Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force											Date: May 2021	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	29.881	32.899	49.621	0.000	49.621	-	-	-	-	-	-
641020: *ICBM Guidance Applications*	-	5.184	3.608	8.022	0.000	8.022	-	-	-	-	-	-
641021: *ICBM Propulsion Applications*	-	0.000	6.954	0.000	0.000	0.000	-	-	-	-	-	-
641022: *ICBM Reentry Vehicle Applications*	-	17.060	22.337	18.166	0.000	18.166	-	-	-	-	-	-
641024: *ICBM Command & Control (C2) Applications*	-	3.713	0.000	0.000	0.000	0.000	-	-	-	-	-	-
644209: *Long Range Planning (LRP)*	-	3.924	0.000	23.433	0.000	23.433	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program ensures a responsive design and development engineering infrastructure to address emerging issues and technology insertion/technology application on legacy and future Intercontinental Ballistic Missile (ICBM), and other common strategic deterrent mission areas to develop enhanced multi-use capabilities. The ICBM Dem/Val program will provide technology maturation and risk reduction activities to support Minuteman (MM) III sustainment, MM III to GBSD transition, and future ICBM systems development. ICBM Dem/Val conducts advanced component development and prototyping to validate emerging strategic missile technologies and future upgrades to the ICBM. Efforts will identify methods to improve system performance, develop potential future RV designs, mitigate evolving threats, reduce life cycle costs, develop/expand modeling/simulation and experimental platforms for weapon qualification activities, improve nuclear safety and surety, and ensure both viability and durability of strategic missile systems.

The ICBM Dem/Val program will develop key enabling engineering tools for the ICBM mission to include MBSE, test software, and modernization of existing analytical tools. This program will leverage modular system, open architecture and agile software development to build key enabling engineering tools and future upgrades to ICBMs.

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 0605831F. In FY20 $0M was expended for civilian pay expenses in this program element, and in FY21 $0M is forecasted for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	30.969	32.959	55.370	0.000	55.370
Current President's Budget	29.881	32.899	49.621	0.000	49.621
Total Adjustments	-1.088	-0.060	-5.749	0.000	-5.749
• Congressional General Reductions	0.000	-0.060			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.088	0.000			
• Other Adjustments	0.000	0.000	-5.749	0.000	-5.749

Change Summary Explanation

Fiscal Year 2020 funding reflects a $1.088 million reduction for Small Business Innovation Research (SBIR).
Fiscal Year 2021 reflects a Congressional General Reduction of $0.060 million for an undistributed mark.
Fiscal Year 2022 reflects a $5 million reduction for higher Air Force priorities and a $0.749 million inflation adjustment.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	Project (Number/Name) 641020 / *ICBM Guidance Applications*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
641020: *ICBM Guidance Applications*	-	5.184	3.608	8.022	0.000	8.022	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Guidance Applications Program (GAP) ensures the development of strategic capability in response to the Nuclear Posture Review, recommendations of the United States Strategic Command (USSTRATCOM) Strategic Advisory Group, USSTRATCOM Commander Guidance, and the Defense Science Board Task Force on Nuclear Deterrence. The program studies and assesses both legacy and future ICBM Guidance System technology applications. Efforts are focused on current and future requirements and technologies, reduced life cycle costs, and increased nuclear surety and safety. Activities leverage the efforts of the Science and Technology community and are coordinated with the Navy strategic applications program to enhance synergy and avoid duplication. Key elements include developing responsive technologies with common applications for future strategic guidance capabilities. This program also includes any needed nuclear surety and certification and system vulnerability assessments.

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 0605831F. In FY20 $0M was expended for civilian pay expenses in this program element, and in FY21 $0M is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Guidance Applications Program	5.184	3.608	8.022
Description: Develop and mature advanced technologies and concepts to support future requirements. ***FY 2021 Plans:*** • Continue the evaluation and testing of strategic and space guidance-related commodities within market for potential use in a future ICBM strategic guidance system; coordinate with the Navy strategic applications program. • Continue development of a Micro-Electro Mechanical System for potential insertion into the Path Length Module. • Continue expanding the Strategic Guidance Hardware independent validation & verification capability to include multi-G force environment and other various environments; perform Guidance analyses and Guidance technology studies. • Continue evaluating emerging strategic instrument technologies for future strategic grade gyros and accelerometers to ensure appropriate test capability development, to include gyrometer and nested IMU development. • Rapidly respond to evolving warfighter priorities and emerging requirements. ***FY 2022 Plans:*** •Conclude development of a Micro-Electro Mechanical System for potential insertion into the Path Length Module.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641020 / *ICBM Guidance Applications*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
•Continue evaluating emerging strategic instrument technologies for future strategic grade gyros and accelerometers to ensure appropriate test capability development, to include gyrometer and nested IMU development. • Rapidly respond to evolving warfighter priorities and emerging requirements. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding increased due to ramp up of Emerging Strategic Instrumentation effort.			
Accomplishments/Planned Programs Subtotals	5.184	3.608	8.022

