Missile Demil Integration Efforts

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• Letterkenny Munitions Center (LEMC) Ammonium Perchlorate Rocket Motor Destruction (ARMD) Capability
  – Closed thermal Destruction of Army and OSM rocket motors containing AP propellant
  – Addresses ~28 different rocket motor systems

• Anniston Munitions Center (ANMC) MLRS Warhead Processing Capability
  – Automated Warhead Disassembly and closed thermal destruction of MLRS M77 Grenades
• ARMD plant designed to process 10,000 rocket motors annually
  – Provides conditions for complete combustion
  – Collects particulate matter and treats hydrochloric acid (HCl)
  – Thermal Treatment Chamber dimensions are ~19 ft. Diameter by ~115 ft. long
  – Designed to process full-up rocket motors up to 680 lbs net explosive weight (NEW) and motor segments up to 800 lbs NEW
  – Flexibility to address ~28 different rocket motor systems

• ARMD Capability houses five main facilities:
  – Motor Preparation Building
  – Thermal Treatment Chamber (TTC)
  – Remote Automated Sealing, Loading, & Ignition circuit (RAMSLIC) Shelter
  – Pollution Abatement System (PAS)
  – Effluent Handling Shelter (EHS)
Main TTC Structure

- TTC
- EHS
- RAMSLIC Shelter
Motor Preparation Building

- Prepare motors for firing and install ARMD igniter
- Remove packaging, environmental seal, unnecessary hardware
- Major Components:  
  - Control Room  
  - 5-ton Bridge Crane  
  - Rocket Motor Conveyor System
The RAMSLIC facilitates the safe loading, firing and unloading of rocket motors into the TTC.

The RAMSLIC is located in a shelter at the end of the TTC.

Roll-off bins for disposal of fired cases located nearby.

The RAMSLIC consists of:
- Trolley System and Trolley Base
- Autoclave Door with Locking Ring
- Motor Shelf
- Two 5-Ton Bridge Cranes
- Spent Case Bins

Prototype RAMSLIC demonstrated with various motors at China Lake testing.
RAMSLIC Shelter

RAMSLIC

- Locking Ring
- Motor Shelf
- Autoclave Door
- Trolley System
• The TTC is a 19’ OD x 115’ L pressure vessel with 1” thick walls and elliptical heads (~30,000 cu. ft. internal volume)
• The TTC provides conditions for completion of combustion and captures exhaust gases until release into the PAS
• Nozzle system contained within vessel washes down walls and floor to flush out settled particulate and residual HCl as required
• TTC has a working pressure of 150 psi and a burst pressure of 250 psi
• TTC features:
  – Two 24” burst disks rated at 137 – 150 psi
  – Two 36” access ports
  – Vent Valve located at the far end
  – Specialized coating (high nickel alloy)
  – Internal sacrificial shielding for potential deflagration events
Thermal Treatment Chamber
Pollution Abatement System (PAS)

- All exhaust gases captured in the TTC are pulled through the PAS at a controlled rate via an induced draft fan
- Wet scrubber technology utilized to remove HCl and particulate
- Magnesium Hydroxide used as HCl neutralizing agent
- The PAS major components are:
  - Venturi Scrubber
  - Spray Tower
  - Packed Bed Scrubber Tower (ADIOX® Tower)
  - Induced Draft Fan
  - Vent Stack
- Prototype PAS demonstrated in motor firings at China Lake at greater than 95% reduction in HCl, 98% reduction in particulate, and 99% reduction in dioxins and furans
- The ARMD and associated PAS are permitted by the Pennsylvania Department of Environmental Protection (PADEP)
Pollution Abatement System

- Spray Tower
- Venturi Scrubber
- ADIOX® Tower
- Vent Stack
- ID Fan
The EHS is designed to:
- Filter/collect particulate
- Neutralize/filter all brine that is used in the thermal treatment chamber wash (TTCW) system and the PAS

Consists of two systems linked through the common use of brine:
- TTCW System
- Scrubber Neutralizer System

