



EXPEDITIONARY FIRE SUPPORT SYSTEM

Ammunition Qualification Test Program



Agenda



- Program Overview
- System Description
- Test Program
- Lessons Learned



Program Overview

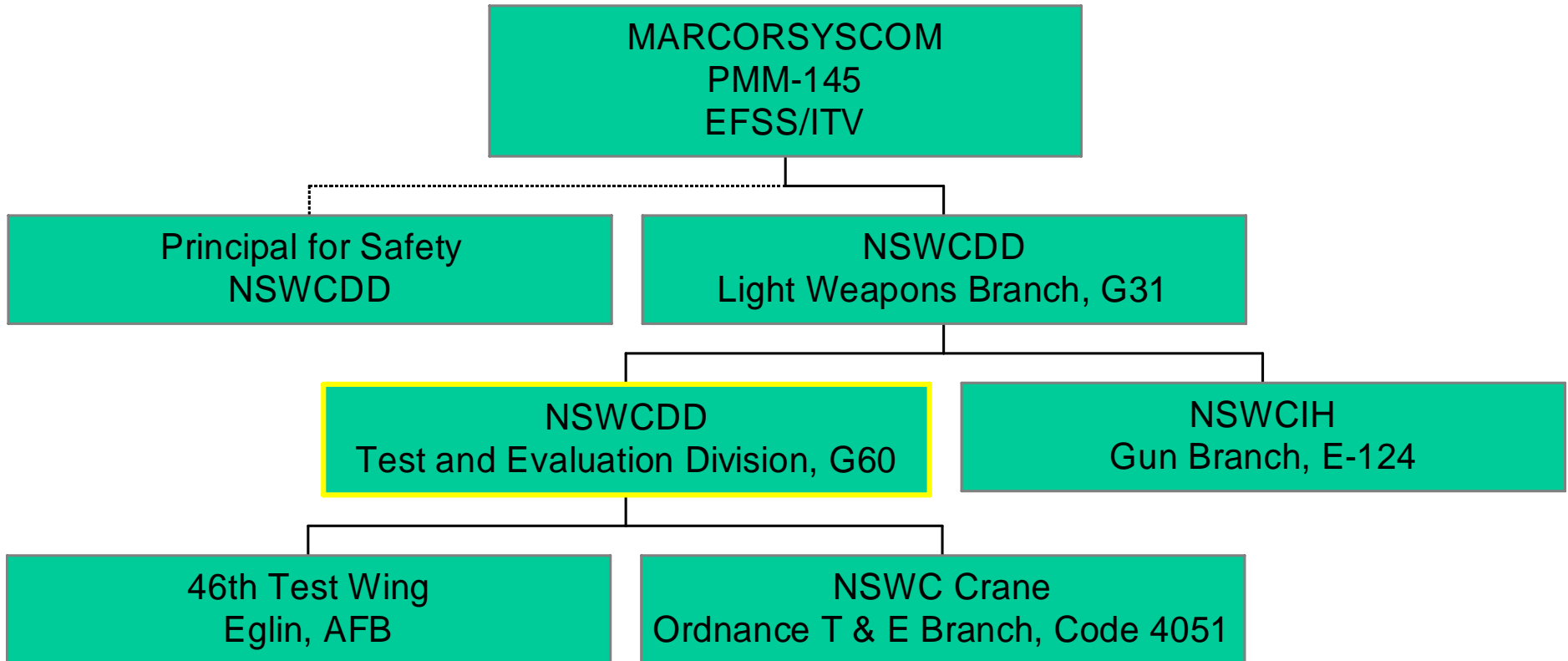


- Program Sponsor - MARCORSYSCOM, PMM-145
General Dynamics Ordnance and Tactical Systems, Prime Contractor
 - Rapidly field the system with four ammunition variants
 - Internally transportable in the V-22

