IMX-104 Manufacturing Process Optimization

*Provide inherent cost benefits for scale-up of IMX-104 manufacturing.*

**OBJECTIVE / SOLUTION**

Establish a capability to manufacture IMX-104, a Government-owned formulation, with optimum process parameters to reduce the unit price while maintaining its insensitive munitions (IM) properties.

**ACHIEVEMENTS**

- Examine/evaluate factors influencing product quality
- Identify operating parameters that affect IM properties on a large scale manufacturing process
- Optimize critical operating parameters
- Prove-out process
- Confirm product quality and IM properties
- Loading operations

**BENEFITS**

- Insensitive Munition (IM) compliant product for Soldiers
- Improved manufacturing efficiency
- Better understanding of operating conditions on the quality of final product
- Reduces unit cost by 20%

**STATUS**

- A request for cost proposal has been forwarded by the contracting office
- Developed and finalized a test plan for program execution

**WEAPON SYSTEMS / SECONDARY ITEMS IMPACTED**

- IMX-104 will support the production of the 81mm High Explosive (HE) mortar
- IMX-104 is the leading candidate to replace Composition B and its equivalence, PAX-21 and PAX-41 as the HE fill in various munitions items

**POTENTIAL COST AVOIDANCE**

- Return on Investment of 24.7 to 1 with a cost benefit of $55.3M

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Improved Manufacturing Technology (ManTech) for Insensitive Munitions (IM)

*Provides inherent cost benefits for scale-up of Insensitive Munitions.*

**OBJECTIVE / SOLUTION**

Optimize process parameters for the full scale production of NTO (3-Nitro 1, 2,4-Triazol-5 One), NTO is a key constituent in the new insensitive munition (IM) formulations. Through leveraged funding, this program will install and integrate process equipment to the existing NTO process line and verify the process modifications increase yield and meets and exceeds NTO specifications.

**ACHIEVEMENTS**

- Completed baseline assessment on NTO manufacturing
- Completed a design of experiments (DOE) study, the variables included:
  - Final re-crystallization temperature
  - Cooling Rate
  - Initial NTO Concentration
  - Agitation
  - Hold Temperature.
- Procured Scanning Election Microscope (SEM) to verify crystal structure and morphology of NTO
- Demonstrated increased NTO yield of up to 10% in a lab-scale environment. This can easily translate in increased yield in production material
- Verified NTO crystal structure and morphology; crystal structure intact and would likely pass Mil Spec requirements
- Conducted preliminary production scale design on equipment sizing and ancillary equipment

**BENEFITS**

- Safer munitions - no inadvertent detonations from fire, accident or enemy fire
- Provide the Soldier with optimized energetic constituents used in new IM formulations
- Provide the US Army a better energetic to cost ratio per Insensitive Munition (IM) benefit

**STATUS**

- Second year ManTech Program
- Completing 30% Design

**WEAPON SYSTEMS / SECONDARY ITEMS IMPACTED**

-Insensitive Energetic Munitions, IMX-101 - used in 155mm M795 and 105mm M1 High Explosive (HE) Insensitive Munitions (IM)
-Insensitive Energetic Munitions, IMX-104 - Used in 120, 81, and 60mm High Explosive (HE) Mortar Family

**POTENTIAL COST AVOIDANCE**

- Return on Investment of 3.7 to 1 with a cost benefit of $5.9M

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