Major components:
- TTCW Neutralizer Tanks
- Filter Presses
- Filtrate (Brine) Tanks
- Caustic Storage Tank
- Scrubber Neutralizer Tank
- Scrubber Clarifier
- Scrubber Recirculation Tank
Effluent Handling System

Effluent Handling Shelter during construction

- TTCW Neutralizer Tanks
- Caustic Storage Tank
- Filtrate Tanks
- Scrubber Neutralizer Tanks
- Neutralizer Tanks
• Rocket Motor Segmenting Capability being developed in order to downsize larger motors
• Largest segment planned for TTC is 805 pounds net explosive weight
• The Water-Cooled Band Saw has completed factory acceptance testing and is scheduled for final testing in early 2016
• Anniston Munitions Center (ANMC) MLRS Warhead Processing Capability
  – Automated Warhead Disassembly and closed thermal destruction of MLRS M77 Grenades
Automated Disassembly of MLRS Warheads

- Warhead Input Station
- Chipless Machining Center
- Grenade Removal Stations
- Grenade Placement Station
- Grenade Fuze Removal Station

After Warhead disassembly:
- De-fused grenades
- Pulled fuses
- Empty foam packs
- Empty warhead skins
Grenade Removal Station

Grenade Removal Tool

Grenade Placement Station

Fuse Removal Station
- M77 Grenade Thermal Treatment Closed Disposal Process (TTCDP)
  - Automated operations to dismantle the grenade
  - Thermally treats energetics in the grenades and fuses
  - Results in empty grenade bodies and copper cones
  - Processing rate of 2,880 grenades per hour

The TTCDP consists of the following Stations:
- Shear Off Station
- Grenade Inverting Station
- Press Station
- Copper Cone Removal Station
- Grenade Transfer Device
- Grenade Ignition Station
- Explosive Inspection Station
- Off Gas Treatment
- Scrap Collection
Shear Off Station

Grenade Inverting Station
The grenade body is centered and pressed down into the mold of the disassembly conveyor.

The copper cone press-tool which is attached to a hydraulic cylinder, runs into the grenade body and deforms / loosens the copper cone.

After the pressing operation. The copper cones are loose inside the grenade body.
Copper Cone Removal Station

- The copper cones are retracted by mechanic inside grippers that pull the copper cone out of the grenade body.
- The copper cones are then placed in holder above the empty grenade bodies

Grenade Transfer Device

- Checks for copper cones in the grenade body
- Automatic reject of grenades with copper cone
- Transfer of grenades without copper cone into the thermal treatment conveyor
Grenade Ignition Station
• Grenade ignition is done by electric heated coils that are moved into the grenades.

• A set of 9 grenades is ignited simultaneously

• The off gasses will be processed through the HEPA filter system

Explosive Inspection Station
• Each grenade is checked by 2 separate probes for explosives by mechanic check cylinders at the end of the thermal treatment conveyor.
• The fuze assemblies will be automatically conveyed from the fuse removal system to the Munitions Destruction System (MDS)

• The MDS utilizes indirectly heated armored chamber to process fuses

• The MDS will be emptied at predetermined times and the scrap recovered

• The off gasses will be processed through the HEPA filter system
• Letterkenny Munitions Center (LEMC) Ammonium Perchlorate Rocket Motor Destruction (ARMD) Capability
  – TTC fabrication currently scheduled for completion 2nd QTR FY16
  – Acceptance testing for the five families of rocket motors scheduled to begin 4th QTR FY16
  – Full rate production scheduled for FY17

• Anniston Munitions Center (ANMC) MLRS Warhead Processing Capability
  – Warhead Processing checkout has been completed
    • 700 warheads successfully processed
  – Factory Acceptance Testing completed in Germany for the M77 TTCDP equipment
  – Equipment is onsite at the ANMC awaiting installation
  – Building facilitization commenced 1st QTR FY16
  – Full System LRIP is scheduled to begin 4th QTR FY16.
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