- NSWCDD and NSWCIH Tasked to Qualify Ammunition
 - NSWCDD, G31, Light Weapons Branch
 - NSWCDD, G60, Test and Evaluation Division, plan, coordinate and conduct test activities
 - Test program started in August 2005.
 - Qualification ammunition delivered in December 2005, major tests completed by November 2006



Test Program Organization





EFSS Mission



EFSS is a “close supporting, all weather, quick responsive indirect fire system supporting Marine Expeditionary Units in the Ship-to-Objective Maneuver” providing accurate fires from with the 120mm rifled towed mortar to 8.1km. The major components of the EFSS are the 120mm rifled towed mortar weapon, the weapon prime mover, a suite of 120mm rifled ammunition, the ammunition supply vehicle, an ammunition trailer, and the ballistic control computer.

The EFSS will be the principal indirect fire support system for the vertical assault element of a Ship to Objective Maneuver (STOM) force.

The EFSS will be employed within the Ground Combat Element (GCE) of the Marine Air Ground Task Force (MAGTF).

Operated by a five-man crew, the EFSS provides indirect fire support that can be directed over friendly troops and out to ranges of 8.1km.





Development, Procurement & Urgency



- Development
 - IM compliant fill for High Explosive Round
 - Modifications to the ammunition containers
 - Qualification Testing

- Procurement
 - LRIP Decision June 2006
 - Full Rate Production August 2007
 - IOC August 2007

- Urgency
 - Mission Need Statement (April 2001)
 - IOC FY2007
 - High Priority USMC Program



XM327 120mm Rifled Towed Mortar



- Original Design in Service Since 1971
 - Fielded by four NATO countries and Japan
 - Estimated 500,000 rounds fired
- Operated By a Five-man Crew
- Spin Stabilized Projectile Provides Improved Accuracy



