Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force											Date: March 2023	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0101328F / *ICBM Reentry Vehicles*							
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
Total Program Element	185.856	100.463	115.616	475.415	0.000	475.415	657.623	766.946	874.571	863.862	Continuing	Continuing
674920: *Mk21A/W87-1*	185.856	100.463	115.616	459.880	0.000	459.880	641.529	687.664	642.804	544.771	0.000	3,378.583
675920: *Next Generation Reentry Vehicle*	0.000	0.000	0.000	15.535	0.000	15.535	16.094	79.282	231.767	319.091	Continuing	Continuing
Program MDAP/MAIS Code: 576												

Note

This program, BA 7, PE 0101328F, project 675920, NGRV Early Acquisition Activities, is a new start.

A. Mission Description and Budget Item Justification

The Intercontinental Ballistic Missile (ICBM) Reentry Vehicles (RVs) activity will design, develop, produce, and deploy integrated RV systems capable of delivering the W87-1 warhead and future warheads when released from the Sentinel (GBSD) weapon system.

The Mk21A program will meet the requirements laid out in the Sentinel (GBSD) weapon system Capability Development Document (CDD) as directed by Air Force Global Strike Command, and will provide needed performance and security enhancements over the Mk21 RV to meet the upgraded requirements for the Department of Energy W87-1 warhead. The Mk21A RV includes: shape stable nose tip; high impulse transducer; arming and fuzing system (AFS); aeroshell forward section, body section, and rear cover; radio frequency subsystem with antennas; RV spin-up system; in-flight disconnect cable; and other electrical cables.

The Next Generation Reentry Vehicle (NGRV) program will ensure the Sentinel (GBSD) weapon system continues to meet CDD requirements in an evolving threat landscape by leveraging advanced capabilities matured by the Research & Development (R&D) and ICBM Demonstration/Validation communities in support of the Air Force's Reentry Vehicle Strategy. Future NGRV solutions will integrate with current and/or future warheads and will include acquisition of complementary countermeasures, embracing the modular and adaptable tenets of the Sentinel (GBSD) weapon system.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F. In FY2022 $934K was expended for civilian pay expenses in this program element, and in FY2023 $0 is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force					Date: March 2023
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*			**R-1 Program Element (Number/Name)** PE 0101328F / *ICBM Reentry Vehicles*		
B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	96.313	118.616	368.449	0.000	368.449
Current President's Budget	100.463	115.616	475.415	0.000	475.415
Total Adjustments	4.150	-3.000	106.966	0.000	106.966
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-3.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	7.499	0.000			
• SBIR/STTR Transfer	-3.349	0.000			
• Other Adjustments	0.000	0.000	106.966	0.000	106.966

Change Summary Explanation

FY22 budget increased from FY23 PB due to a $7.499M reprogramming from ICBM Fuze Modernization (PE 0604933F) to support additional risk reduction activities on the Mk21A TMRR contract.

FY23 budget decreased from FY23 PB due to a $3M Congressional Mark citing excess to need.

FY24 budget increased from the FY23 PB based on several factors. First Mk21A's recent cost estimates refined the Sentinel integration costs. Specifically, the cost increase is attributed to changes needed to the Payload Reentry System requirements (+$43.4M). Secondly, Mk21A added another fight test due to the anomalous flight test in July 2022 (+$48M). Lastly, NGRV funding was accelerated to begin early acquisition activities in FY 2024 (+$15.5M).

