Precision Guided Missiles and Rockets
Program Review
Presented to
PRECISION STRIKE ANNUAL PROGRAMS REVIEW
15 April 2008

LTC Mark Pincoski
Product Manager PGM/R
Precision Fires Rocket & Missile Systems (PFRMS)
Phone: (256) 876-5727 (DSN 746)
mark.pincoski@msl.army.mil

ANY WARFIGHTER, ANYWHERE, ALL THE TIME

Distribution A: Approved for Public Release
PGM/R Agenda

- GMLRS Program Review
  - Program Schedule/Evolution
  - GMLRS DPICM
  - GMLRS Unitary
  - Operational Update

- ATACMS Program Review
  - Program Schedule/Evolution
  - ATACMS Unitary
  - Operational Update
Guided MLRS Rockets
# GMLRS Program Schedule

<table>
<thead>
<tr>
<th>FY07</th>
<th>FY08</th>
<th>FY09</th>
<th>FY10</th>
<th>FY11</th>
<th>FY12</th>
<th>FY13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
<td>4th</td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**GMLRS DPICM Full Rate Production & Deployment**

**GMLRS Unitary SDD**

**GMLRS Unitary LRIP**

**Unitary SDD**

**Alternative Warhead Development**

**Unclassified**

---

**Any Warfighter, Anywhere, All The Time**

PGM Conf Apr 2008
Any Warfighter, Anywhere, All The Time

MLRS/GMLRS
History and Evolution

Area Suppression

- Basic Rocket (M26)
  - 1980
  - 10-32 km Range
  - Free Flight Rocket
  - Improved Accuracy
  - 518 ea M77 DPICM Grenades
  - 5% to 10% Dud Rate
  - Defeats Soft Targets

- Extended Range Rocket (M26A2)
  - 1996
  - 13-45 km Range
  - Free Flight Rocket
  - Improved Accuracy
  - 518 ea M77 DPICM Grenades
  - 5% to 10% Dud Rate
  - Defeats Soft Targets

- Guided DPICM Rocket (M30)
  - 1998
  - 15-70 km Range
  - Inertial Guidance with GPS Assist
  - 404 ea M101 DPICM Grenades
  - <1% Dud Rate
  - Significantly Reduced Target Footprint
  - Defeats Soft Targets

- Guided DPICM Rocket w/SDF (XM30E1)
  - 2004
  - 15-70 km Range
  - Inertial Guidance with GPS Assist
  - 404 ea M101 DPICM Grenades
  - <1% Dud Rate
  - Significantly Reduced Target Footprint
  - Defeats Soft Targets

- Guided Unitary Rocket-UMR (M31)
  - 2005
  - 15-70 km Range
  - Inertial Guidance with GPS Assist
  - Improved Accuracy
  - 518 ea M77 DPICM Grenades
  - 5% to 10% Dud Rate
  - Defeats Soft Targets

- Guided Unitary Rocket (XM31E1)
  - 2008
  - 15-70 km Range
  - Inertial Guidance with GPS Assist
  - 200 lb Unitary Warhead
  - Defeats Hard Stationary Point & Soft Area Targets
  - Tri Mode Fuze
    - Point Detonate
    - Delay
    - Low Collateral Damage

- Guided Advanced Warhead Rocket
  - 2009
  - 15-70 km Range
  - Inertial Guidance with GPS Assist
  - 200 lb Unitary Warhead
  - Defeats Hard Stationary Point & Soft Area Targets
  - Tri Mode Fuze
    - Point Detonate
    - Delay
    - Low Collateral Damage
    - Trajectory Shaping

Precision Strike

- 2009
  - 15-70 km Range
  - Inertial Guidance with GPS Assist
  - 200 lb Unitary Warhead
  - Defeats Hard Stationary Point & Soft Area Targets
  - Tri Mode Fuze
    - Point Detonate
    - Delay
    - Low Collateral Damage
    - Trajectory Shaping

- 2014
  - 15-70 km Range
  - Inertial Guidance with GPS Assist
  - Complies w/Latest Cluster Munitions Policy
  - Significantly Reduced Target Footprint
  - Defeats Soft Targets

- 2004
  - 15-70 km Range
  - Inertial Guidance with GPS Assist
  - 200 lb Unitary Warhead
  - Defeats Hard Stationary Point & Soft Area Targets
  - Tri Mode Fuze
    - Point Detonate
    - Delay
    - Trajectory Shaping