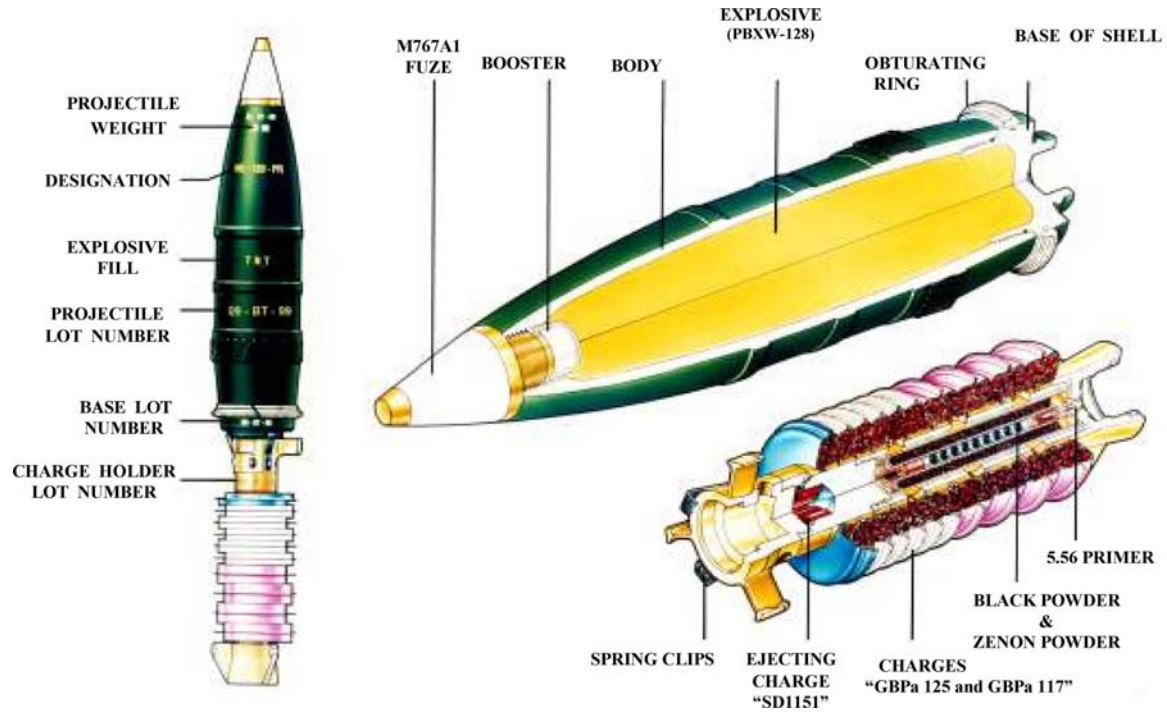
Ammunition Suite



- EFSS Will Be Deployed With Four Types Of Rounds
 - XM1101 High Explosive (HE) w/IM modifications
 - XM1103 Smoke (White Phosphorous (WP))
 - XM1105 Illumination (ILLUM)
 - XM1107 Practice (PRAC)