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force			Date: March 2023
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101328F / *ICBM Reentry Vehicles*	Project (Number/Name) 674920 / *Mk21A/W87-1*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
674920: *Mk21A/W87-1*	185.856	100.463	115.616	459.880	0.000	459.880	641.529	687.664	642.804	544.771	0.000	3,378.583
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Mk21A Reentry Vehicle (RV) program will design, develop, produce, and deploy an integrated RV capable of delivering the W87-1 warhead when released from the Sentinel (GBSD) weapon system. The Mk21A program will provide needed performance and security enhancements over the Mk21 RV to meet the upgraded requirements for the Department of Energy (DOE) W87-1 warhead, while ensuring the time certain delivery of both the W87-1 and Mk21A programs. The Mk21A will also meet the requirements laid out in the Sentinel (GBSD) weapon system Capability Development Document (CDD) as directed by Air Force Global Strike Command. The Mk21A RV includes: shape stable nose tip; high impulse transducer; arming and fuzing system (AFS); aeroshell forward section, body section, and rear cover; radio frequency subsystem with antennas; RV spin-up system; in-flight disconnect cable; and other electrical cables.

The major activities in the Mk21A RV Technology Maturation and Risk Reduction (TMRR) phase include: (1) Trade Studies, (2) Prototype designs, (3) government systems engineering, analytics, and test capability development, (4) RV risk reduction, and (5) Weapon System (WS) integration risk reduction.

During the Engineering and Manufacturing Development (EMD) phase, the Mk21A program will include prime contractor development of a critical RV design, applicable support equipment, data, flight test hardware, infrastructure, and training materials while examining and mitigating weapon system integration risks, nuclear surety, hardness and certification, and system vulnerability assessments. Additionally, the program, in conjunction with the National Nuclear Security Administration, will develop test assets to ensure the integration and qualification of the Mk21A and W87-1 on Sentinel (GBSD) weapon system.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F. In FY2022 $934K was expended for civilian pay expenses in this program element, and in FY2023 $0 is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Mk21A Technology Maturation and Risk Reduction	100.463	82.409	-
Description: The objectives of TMRR for Mk21A are as follows: (1) Deliver one preliminary design and three prototypes for flight testing to inform Department of Energy (DOE)/National Nuclear Security Administration (NNSA) designs and further technology maturation (2) Incorporate a modular, open systems architecture (3) Implement Model Based System Engineering (MBSE) enabling the government to own the technical baseline (4) Demonstrate performance of weapon system capabilities through prototyping, modeling, simulation, and testing (5) Conduct flight test of prototype RVs in an ICBM-like environment			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0101328F / *ICBM Reentry Vehicles*	**Project (Number/Name)** 674920 / *Mk21A/W87-1*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
FY 2023 Plans: • Conclude TMRR contract efforts • Modify, modernize, and expand the analytic environment and labs in ongoing TMRR support and the anticipated transition to EMD activities to enable full execution of the program's capability to own the technical baseline throughout the program life cycle • Finalize initial weapon system RV preliminary design and reduce integration risk by concluding trade studies, system engineering, test activities, and system modeling and simulation • Continue to develop, mature, and execute a unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements • Conduct prototype RV flight test • Continue activities to mitigate RV development risks • Continue to expand and develop analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled and securely transmitted between government and contractors • Conduct planning and test activities in preparation to integrate the Mk21A onto Sentinel (GBSD) weapon system ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease due to the conclusion of the TMRR phase and transition to the EMD phase.			
Title: Mk21A Engineering & Manufacturing Development	0.000	33.207	459.880
Description: The objectives of EMD for Mk21A are as follows: (1) Develop and build a Mk21A RV capable of delivering DOE/NNSA W87-1 (2) Incorporate a modular, open systems architecture (3) Implement MBSE enabling the government to own the technical baseline (4) Demonstrate performance of weapon system capabilities through modeling, simulation, and testing of the EMD design (5) Integrate Mk21A/W87-1 into the Sentinel (GBSD) weapon system ***FY 2023 Plans:*** • Award EMD contract • Execute the EMD contract to advance Mk21A major activities to include systems engineering activities, information technology, data management, analytical capabilities and delivery of mature, low risk reentry vehicle design • Develop test assets supporting the qualification of the Mk21A and W87-1 on Sentinel (GBSD) weapon system in conjunction with the DOE/NNSA • Begin Sentinel (GBSD) weapon system integration activities to support delivery of the Mk21A and W87-1 • Continue activities to mitigate RV development risks • Continue prototype RV/heatshield flight test preparation			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0101328F / *ICBM Reentry Vehicles*	**Project (Number/Name)** 674920 / *Mk21A/W87-1*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
• Continue to develop, mature, and execute a unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements ***FY 2024 Plans:*** • Execute EMD contract to continue advancing Mk21A major activities to include systems engineering activities, information technology, data management, analytical capabilities and delivery of mature, low risk reentry vehicle design • Develop and build test assets supporting the qualification of the Mk21A and W87-1 on Sentinel (GBSD) weapon system in conjunction with the DOE/NNSA • Continue Sentinel (GBSD) weapon system integration activities to support delivery of the Mk21A and W87-1 • Begin ground testing and flight test planning with the Sentinel (GBSD) weapon system to collect relevant environmental data to feed W87-1 development at DOE/NNSA • Continue activities to mitigate RV development risks including prototype RV/heatshield flight test • Continue to develop, mature, and execute a unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase due to the planned EMD contract award in 4th quarter FY23 and transition to first full year of EMD (contractor labor, hardware, and flight test execution) and Sentinel integration in order to maintain alignment with Sentinel and W87-1 programs.			
Accomplishments/Planned Programs Subtotals	100.463	115.616	459.880