- 2009
  - 15-70 km Range
  - Inertial Guidance with GPS Assist
  - 200 lb Unitary Warhead
  - Defeats Hard Stationary Point & Soft Area Targets
  - Tri Mode Fuze
    - Point Detonate
    - Delay
    - Proximity
    - Low Collateral Damage
    - Trajectory Shaping
**GMLRS DPICM Overview**

- **Overview**
- **Characteristics**
  - Range: 70 Km
  - Effectiveness: 30% Expected Fractional Damage
  - Rocket Reliability: Threshold: 92%; Objective 95%
  - Guidance: Inertial GPS Aided
  - All Weather; Day/Night
  - Immediate Response
  - <2% Hazardous Dud Rate
  - Launched From M270A1 or HIMARS

**Common GMLRS Components**
- Tail Section
- Rocket Motor Section
- Warhead Section
- Guidance & Control Section

- **Weight at Launch:** 668 lbs
- **Weight at Burnout:** 401 lbs
- **CG (X) at Launch:** 7" 2"
- **CG (X) at Burnout:** 5" 11"
- **Length:** 12" 11"
- **Diameter:** 9"
Any Warfighter, Anywhere, All The Time

CHARACTERISTICS

• 80% Commonality of Components With GMLRS DPICM
• Additional Commonality With GMLRS Unitary UMR Rocket Currently In Production and Employment
• Launchers - HIMARS or M270A1
• Range - 70 Km
• All Weather; Day/Night
• Accuracy - Less than 5 meters Circular Error Probability (CEP)
• Guidance System (GS) - Contains Inertial Measurement Unit with GPS Updates
• Control Actuation System (CAS) - Commands Canard Steering
• Payload – 200 lb Class Unitary Warhead
• Tri-Mode Fuze: Point Detonate, Delay, Proximity
• Rocket Motor – Arcadene 361 HTPB (260.5 lbs) Propellant With Steel Case
• Spinning Tail Fins / Roll Joint Assembly - Decouples Rocket Roll from the GS
• Electronic Safe and Arm Fuze (ESAF) - Initiates Warhead

Weight at Launch | 668 lbs
Weight at Burnout | 401 lbs
CG (X) at Launch  | 7" 2"
CG (X) at Burnout | 5" 11"
Length            | 12"11"
Diameter          | 9"
• In Production Qualification Tests Conducted in September and November 2007 the BT Fuze SDF Demonstrated a Hazardous Dud Rate of Less Than 0.15% and a Reliability Rate of Greater Than 96%

• Meets all Requirements Established in January 10, 2001, Secretary of Defense Policy Memorandum Stating That Beginning in FY 2005, All Newly Procured Cluster Submunitions Must Have a Dud Rate of Less Than 1%

• SDF will be Integrated into GMLRS DPICM Production at the Earliest Opportunity (FRP2 deliveries in FY 2009 from FRP2 Contract)
GMLRS-Unitary Rocket Usage

672 Total Rockets Fired As Of 26 March 2008

Who Shoots GMLRS-U:

<table>
<thead>
<tr>
<th>Who</th>
<th>Qty</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Army</td>
<td>564</td>
<td>83.93%</td>
</tr>
<tr>
<td>USMC</td>
<td>24</td>
<td>3.57%</td>
</tr>
<tr>
<td>UK</td>
<td>84</td>
<td>12.50%</td>
</tr>
</tbody>
</table>

US Army Missions

Who Requests GMLRS-U:

<table>
<thead>
<tr>
<th>Who</th>
<th>Qty</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Army</td>
<td>349</td>
<td>61.88%</td>
</tr>
<tr>
<td>Marines</td>
<td>121</td>
<td>21.45%</td>
</tr>
<tr>
<td>Other</td>
<td>94</td>
<td>16.67%</td>
</tr>
</tbody>
</table>

How GMLRS-U is employed:

<table>
<thead>
<tr>
<th>How</th>
<th>Qty</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Troops In Contact</td>
<td>177</td>
<td>31.38%</td>
</tr>
<tr>
<td>Pre-Planned</td>
<td>387</td>
<td>68.62%</td>
</tr>
</tbody>
</table>

Environments GMLRS-U is employed:

<table>
<thead>
<tr>
<th>Environment</th>
<th>Qty</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban/COIN</td>
<td>535</td>
<td>94.86%</td>
</tr>
<tr>
<td>Other (TD/Test)</td>
<td>29</td>
<td>5.14%</td>
</tr>
</tbody>
</table>

Capability Gap: Persistent, responsive, all-weather, rapidly-deployable, long-range, surface-to-surface, precision-strike capability.

