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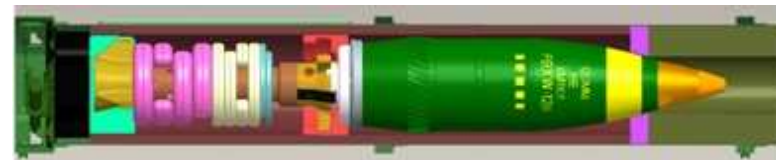
***“CONTAINER MODIFICATIONS FOR THE 120MM HE  
MORTAR AMMUNITION TO IMPROVE REACTIONS WHEN  
SUBJECTED TO THE FAST COOK OFF TEST”***

**L.J. Rodriguez  
Naval Surface Warfare Center Dahlgren Division  
Dahlgren, VA, U.S.A.**

# System Description

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The Expeditionary Fire Support System (EFSS) is a close-support, all weather, quick responsive indirect fire system supporting Marine Expeditionary Units (MEU) that provides accurate fires from the 120mm rifled towed mortar up to 8 kilometers (km). 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, and an ammunition trailer. The EFSS conventional ammunition suite consists of the 120mm M1101 HE Round, the M1103 SMOKE Round, the M1105 ILLUM Round and the M1107 PRAC Round.



# EFSS HE Ammunition IM History

EFSS IM Reaction Assessment Results								
Baseline								
Copntainer Type	Ammunition Type	FCO	SCO	BI	FI	SD	SCJ	H/C
PA117 IM	EFSS 120mm HE (M1101)	IV	V	V	III	P	F	1.2.1E

The current HE ammunition has the following IM features:

- Explosive Fill: PBXN-114, an HMX based cast cured fill.
- Fuze: M767A1 fuze utilizing a PBXN-5 booster.
- Fuze Venting Liner: A plastic liner between the fuze and the projectile.
- Container: Longitudinal pressure release panels and a release valve incorporated to the PA117 containers for venting.



# Tests and Results

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- Three containers were modified and subjected to the FCO test
  - One container was modified to include a pressure release panel at the end of the container.
  - The second container was modified to include the pressure release panel and a 1/4 inch thick metal mesh.
  - The third container was modified to include the pressure release panel and a 1/8 inch thick metal mesh.
  - The results of this test were then analyzed and the best performing container design was chosen to be evaluated in the storage configuration.
- A second test was conducted on nine EFSS HE cartridges. The cartridges were packaged in the PA 117 containers with the modifications that yielded the best results from the first test.
  - Type 5 results were not observed during the second test.
- A third test was conducted to evaluate possible solutions to the observed response.

# Container Modifications – Test 1

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a. Pressure release panel



b. Prior to insertion of pressure release panel



c. Left container mesh is 1/8" thick  
Right container mesh is 1/4" thick

# Test 1 Results

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Container with  
pressure release panel  
and 1/4" mesh



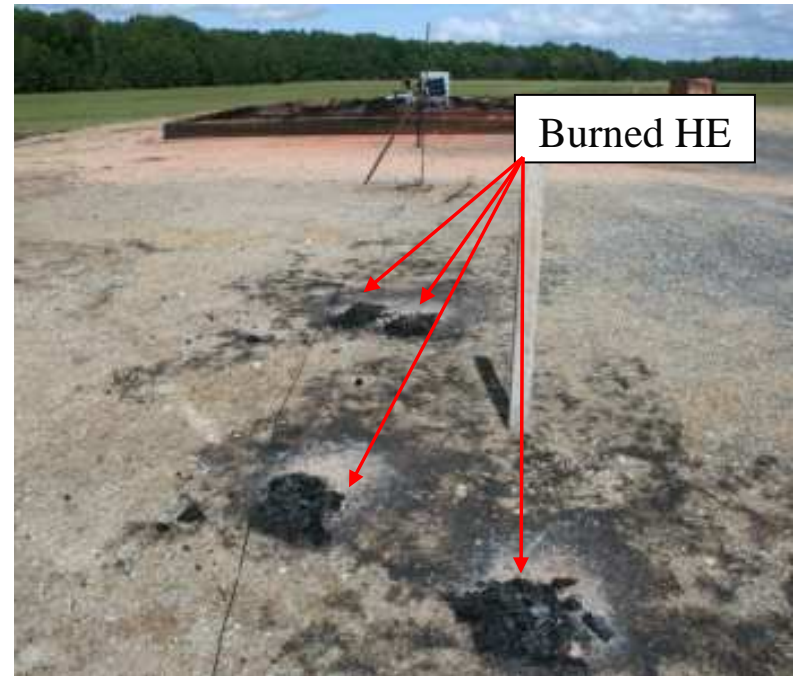
Container with  
pressure release panel  
and 1/8" mesh

Container with  
pressure release panel  
only

<b>Container Type</b>	<b>Post-Test Condition/Notes</b>
Pressure release panel only	<ul style="list-style-type: none"> <li>• No debris ejected beyond 50 feet</li> <li>• Fuze ejected but remained intact, inside pit, booster still live</li> <li>• Projectile recovered inside pit under table</li> <li>• Container lid remained attached to container</li> <li>• TCA recovered hanging from can</li> </ul>
Pressure release panel + 1/8" mesh	<ul style="list-style-type: none"> <li>• Mesh blown out</li> <li>• Burning explosive billet ejected from pit to 90 feet</li> <li>• Container lid ejected</li> <li>• Fuze ejected, booster still live</li> <li>• Projectile and TCA remained inside pit</li> </ul>
Pressure release panel + 1/4 " mesh	<ul style="list-style-type: none"> <li>• Mesh remained intact</li> <li>• Fuze remained inside container</li> <li>• Burned components recovered inside can (booster reacted)</li> <li>• Container lid ejected</li> <li>• Projectile and TCA recovered inside pit</li> </ul>

# Test 2 Results

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# Test 3 Results



a. Pressure release panel with mesh



b. Debris



c. Post Test Results

# Conclusions

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- Containers with the pressure release panels only (no mesh) performed the best overall.
- The results of test 1 and 3 indicate that adding a mesh system to restrain the distances of the explosive or the fuzes being expelled adversely affect the response of the test items to the FCO test.
- Design utilized in Test 2 provides significant improvement over the current design reducing the amount of debris outside the 50ft radius and reduces by more than half the longest distance reached by any debris.

# Acknowledgements

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