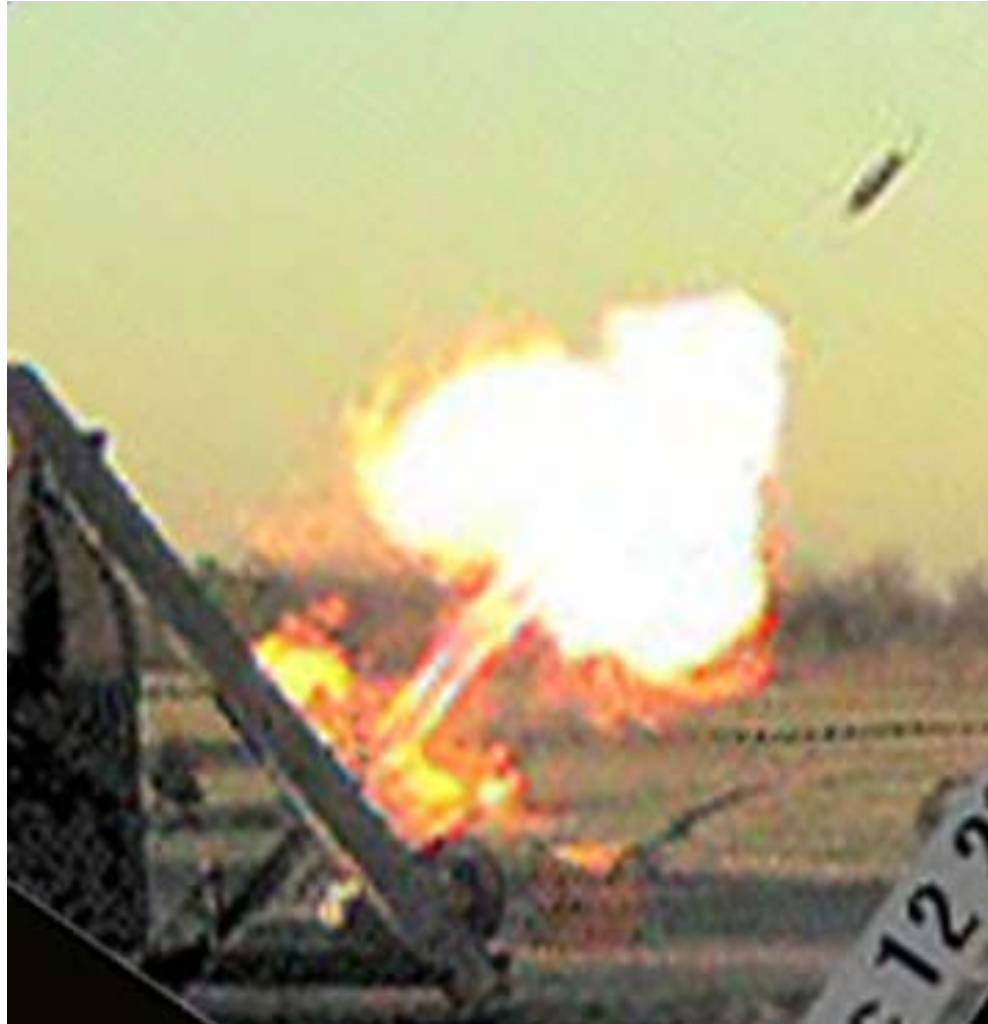


Ammunition





Ammunition





Ammunition Trailer



- Loaded 6X5 Horizontally for Vehicle Transport and Palletized 6X6 Horizontally for Shipping (XM1101 HE, XM1105 ILLUM, and XM1107 PRAC Rounds)
- Loaded 5X5 Vertically for Vehicle Transport and Shipping Palletized (XM1103 SMOKE Rounds)