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 04 PE 0605230F: *GBSD*	538.643	1,447.113	2,570.442	-	2,570.442	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Accomplish studies, analyses, concept development and engineering; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved. Current effort deliverables to include strategic grade guidance prototypes to support multiple ongoing Air Force initiatives.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641020 / *ICBM Guidance Applications*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GAP Micro-Electronic Module System	Various	Various : Various	-	1.199	Jan 2020	1.000	Jan 2021	0.878	Dec 2021	-		0.878	-	-	-
GAP Emerging Strategic Instrument	Various	Various : Various	-	3.983	Jan 2020	2.403	Jan 2021	6.682	Dec 2021	-		6.682	-	-	-
		Subtotal	-	5.182		3.403		7.560		-		7.560	-	-	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GAP, Program Management Administrative Support Services	C/Various	Various : Various	-	0.002	Jan 2020	0.205	Jan 2021	0.462	Dec 2021	-		0.462	-	-	-
		Subtotal	-	0.002		0.205		0.462		-		0.462	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	5.184		3.608		8.022		-		8.022	-	-	N/A

Remarks

GAP Emerging Strategic Instruments increased due to ramp up of Sparrow project.

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641020 / *ICBM Guidance Applications*

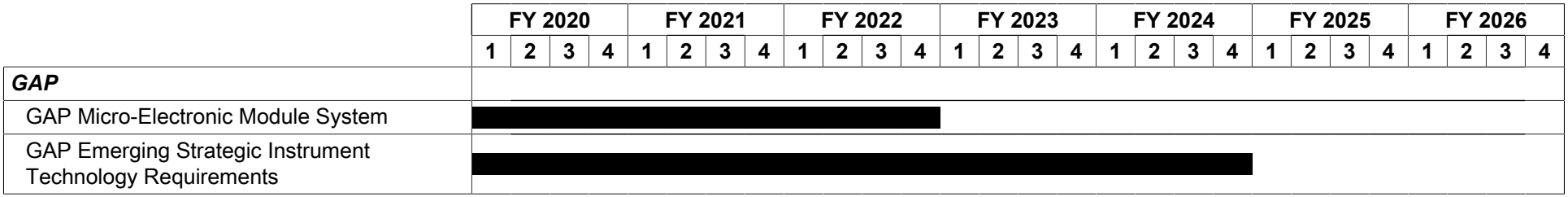

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641020 / *ICBM Guidance Applications*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
GAP				
GAP Micro-Electronic Module System	1	2020	4	2022
GAP Emerging Strategic Instrument Technology Requirements	1	2020	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	Project (Number/Name) 641021 / *ICBM Propulsion Applications*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
641021: *ICBM Propulsion Applications*	-	0.000	6.954	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Propulsion Applications Program (PAP) develops and assesses strategic propulsion system technology applications for both legacy and future ICBM propulsion systems through projects exploring improvements and/or alternatives to current propulsion systems, conducting studies assessing application of new technologies to meet future common propulsion systems requirements, and assessing opportunities for applying common materials and technology between the ICBM, submarine-launched ballistic missile (SLBM) propulsion systems, and other rocket motor propulsion capabilities. Efforts are focused on current and future requirements and technologies, reduced life cycle costs, and increased nuclear surety, safety, certification and system vulnerability assessments.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver ICBM Demonstration/Validation for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605833F or 0605831F.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Propulsion Applications Program	0.000	6.954	0.000
Description: Assess, develop, evaluate, and demonstrate common solid and liquid propulsion technology and manufacturing leading up to a static fire and test of strategic propulsion systems; develop capability and explore improvements to current and future propulsion systems; and support the research and development industrial base and critical infrastructure. ***FY 2021 Plans:*** • Initiate propellant studies to develop alternative propulsion systems for future ICBM program insertion. • Initiate propulsion system studies to develop low-toxic propellant formulations for future ICBM program insertion. • Continue to monitor emerging technologies to rapidly respond to warfighter priorities and emerging requirements. • Initiate stand up of a developmental flight test capability to test relevant technologies in a real world operational setting. ***FY 2022 Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding decreased to due funding being realigned to LRP for the developmental flight test.			
Accomplishments/Planned Programs Subtotals	0.000	6.954	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641021 / *ICBM Propulsion Applications*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 04 PE 0605230F: *GBSD*	538.643	1,447.113	2,570.442	-	2,570.442	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Studies, analyses, limited engineering, hardware development and/or testing will be accomplished; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved. Current effort deliverables include flight test demonstrations to support multiple studies.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	Project (Number/Name) 641021 / *ICBM Propulsion Applications*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test Flight	Various	Various : Various	-	-		6.675	Apr 2021	0.000		-		0.000	-	-	-
		Subtotal	-	-		6.675		0.000		-		0.000	-	-	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PAP Program Management Administration	Various	Various : Various	-	0.000	Jan 2020	0.279	Jan 2021	0.000		-		0.000	-	-	-
		Subtotal	-	0.000		0.279		0.000		-		0.000	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	0.000		6.954		0.000		-		0.000	-	-	N/A