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• RDTE 04 PE 0605230F: *Ground Based Strategic Deterrent*	2,464.875	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2,464.875
• RDTE 05 PE 0605238F: *Ground Based Strategic Deterrent EMD*	0.000	3,614.290	3,746.935	-	3,746.935	3,401.679	3,246.870	2,610.928	1,855.302	2,168.865	20,644.869
• MPAF 01 MGBSD0: *GBSD*	8.895	0.000	539.300	-	539.300	502.720	5,735.106	6,456.735	6,172.571	41,252.826	60,668.153
• RDTE 04 060351F/641022: *Dem/Val - RVAP*	27.679	13.042	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	40.721
• RDTE 04 0603851F: *Intercontinental Ballistic Missile - Dem/Val*	38.005	28.921	45.319	-	45.319	56.756	0.000	0.000	0.000	0.000	169.001

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0101328F / *ICBM Reentry Vehicles*	**Project (Number/Name)** 674920 / *Mk21A/W87-1*

D. Acquisition Strategy

The Mk21A RV program acquisition strategy delivers an integrated RV capable of delivering the W87-1 warhead to target beginning in FY30. For the TMRR phase, the Program Office competitively awarded one cost plus fixed fee contract in October 2019. The Air Force is responsible for developing, producing, and maintaining the RV. The DOE/NNSA develops/modifies the nuclear weapon inside the RV, including the Weapon Electrical System, which is the firing set that interfaces with the DoD fuze. Mk21A includes the use of Mk21 Mod 6 aeroshells which were originally developed as test vehicles for the legacy Peacekeeper ICBM and must be modified for use as war reserve aeroshells. Mk21A subsystems include the shape stable nose tip, high impulse transducer, arming and fuzing system (AFS), aeroshell forward section/body section and rear cover, radio frequency subsystem, antennas, spin generators, and cables.

The objectives of TMRR for Mk21A are as follows: (1) deliver one preliminary design and three prototypes; (2) incorporate a modular, open systems architecture; (3) implement MBSE enabling the government to own the technical baseline; (4) demonstrate performance of weapon system capabilities through prototyping, modeling, simulation, and testing; (5) conduct test flight of prototype RVs in an ICBM-like environment.

The TMRR phase includes a System Requirements Review, System Functional Review, Preliminary Design Review, and prototype RV flight test(s). The contractor performs risk reduction and testing on select components to further evolve the design during TMRR, to lower component integration risk during the EMD phase. The TMRR contract is a three year based contract plus a one year option with test related activities through 4QFY23.