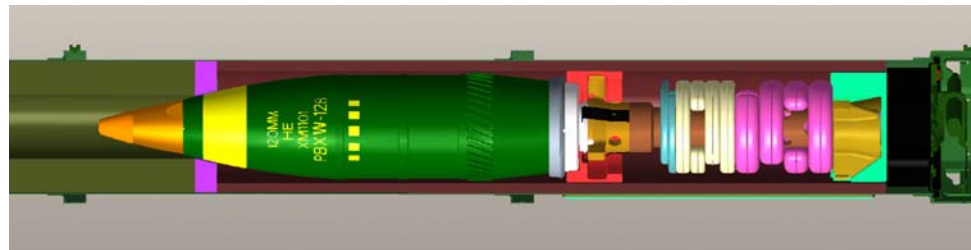




EFSS Ammunition Shipping/Storage Container

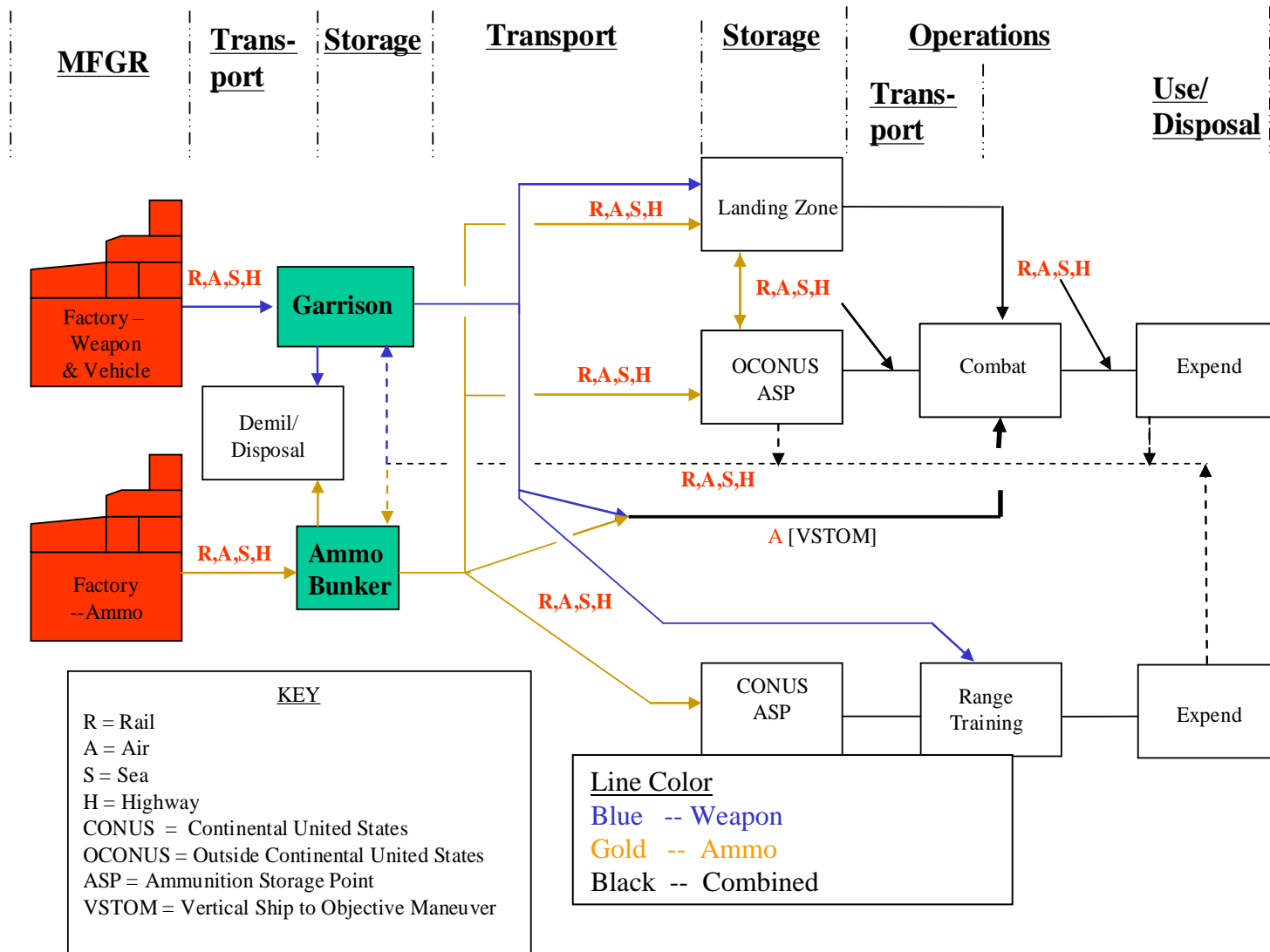


- Rounds Packaged in Metal Ammunition Containers
 - PA117 vented and PA103 containers
- Blowout Panels for Rapid Out-Gassing Venting
- Relief Valve for Slow Out-Gassing Venting
- Performance Oriented Packaging (POP) Certification Complete





Stockpile to Target Sequence





EFSS IM Threat Hazard Assessment (THA)



- THA Conducted in January 2005
- Threats Analyzed
 - Thermal environments produced by hydrocarbon fuel fires
 - Shock environments produced by detonation of other weapons
 - Impact environments by bullets, fragments, shaped charge jets, spall
- Determined Tests To Conduct
 - Slow Cook-Off (SCO)
 - Fast Cook-Off (FCO)
 - Bullet Impact (BI)
 - Fragment Impact (FI)
 - Sympathetic Detonation (SD)
 - Shaped Charge Jet Impact (SCJI)
- Determined Test Not To Conduct
 - Spall Impact (SI) – not transported or stored in armored vehicle or armored enclosure