Remarks

The developmental test flight enables us to demonstrate developing technologies in relevant ICBM environments.

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641021 / *ICBM Propulsion Applications*

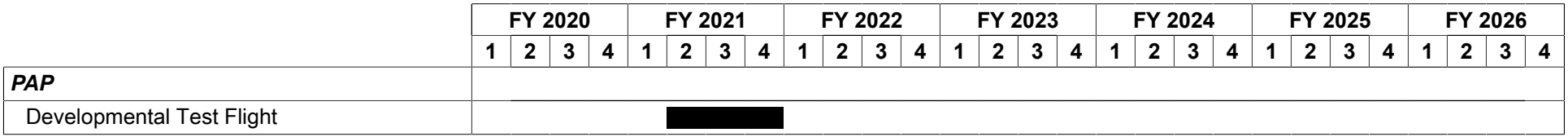

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641021 / *ICBM Propulsion Applications*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
PAP				
Developmental Test Flight	2	2021	4	2021

Note

Developmental Test Flight is transitioning to LRP in FY22

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	Project (Number/Name) 641022 / *ICBM Reentry Vehicle Applications*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
641022: *ICBM Reentry Vehicle Applications*	-	17.060	22.337	18.166	0.000	18.166	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Reentry Vehicle Applications Program (RVAP) ensures the ICBM force is equipped with the safest, most reliable, most survivable Reentry Systems, and explores options for common, multi-mission capabilities. The program enables a responsive engineering infrastructure by developing modeling/simulation, ground and flight test platforms to support Reentry System qualifications. The program ensures the availability of long-lead components and materials while identifying life cycle cost reduction methods. In addition, the program matures and tests advanced Reentry System technologies and designs to meet future requirements. This includes studying and assessing technology applications relevant to Mk12A, Mk21, Mk21A and future ICBM Reentry Systems. The program leverages investments by the Science & Technology community and Navy reentry systems applications program. Testing may occur on a space available basis on Air Force and Navy Force Development Evaluation (FDE) flights.

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 0605831F. In FY20 $0M was expended for civilian pay expenses in this program element, and in FY21 $0M is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Reentry Vehicle Applications Program	17.060	22.337	18.166
Description: Mature, evaluate, and test reentry system materials, technologies, and vehicles including modeling/simulation, and ground and flight test platforms for use in current and future strategic applications.			
FY 2021 Plans: • Conduct materials development, prototyping, and test. • Develop new modeling/simulation and flight test platforms for future weapon qualification activities. • Continue study for future RV concepts. • Continue materials test platform on orbital vehicle. • Rapidly respond to evolving warfighter priorities and emerging requirements. • Develop designs and production concepts for trusted radiation-hardened advanced microelectronics. • Continue design of Virtual Environment Trainer for ICBM Platforms. • Design predictive health management tool based on engineering predictive analysis. • Continue supporting the Joint Technology Demonstrator			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641022 / *ICBM Reentry Vehicle Applications*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
• Initiate developmental flight test capability.			
FY 2022 Plans: • Continue new modeling/simulation and flight test platforms for future weapon qualification activities. • Continue study for future RV concepts. • Develop designs and production concepts for trusted radiation-hardened advanced microelectronics. • Design predictive health management tool based on engineering predictive analysis. • Conclude design of Virtual Environment Trainer for ICBM Platforms. • Initiate thermal protection systems (TPS) materials research. • Initiate digital engineering research. • Initiate Rad Hard Non-Volatile Memory research. • Initiate Rad Hard Radar research. • Continue the Joint Technology Demonstrator effort. • Rapidly respond to evolving warfighter priorities and emerging requirements.			
FY 2021 to FY 2022 Increase/Decrease Statement: Funds decreased due to funding being realigned to LRP for the developmental flight test.			
Accomplishments/Planned Programs Subtotals	17.060	22.337	18.166