The objectives of EMD for Mk21A are as follows: (1) develop and build a Mk21A RV capable of delivering the W87-1 Warhead; (2) incorporate a modular, open systems architecture; (3) implement MBSE enabling the government to own the technical baseline; (4) demonstrate performance of weapon system capabilities through prototyping, modeling, simulation, and testing of the EMD design; (5) integrate Mk21A/W87-1 into the Sentinel (GBSD) weapon system.

The EMD phase includes an EMD contractor update to the Preliminary Design Review, Critical Design Review, and a Production Readiness Review. Testing includes ground and flight test vehicles which support the integration on Sentinel (GBSD) weapon system. The contractor will convert Mod 6 (Mk21) to Mod 3 (War Reserve) RVs and perform integration of the W87-1 with the Mk21A and the Sentinel (GBSD) weapon system. The EMD/Production & Deployment contract is a thirteen year based contract with EMD efforts through 2QFY27. After Milestone B approval during 3QFY23, the EMD contract award is planned for 4QFY23.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force			Date: March 2023
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101328F / *ICBM Reentry Vehicles*	Project (Number/Name) 674920 / *Mk21A/W87-1*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mk21A EMD Contract	SS/CPIF	Lockheed Martin : King of Prussia, PA	0.000	-		31.123	Jul 2023	232.479	Nov 2023	-		232.479	1,057.909	1,321.511	-
Mk21A LGM-35A Sentinel (GBSD) Integration Contract	C/CPIF	Northrop Grumman Sys Corp : El Segundo, CA	0.000	-		2.863	Aug 2023	108.768	Nov 2023	-		108.768	286.005	397.636	-
Mk21A W87-1 Integration	MIPR	NNSA : Various	0.000	1.865	Sep 2022	14.335	Nov 2022	13.000	Nov 2023	-		13.000	3.569	32.769	-
Mk21A TMRR Contract	C/CPFF	Lockheed Martin : King of Prussia, PA	118.822	79.458	Nov 2021	51.402	Nov 2022	-		-		-	0.000	249.682	250.747
		Subtotal	118.822	81.323		99.723		354.247		-		354.247	1,347.483	2,001.598	N/A

Remarks

• Unless specifically noted, the efforts within this cost category cover both TMRR and EMD phases of the program.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mk21A EMD Support	Various	TBD : TBD	0.000	-		0.286	Aug 2023	5.819	Nov 2023	-		5.819	467.975	474.080	-
Mk21A Integration Support: FFRDC/UARC	MIPR	Various : Various	0.987	0.661	Nov 2021	1.261	Jan 2023	3.219	Nov 2023	-		3.219	8.750	14.878	-
Mk21A Integration Support: ISC 1.0	C/FP	BAE : Hill AFB, UT	7.451	2.364	Oct 2021	2.734	Oct 2022	-		-		-	0.000	12.549	-
Mk21A Integration Support: ISC 2.0	C/CPAF	TBD : TBD	0.000	-		0.703	Jul 2023	6.661	Oct 2023	-		6.661	39.734	47.098	-
Mk21A Direct Cite Civilian Pay	Various	US Gov Civilians : Hill AFB, UT	4.277	0.934	Oct 2021	-		-		-		-	0.000	5.211	-
Mk21A Digital and Model Based System Engineering Support	TBD	TBD : TBD	0.000	-		-		3.589	Oct 2023	-		3.589	7.235	10.824	-
Mk21A Other Support: PMA	Various	Various : Various	0.585	0.261	Nov 2021	0.332	Nov 2022	-		-		-	9.554	10.732	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0101328F / *ICBM Reentry Vehicles*	**Project (Number/Name)** 674920 / *Mk21A/W87-1*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mk21A Fuze Trade Study (TMRR)	MIPR	Sandia National Lab : Albuquerque, NM	1.913	-		-		-		-		-	0.000	1.913	-
		Subtotal	15.213	4.220		5.316		19.288		-		19.288	533.248	577.285	N/A