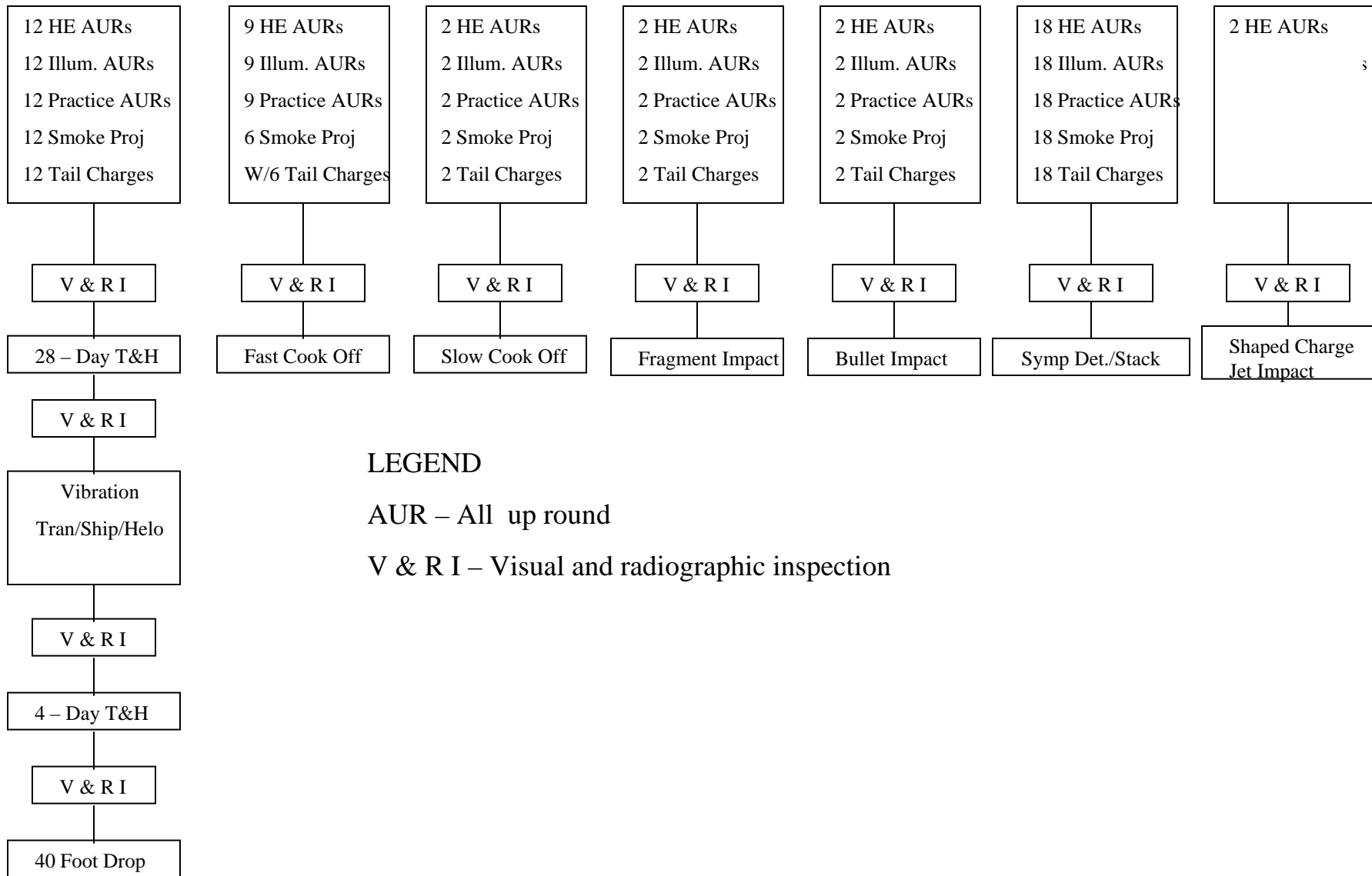
TEST PROGRAM



- Harmonized IM and Hazard Classification Test Plan.
- Comprehensive Environmental/Durability Test Series.
- Collaboration Between NSWCDD, NSWCIH, NSWCDD And Eglin AFB for test execution.



