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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Army										Date: May 2017		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)					R-1 Program Element (Number/Name) PE 0604854A / Artillery Systems - EMD							
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	2.251	4.506	1.972	-	1.972	2.312	7.097	8.835	9.185	Continuing	Continuing
509: LIGHTWEIGHT 155M HOWITZER	-	2.251	4.506	1.972	-	1.972	2.312	7.097	8.835	9.185	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Lightweight 155mm Howitzer (LW155), also known as the M777A2, provides direct, reinforcing, general support fires to maneuver forces and direct support artillery. It replaces all howitzers in all missions in the USMC and replaces the M198 howitzer as the general support artillery for light forces in the Army. The LW155 fires unassisted projectiles to a range of 15 miles and assisted projectiles to 19 miles. The addition of the digital fire control system enables the weapon to program and fire the improved Excalibur precision-guided munitions to ranges in excess of 25 miles with better than 10-meter Circular Error Probable (CEP) accuracy. The LW155 is the first ground combat system whose major structures are made of high strength titanium alloy and the system makes extensive use of hydraulics to operate the breech, load tray, recoil and wheel arms. The combination of titanium structures and the use of hydraulic systems resulted in a significant weight savings of 7000 lbs over the M198 system. Compared to the M198, the LW155 emplaces three-times faster and displaces four-times faster. It traverses 32 percent more terrain worldwide and is 70 percent more survivable than the M198. It is a successful joint service program between the Marine Corps and Army working together to develop, produce, field, and sustain the howitzer. The LW155 was first introduced into the Marine Corps in April 2005 and the Marines have now fielded the howitzer to all active units. The Army has fielded the howitzer to its Stryker Brigade Combat teams (SBCT), Fires Brigades and National Guard. Fielding of the Infantry Brigade Combat Teams (IBCT) commenced in FY14 and will continue through 2018. The LW155 saw extensive action in Afghanistan, receiving high marks for its performance. Having now been in the field for over 10 years, the howitzer will be going through obsolescent replacement of electronic components in its digital fire control system.

Funding supports engineering studies for capabilities identified in the Joint U.S. Army, U.S. Marine Corps Operational Requirements Document (JORD) for the Advanced Towed Cannon System but deferred during Engineering Manufacturing and Development due to technology maturity, cost and schedule as well as government sustainment activities requiring RDTE. This includes a digital direct fire sight for the Digital Fire Control System; low temperature, high density power solutions; and electric elevation drives and auto loader to achieve full operational requirements. Efforts in FY2015-FY2018 center on researching technical solutions while efforts in FY2019-FY2022 will involve developing technology demonstrator prototypes.

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B. Program Change Summary (\$ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	1.953	1.756	1.800	-	1.800
Current President's Budget	2.251	4.506	1.972	-	1.972
Total Adjustments	0.298	2.750	0.172	-	0.172
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	0.298	0.000	0.172	-	0.172
• FY17 Amendment	0.000	2.750	0.000	-	0.000

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Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604854A / Artillery Systems - EMD				Project (Number/Name) 509 / LIGHTWEIGHT 155M HOWITZER			
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
509: LIGHTWEIGHT 155M HOWITZER	-	2.251	4.506	1.972	-	1.972	2.312	7.097	8.835	9.185	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The Lightweight 155mm (LW155) Towed Howitzer is a jointly managed program with the Marine Corps.

A. Mission Description and Budget Item Justification

The Lightweight 155mm Howitzer (LW155), also known as the M777A2, provides direct, reinforcing, general support fires to maneuver forces and direct support artillery. It replaces all howitzers in all missions in the USMC and replaces the M198 howitzer as the general support artillery for light forces in the Army. The LW155 fires unassisted projectiles to a range of 15 miles and assisted projectiles to 19 miles. The addition of the digital fire control system enables the weapon to program and fire the improved Excalibur precision-guided munitions to ranges in excess of 25 miles with better than 10-meter Circular Error Probable (CEP) accuracy. The LW155 is the first ground combat system whose major structures are made of high strength titanium alloy and the system makes extensive use of hydraulics to operate the breech, load tray, recoil and wheel arms. The combination of titanium structures and the use of hydraulic systems resulted in a significant weight savings of 7000 lbs over the M198 system. Compared to the M198, the LW155 emplaces three-times faster and displaces four-times faster. It traverses 32 percent more terrain worldwide and is 70 percent more survivable than the M198. It is a successful joint service program between the Marine Corps and Army working together to develop, produce, field, and sustain the howitzer. The LW155 was first introduced into the Marine Corps in April 2005 and the Marines have now fielded the howitzer to all active units. The Army has fielded the howitzer to its Stryker Brigade Combat teams (SBCT), Fires Brigades and National Guard. Fielding of the Infantry Brigade Combat Teams (IBCT) commenced in FY14 and will continue through 2018. The LW155 has seen extensive action in Afghanistan, receiving high marks for its performance. Having now been in the field for over 10 years, the howitzer will be going through obsolescent replacement of electronic components in its digital fire control system.