Remarks

• Mk21A Fuze Effort incorporated into the Mk21A TMRR Contract starting in FY21.
• FFRDC/UARC costs began to be included as a separate line item under support costs beginning in FY21. Costs were previously included under Mk21A Test and Evaluation line item.
• Unless specifically noted, the efforts within this cost category cover both TMRR and EMD phases of the program.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mk21A Test & Evaluation	Various	Various : Various	35.072	13.610	Nov 2021	3.819	Nov 2022	59.728	Nov 2023	-		59.728	0.000	112.229	-
Mk21A EMD Test Support	Various	TBD : TBD	0.000	-		1.798	Aug 2023	20.547	Oct 2023	-		20.547	628.168	650.513	-
Mk21A Test & Evaluation: Air Force and NNSA Demonstrator Initiative (ANDI) (TMRR)	MIPR	Various : Various	13.946	0.020	Oct 2021	-		-		-		-	0.000	13.966	-
		Subtotal	49.018	13.630		5.617		80.275		-		80.275	628.168	776.708	N/A

Remarks

• FY22, FY23, and FY24 Test & Evaluation support includes developing ground test plans and flight test plans to support development of prototype test vehicles and conduct flight test(s). These test(s) will provide detailed, reliable data to inform EMD and to inform Mk21A development and risk reduction, and NNSA for the W87-1 development.
• The Mk21A Test & Evaluation line includes incremental funding to launch RV prototypes on Rocket Systems Launch Program (RSLP) missiles. The incremental funding allows contracts to be established for support and the build-up of the flight test vehicles and missiles in order to meet the scheduled tests. The additional $48M in FY24 funding will be used to support the flight a test in FY25 (various efforts such as Lockheed Martin, not just RSLP, will be supported by that funding).
• Prototype RV Flight Test #2 costs in FY23 were shared between the Mk21A and ICBM Demonstration/Validation program elements to meet combined interests.
• Mk21A Test & Evaluation: Air Force and NNSA Demonstrator Initiative (ANDI) is a former ICBM Demonstration/Validation study that was transitioned to the Mk21A program office. The ANDI effort is expected to span over FY20, FY21, and FY22 and will provide critical information for EMD.
• Unless specifically noted, the efforts within this cost category cover both TMRR and EMD phases of the program.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force			Date: March 2023
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101328F / *ICBM Reentry Vehicles*	Project (Number/Name) 674920 / *Mk21A/W87-1*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mk21A PMA	C/Various	Various : Various	2.803	1.290	Nov 2021	4.960	Nov 2022	6.070	Nov 2023	-		6.070	7.869	22.992	-
		Subtotal	2.803	1.290		4.960		6.070		-		6.070	7.869	22.992	N/A

Remarks

- Increase from FY23 to FY24 due to the first full year of EMD and associate administrative costs to support.
- The efforts within this cost category cover both TMRR and EMD phases of the program.

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	185.856	100.463		115.616		459.880		-		459.880	2,516.768	3,378.583	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0101328F / *ICBM Reentry Vehicles*	**Project (Number/Name)** 674920 / *Mk21A/W87-1*

