&A enhancements
• PEO Ammunition / User Payoff:
  • Insert Current Technology Into Today’s Munitions
  • Preclude Obsolescence By Incorporating Component Technology
  • Provide Safer, More Reliable and More Lethal Munitions
**ARDEC In-House Fuzing Capabilities**

**Fuze Development Center**

**Current Projects Supported:**
- PGM Simulator
- SMADSNET
- EPIAFS GNC Trainer
- Artillery Training Kit
- M228 Support
- M762 Training Fuzes
- Anti-Tamper Fuze

**Capabilities for Rapid Prototyping:**
- Custom Circuit Card Design and Fabrication
- Automated Surface Mount Assembly
- Optical Strain and Stress Measurement
- Environmental Test
- Real-Time X-Ray Inspection
- Stereo lithography
- High Speed Spin Stand
- Machine Shop

**Mission: To Accelerate New Technology To The Field**
**General Info**

- Fuze function currently located at Adelphi, MD (already part of ARDEC)
- Provides focus on fuze science and technology efforts and early development
- 42 KSF: Admin space; Laboratory/Test areas; ammunition magazines
- Multiple sites around Picatinny Arsenal; renovations and new construction

![Army Fuze Engineering Complex](image1)

![Fuze Energetic Research Laboratory](image2)

![State of the Art Anechoic Chamber](image3)

![Fuze Electromagnetic Research Laboratory](image4)
Army Fuze Safety Review Board (AFSRB) Support 2009 - 2010

- **Initial/Interim Fuze Safety Certification (Test/TC)**
  - XM1156 Precision Guidance Kit (PGK) - 4 February 2009
  - Multi-role Anti-armor Anti-personnel Weapon System (MAAWS) 84mm Anti-Structure Munition (ASM) 509 - 4 March 2009
  - M762/M762A1 Electronic Time (ET) Fuze Used on 155mm XM1066 Infrared (IR) Illuminating Projectile – 8 April 2009
  - Selectable Lightweight Attack Munition (SLAM) M4E1 and M320E1 SLAM Improved Functional Trainer (SIFT) – 10 August 2009

- **Final Safety Certifications (MR):**
  - M153 Time Delay - Sympathetic Detonator (TD-SYDET) and M316 Trainer - 4 February 2009
  - Dual Safe Fuze for the AT4CS-RS 84mm HEAT Weapon - 18 March 2009
  - M156 Magneto-Inductive Remote Activation Munition System (MI-RAMS) with M39 Receiver (also know as “Type A Receiver”) - 9 April 2009
  - M783 PD/Dly Fuze Used with 81mm M889A2 HE Mortar Cartridge and M734A1 Multi-Option Fuze for Mortar (MOFM) Used with 81mm M821A2 HE Mortar Cartridge – 30 June 2009
  - Smoke, Visual, Restricted Terrain, XM106 (formerly known as XM106 Screening Obscuration Device-Visual Restricted (SOD-Vr)) with M201A1 Mod 3 Fuze - 27 July 2009
  - F555 Electronic Time (ET) Fuze Used on 84mm 545C Illuminating Round - 25 September 2009
  - XM7 Spider (SW control of Safety Critical Functions) – June 2009

- **UMR & Approval Letters**
  - AFSRB, Navy Fuze & Initiation Systems Technical Review Panel (FISTRP), and Air Force Nonnuclear Munitions Safety Board (NNMSB) Executive Secretary on Anti-Structural Munition (ASM) Hand Grenade, MK14 - Mod 25 February 2009
  - 2.75 Inch (70mm) XM282 Multi-Purpose Penetrator (MPP) Warhead Rocket - 28 April 2009
  - M762/M762A1 Electronic Time (ET) Fuze Used on 155mm XM1066 Infrared (IR) Illuminating Projectile - 14 May 2009
  - Viper Strike Munition (VSM) Used on the Hunter Unmanned Aerial Vehicle (UAV) (Impact Mechanism change and added timeout detonation feature) - 3 September 2009

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**ARDEC FOCUS:**
Smaller, Smarter, Safer Fuzing for the Warfighter
Summary

• Global Leader In Armaments Technology Solutions
• Provide Exceptional Customer Satisfaction
  – We work with soldiers:
    – Develop new armaments systems
    – Improve fielded systems
    – Quickly solve field problems
• State of the Art Fuzing Capabilities
  • In-House Facilities
  • S&T Technical Expertise

Flexible, Agile, Innovative and Responsive