HARMONIZED IM/HC TESTS



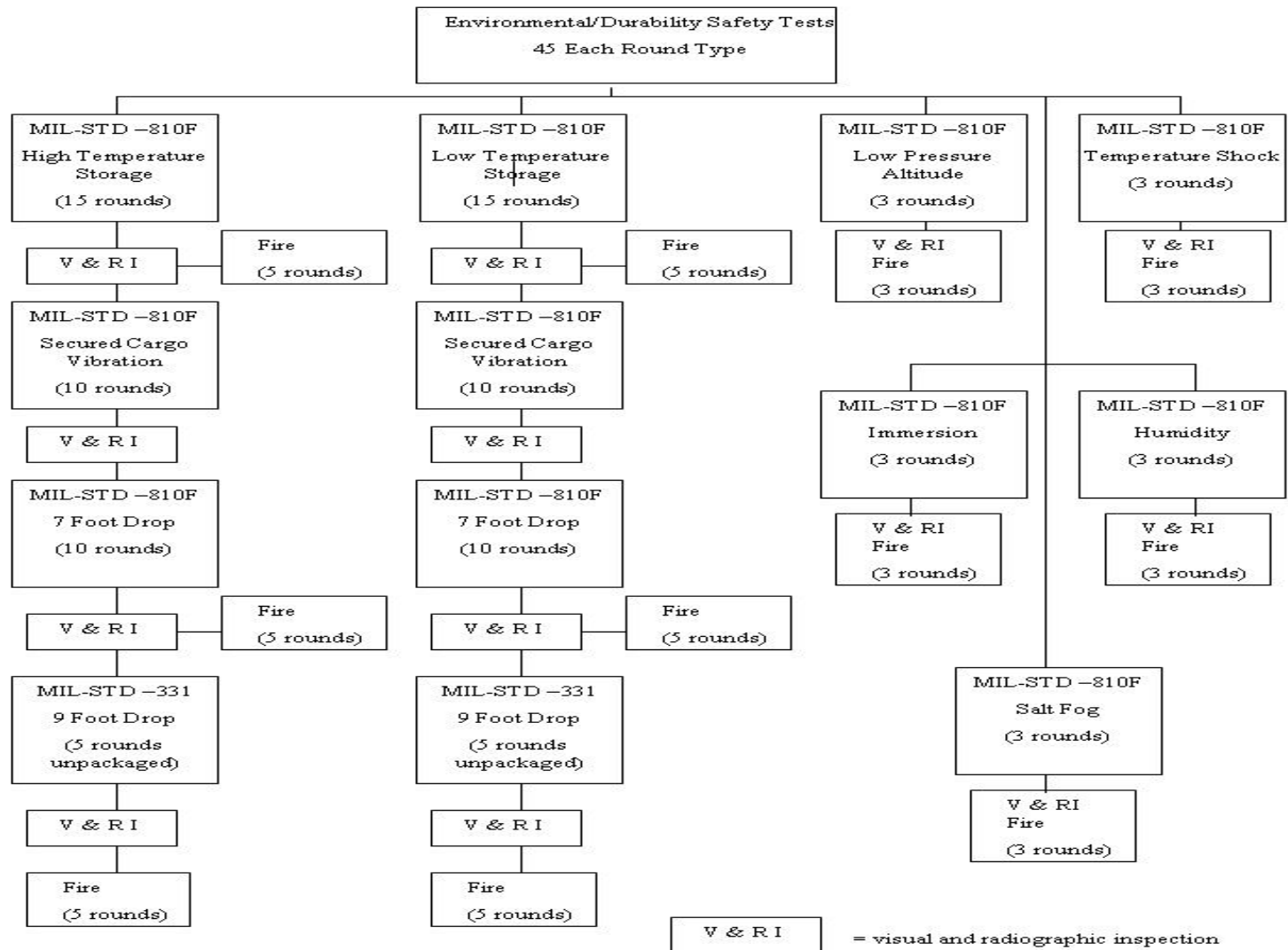
LEGEND

AUR – All up round

V & R I – Visual and radiographic inspection



ENVIRONMENTAL/DURABILITY





TEST CHALLENGES



- Schedule
 - Concurrent work
 - Incorporating packaging changes into work flow
- Large Number of Tests
 - 44 IM tests total
 - 105 Environmental tests total
- Volume of Data
- Hazard Classification of Mixed Smoke Pallet



EARLY TEST RESULTS



- Packaging Problems At High Temperature
 - Non-hazardous off gassing produced overpressure
 - One way check valve installed

- Support Dunnage Problems During Vibration
 - Aft support broke down during transportation vibration at temperature
 - Dunnage redesigned and rounds repackaged

- Tests Repeated



TEST RESULTS



- Planned Tests Completed, Regression Testing Underway
 - Packaging changes
 - IM signature, ammunition performed well
- Gun firing at NSWCDD and Hawthorne, NV





Lessons Learned



- Leverage Test Facilities and Capabilities
 - Schedule
 - Idea sharing

- Quick Response of PMO and Prime Contractor Invaluable

- Communication = Flexibility



Questions?