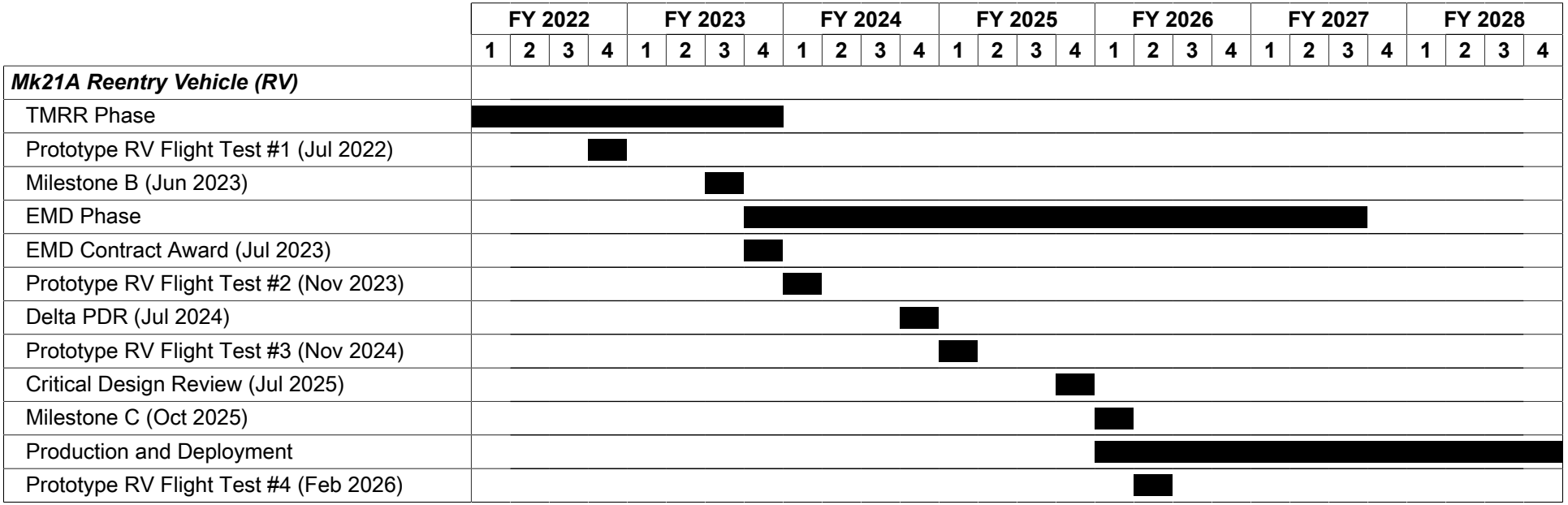

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0101328F / *ICBM Reentry Vehicles*	**Project (Number/Name)** 674920 / *Mk21A/W87-1*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Mk21A Reentry Vehicle (RV)				
TMRR Phase	1	2022	4	2023
Prototype RV Flight Test #1 (Jul 2022)	4	2022	4	2022
Milestone B (Jun 2023)	3	2023	3	2023
EMD Phase	4	2023	3	2027
EMD Contract Award (Jul 2023)	4	2023	4	2023
Prototype RV Flight Test #2 (Nov 2023)	1	2024	1	2024
Delta PDR (Jul 2024)	4	2024	4	2024
Prototype RV Flight Test #3 (Nov 2024)	1	2025	1	2025
Critical Design Review (Jul 2025)	4	2025	4	2025
Milestone C (Oct 2025)	1	2026	1	2026
Production and Deployment	1	2026	4	2028
Prototype RV Flight Test #4 (Feb 2026)	2	2026	2	2026

Note

- TMRR Phase began in 1QFY20
- Flight test #2 is delayed to Nov 2023 (1QFY24), but will continue to be funded using FY23 dollars
- Flight test #3 is currently scheduled for Nov 2024 (1QFY25)
- Flight Test #4 is currently scheduled for Feb 2026 (2QFY26) and is a rideshare on the Experimental Flight Test 2 funded by PE 0603851F, ICBM Demonstration/ Validation
- Flight Tests: there have been delays in scheduled flight tests due to range availability, but the delays have not impacted the program.
- Due to differing level of complexity of the RV components, the program anticipates aeroshells will start production sooner, while subcomponents like the fuze may remain in development resulting in overlap of EMD and Production & Deployment (P&D). P&D phase continues beyond FY2028.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force			Date: March 2023
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101328F / *ICBM Reentry Vehicles*	Project (Number/Name) 675920 / *Next Generation Reentry Vehicle*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
675920: *Next Generation Reentry Vehicle*	0.000	0.000	0.000	15.535	0.000	15.535	16.094	79.282	231.767	319.091	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 7, PE 0101328F, project 675920, NGRV Early Acquisition Activities, is a new start.