Funding supports engineering studies for capabilities identified in the Joint U.S. Army, U.S. Marine Corps Operational Requirements Document (JORD) for the Advanced Towed Cannon System but deferred during Engineering Manufacturing and Development due to technology maturity, cost and schedule as well as government sustainment activities requiring RDTE. This includes a digital direct fire sight for the Digital Fire Control System; low temperature, high density power solutions; electric elevation drives and auto loader to achieve full operational requirements; and extended range and mobility concepts. Efforts in FY2018 through FY2019 will continue to support XM907 Common Cannon Assembly support; objective M777ER design, analysis, and drawings; and M777ER component fabrication. Funding in FY2019 through FY2020 will support component integration and engineering tests. FY2021 will support completion of the demonstrator and system demonstration testing.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2016	FY 2017	FY 2018
Title: Management Services	0.197	0.199	0.204
Description: Funding supports management services within the Program Management Office, Towed Artillery Systems			
FY 2016 Accomplishments:			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2016	FY 2017	FY 2018
Funding supported management and coordination with the Armaments Research Development and Engineering Center to conduct modeling, simulation, analysis and trade studies to characterize the M777A2 for performance improvements. The data generated from these efforts will be used to establish a database to support future technology demonstrations focused on achieving current JORD objective capabilities as well as Force 2025 and Beyond Initiatives. FY 2017 Plans: Funding supports management and coordination with the Armaments Research Development and Engineering Center to conduct modeling, simulation, analysis and trade studies to characterize the M777A2 for performance improvements. The data generated from these efforts will be used to establish a database to support future technology demonstrations focused on achieving current JORD objective capabilities as well as Force 2025 and Beyond Initiatives. FY 2018 Plans: Funding will support management and coordination with the Armaments Research Development and Engineering Center to conduct modeling, simulation, analysis and trade studies to characterize the M777A2 for performance improvements. The data generated from these efforts will be used to establish a database to support future technology demonstrations focused on achieving current JORD objective capabilities as well as Force 2025 and Beyond Initiatives.				
Title: Product Development Description: Funds engineering support from the Armaments Research Development and Engineering Center FY 2016 Accomplishments: Funding supported continued modeling, simulation, and analysis to characterize the objective M777A2 extended range design, analysis, and drawings. Continued XM907 common cannon assembly support and objective M777ER Design, Analysis, and drawings. FY 2017 Plans: Funding supports continued modeling, simulation, and analysis to characterize the objective M777A2 extended range design, analysis, and drawings. Continues XM907 common cannon assembly support. Funding also supports the design and analysis of items such as the muzzle brake, slide block breech, and upper carriage for integration into the M777ER. FY 2018 Plans: Funding will support continued modeling, simulation, and analysis to characterize the objective M777A2 extended range design, analysis, and drawings. Continues XM907 common cannon assembly support and will provide for fabrication of cannon integration components.		2.054	4.307	1.768
Accomplishments/Planned Programs Subtotals		2.251	4.506	1.972

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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>FY 2018</u> <u>Base</u>	<u>FY 2018</u> <u>OCO</u>	<u>FY 2018</u> <u>Total</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• M777 Mods: <i>M777 Mods - Modification of Weapons and Other Combat Vehicles SSN GZ1700</i>	10.070	33.600	3.985	-	3.985	3.973	3.201	13.290	18.906	Continuing	Continuing

Remarks

Procurement Funding supports active retrofits and hardware refresh for previously contracted Digital Fire Control System components, addressing obsolescence. FY21 and FY22 funding procures integration and mounting hardware for new system radio and Global Positioning System antennae.

D. Acquisition Strategy

This is a collaborative effort between the Program Management Office, Towed Artillery Systems, and the Armaments Research Development and Engineering Center at Picatinny Arsenal.

E. Performance Metrics

N/A