Description

- GPS-Augmented Inertial Guidance
- 200lb-Class HE IM-Compliant Warhead
- Multi-Fuze Selection (Point Detonating, Delay, Proximity)
- 15-70km Range

Current Targets

- Precisely Located/Mensurated Point targets
- Congested/Complex Urban Targets
- Targets in Areas Where Collateral Damage is of Concern

Effectiveness/Reliability

- BDA Shows High Level of Effectiveness
- Rare Reports of Minor Collateral Damage
- Reliability of US Army Missions: 98.6%
Army Tactical Missile System
ATACMS History and Evolution

ATACMS Has Evolved From an Area to Precision Weapon

Any Warfighter, Anywhere, All The Time
### ATACMS Family Of Munitions

<table>
<thead>
<tr>
<th>Variant</th>
<th>Nom.</th>
<th>Navigation</th>
<th>Mission</th>
<th>Munition</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ATACMS BLOCK I</strong></td>
<td>M39</td>
<td>Inertial Guidance (MGS)</td>
<td>Area Weapon System (APAM)</td>
<td>M74 Submunition</td>
<td>Min – 25 km</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max – 165 km</td>
</tr>
<tr>
<td><strong>ATACMS BLOCK IA</strong></td>
<td>M39A1</td>
<td>GPS Aided Inertial Guidance</td>
<td>Area Weapon System (APAM)</td>
<td>M74 Submunition</td>
<td>Min – 70 km</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max – 300 km</td>
</tr>
<tr>
<td><strong>ATACMS QRU</strong></td>
<td>M48</td>
<td>GPS Aided Inertial Guidance (MGS II)</td>
<td>Precision Point</td>
<td>WDU - 18 Unitary Warhead, FMU-141/B PD Fuse</td>
<td>Min – 70 km</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max – 270 km</td>
</tr>
<tr>
<td><strong>ATACMS T2K</strong></td>
<td>M57</td>
<td>GPS Aided Inertial Guidance (T2K)</td>
<td>Precision Point (near vertical engagement)</td>
<td>WDU - 18 Unitary Warhead, FMU-161/B PD Fuse</td>
<td>Min – 70 km</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max – 270 km</td>
</tr>
</tbody>
</table>
CHARACTERISTICS

- Launchers - HIMARS or M270A1
- Range - 70 Km Minimum / 270 Km Maximum
- All Weather; Day/Night
- Accuracy - Less than 9 meters Circular Error Probability (CEP)
- Guidance System (GS) - Contains Inertial Measurement Unit with GPS Updates
- Control Actuation System (CAS) - Commands Canard Steering
- Payload – 500 lb Class Unitary Warhead
- Tri-Mode Fuze: Point Detonate, Delay, Proximity
**Total ATACMS QRU Fired: 44**

- **Successful (Reliability)** 43  97.73%
- **Failures** 1  2.27%

**How ATACMS QRU is employed:**

- **Time-Sensitive Targets**
- **Pre-Planned Targets**
- **Urban/Non-Urban Environments**

**Mission Process**

- Target located by Multiple Sensors
- Target refined using Precision Strike Suite- Special Operation Forces or Mensuration via Rainstorm/Raindrop, etc.
- Passed to AFATDS for tactical fire control
- Launcher receives and executes mission
Summary

• GMLRS And ATACMS Provide the Warfighter An Unprecedented Capability That is Proven in Combat
• GMLRS Unitary Continues To be Used In Current Operations
• GMLRS DPICM And Unitary Production Deliveries Ongoing
• GMLRS Unitary To Enter Full Rate Production In 2009
LTC Mark Pincoski
Product Manager - Precision Guided Missiles and Rockets
Precision Fires Rocket & Missile Systems (PFRMS)
SFAE-MSLS-PF
Building 5250
Redstone Arsenal, AL 35898-8000
Phone: (256) 876-5727 (DSN 746)
mark.pincoski@msl.army.mil
Acronyms

AMRDEC – Aviation and Missile Research and Development Center
ATACMS – Army Tactical Missile System
CENTCOM – U.S. Central Command
DOD – Department of Defense
DPICM – Dual Purpose Improved Conventional Munitions
FRP – Full Rate Production
GMLRS – Guided Multiple Launch Rocket System
GPS – Global Positioning System
HIMARS – High Mobility Artillery Rocket System
IED – Improvised Explosive Device
IM – Insensitive Munitions
JROC – Joint Requirements Oversight Council
LRIP – Low Rate Initial Production
MIPA – Missile Production Allocation
QRU – Quick Reaction Unitary
RDT&E – Research, Development, Test and Evaluation
SLEP – System Life Extension Program
UXO – Unexploded Ordnance