A. Mission Description and Budget Item Justification

The Next Generation Reentry Vehicle program will design, develop, produce, and deploy new payload system suites (reentry vehicles and countermeasures) and integrate them into the Sentinel (GBSD) weapon system. Key next generation payload attributes include enhancements in accuracy, lethality, survivability, and ICBM Reentry System/Reentry Vehicle (RS/RV) interoperable operations. Next generation reentry vehicle and countermeasure technologies are based on emerging threats, AF priorities, and development capacity. Program activities will also include the employment of digital acquisitions through the application of digital engineering, agile software development, and open systems architectures.

FY2024 funding supports early acquisition activities that lead to competitive contract awards for a next generation reentry vehicle and countermeasures in support of strengthening the atrophying industrial base, posturing the nation and the AF to counter adversary threats both projected and unforeseen. These efforts support a Materiel Development Decision (MDD) in FY2024 and Milestone A in FY2026. The intent is to encourage a wide pool of industry involvement in the development of materiel solutions that support the mission requirements that combat future and immediate threats to drive ultimate effectiveness requirements for the weapon system. This includes program management support, operational concept exploration, technology trade studies, operational and system architecture development, maturation and risk reduction of RV related technologies including weapons systems and integrated system concept development and demonstration.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F. In FY2022 $0 was expended for civilian pay expenses in this program element, and in FY2023 $0 is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: NGRV Early Acquisition Activities	0.000	0.000	15.535
Description: Next generation RV and countermeasure assessments and personnel requirements are critical to sufficiently standup the program management team and execute pre-Milestone A acquisition activities to avoid significant schedule risk. The NGRV Program Management Team will serve to integrate the results of the NGRV Requirements Study with a cogent acquisition strategy leading into MDD and Milestone A.			
FY 2023 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
N/A ***FY 2024 Plans:*** • Next generation reentry vehicle and countermeasure market research • Conduct pre-Milestone A operational concept and technology trade studies • Initiate initial integration study into the Sentinel Weapon System • Prepare for Materiel Development Decision (MDD) and Milestone A • Develop plan for additional industrial base development capacity ***FY 2023 to FY 2024 Increase/Decrease Statement:*** This project (675920 / Next Generation Reentry Vehicle) is a new start in FY 2024.			
Accomplishments/Planned Programs Subtotals	0.000	0.000	15.535

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• RDTE 04 0605230F: *Ground Based Strategic Deterrent*	2,464.875	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2,464.875
• RDTE 05 0605238F: *Ground Based Strategic Deterrent EMD*	0.000	3,614.290	3,746.935	-	3,746.935	3,401.679	3,246.870	2,610.928	1,855.302	2,168.865	20,644.869
• MPAF 01 MGBSD0: *Ground Based Strategic Deterrent*	8.895	0.000	539.300	-	539.300	502.720	5,735.106	6,456.735	6,172.571	41,252.826	60,668.153
• RDTE 04 0603851F/644209: *ICBM Dem/Val - LRP*	38.005	28.921	45.319	-	45.319	56.756	0.000	0.000	0.000	0.000	169.001

Remarks

D. Acquisition Strategy

The TMRR phase will include competitively awarded contracts, flight testing and continued engagement and synchronization with the Department of Energy (DOE)/ National Nuclear Security Administration (NNSA). The Air Force is responsible for developing, producing, and maintaining next generation payload systems. DOE/NNSA develops/modifies the nuclear weapon inside the RV and all internal systems and components of the nuclear weapon. EMD objectives are to develop and build a next generation payload suite leveraging model based systems engineering (MBSE), Modeling & Simulation, and Open System Architecture (OSA).

The program will employ agile contracting strategies for the next generation RV and countermeasures to fill capability gaps based on a rapidly evolving threat. This will include multiple competitive contract awards, options for agile and adaptive framework for onboarding and offboarding capabilities and maintaining a constant link with

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
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DOE/NNSA to ensure continued weapon system effectiveness. Overall objectives are to bolster the Sentinel (GBSD) payload suite by continually leveraging MBSE, M&S, and OSA throughout the mission sets.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force			Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0101328F / *ICBM Reentry Vehicles*	**Project (Number/Name)** 675920 / *Next Generation Reentry Vehicle*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NGRV Operational Concepts and Technology Trade Studies	TBD	TBD : TBD	0.000	-		-		5.030	Mar 2024	-		5.030	Continuing	Continuing	-
		Subtotal	0.000	-		-		5.030		-		5.030	Continuing	Continuing	N/A

Remarks

Program plans to explore agile contract vehicle strategies to develop technology trade space for the program, to include countermeasure development, through a widely distributed pool of industry players.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NGRV Direct Cite Civilian Pay	Various	US Gov Civilians : Hill AFB, UT	0.000	-		-		2.432	Oct 2023	-		2.432	Continuing	Continuing	-
NGRV Integration Support: ISC	C/CPAF	TBD : TBD	0.000	-		-		1.518	Mar 2024	-		1.518	Continuing	Continuing	-
NGRV FFRDC/UARC Support	TBD	TBD : TBD	0.000	-		-		3.800	Mar 2024	-		3.800	Continuing	Continuing	-
NGRV Mission Modeling Framework Support	MIPR	MSIC : Huntsville, AL	0.000	-		-		1.505	Mar 2024	-		1.505	Continuing	Continuing	-
		Subtotal	0.000	-		-		9.255		-		9.255	Continuing	Continuing	N/A

Remarks

Acronyms:
Missile and Space Intelligence Center (MSIC)

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NGRV IT Infrastructure	TBD	TBD : TBD	0.000	-		-		1.005	Mar 2024	-		1.005	Continuing	Continuing	-
NGRV PMA	Various	Various : Various	0.000	-		-		0.245	Mar 2024	-		0.245	Continuing	Continuing	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force			Date: March 2023
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	0.000	-		-		1.250		-		1.250	Continuing	Continuing	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	-		-		15.535		-		15.535	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0101328F / *ICBM Reentry Vehicles*	**Project (Number/Name)** 675920 / *Next Generation Reentry Vehicle*

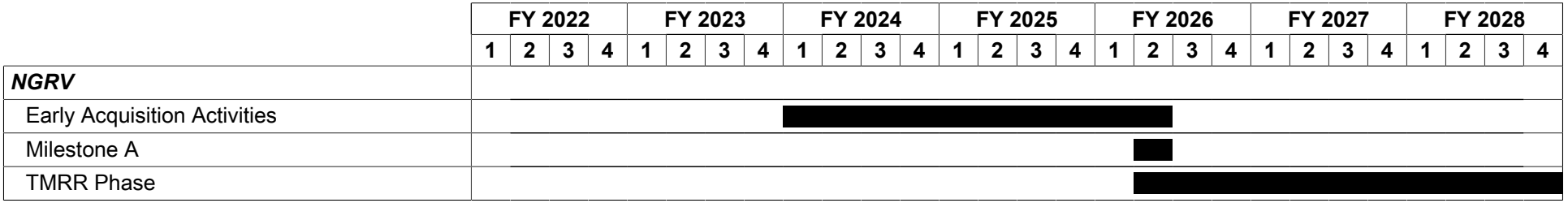

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0101328F / *ICBM Reentry Vehicles*	**Project (Number/Name)** 675920 / *Next Generation Reentry Vehicle*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
NGRV				
Early Acquisition Activities	1	2024	2	2026
Milestone A	2	2026	2	2026
TMRR Phase	2	2026	4	2028