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 04 0605230F: *Ground Based Strategic Deterrent*	538.643	1,447.113	2,570.442	-	2,570.442	-	-	-	-	-	-
• RDTE 07 0101328F: *ICBM Reentry Vehicles*	63.484	112.547	86.313	-	86.313	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Studies, analyses, limited engineering, and pre-prototype hardware development will be accomplished; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved. Current effort deliverables include various technologies for ICBM re-entry vehicles including modeling and simulation software, alternate high temperature materials, advanced concepts, and radiation-hardened microelectronics.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	Project (Number/Name) 641022 / *ICBM Reentry Vehicle Applications*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
RVAP Support	C/FFP	BAE Systems : Clearfield, UT	-	2.810	Mar 2020	1.800	Mar 2021	2.800	Dec 2021	-		2.800	-	-	-
RVAP Study Support	C/FFP	Aerospace : Various	-	1.710	Jan 2020	0.850	Jan 2021	0.850	Dec 2021	-		0.850	-	-	-
RVAP Engineering Support	C/FFP	MITRE : Various	-	-		-		0.500	Dec 2021	-		0.500	-	-	-
		Subtotal	-	4.520		2.650		4.150		-		4.150	-	-	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
RVAP Joint Technology Demonstrator	MIPR	SNL and LLNL : Various	-	0.800	Jan 2020	0.500	May 2021	1.000	Dec 2021	-		1.000	-	-	-
RVAP Flight Materials Test Platform	MIPR	SAF/FMBIB : Various	-	0.500	Jul 2020	0.000		-		-		-	-	-	-
RVAP Modeling and Simulation Programs	Various	Various : Various	-	1.539	Feb 2020	1.300	Feb 2021	0.500	Dec 2021	-		0.500	-	-	-
RVAP Nosetip Studies	Various	Various : Various	-	1.000	Apr 2020	-		-		-		-	-	-	-
RVAP Advanced Concept Studies	Various	Various : Various	-	6.047	Dec 2019	5.100	Jan 2021	4.000	Dec 2021	-		4.000	-	-	-
RVAP Aeroshell Studies	Various	Various : Various	-	0.000	Jan 2020	-		-		-		-	-	-	-
RVAP Virtual Environment Trainer	C/CPFF	By Light Professional IT : Orlando, FL	-	2.000		2.200	Apr 2021	0.500	Dec 2021	-		0.500	-	-	-
RVAP Radiation-Hardened Advanced Microelectronics	Various	Various : Various	-	0.000	Feb 2020	9.085	Jan 2021	6.566	Dec 2021	-		6.566	-	-	-
Developmental Flight Test	Various	Various : Various	-	-		0.800	Apr 2021	-		-		-	-	-	-
Rad Hard Non-Volatile Memory	Various	Various : Various	-	-		-		0.500	Apr 2022	-		0.500	-	-	-
Rad Hard Radar	Various	Various : Various	-	-		-		0.250	Jun 2022	-		0.250	-	-	-
		Subtotal	-	11.886		18.985		13.316		-		13.316	-	-	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641022 / *ICBM Reentry Vehicle Applications*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
RVAP Program Management Administration	Various	Various : Various	-	0.654	Jan 2020	0.702	Jan 2021	0.700	Dec 2021	-		0.700	-	-	-
		Subtotal	-	0.654		0.702		0.700		-		0.700	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	17.060		22.337		18.166		-		18.166	-	-	N/A

Remarks

The developmental test flight enables us to demonstrate developing technologies in relevant ICBM environments.

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641022 / *ICBM Reentry Vehicle Applications*

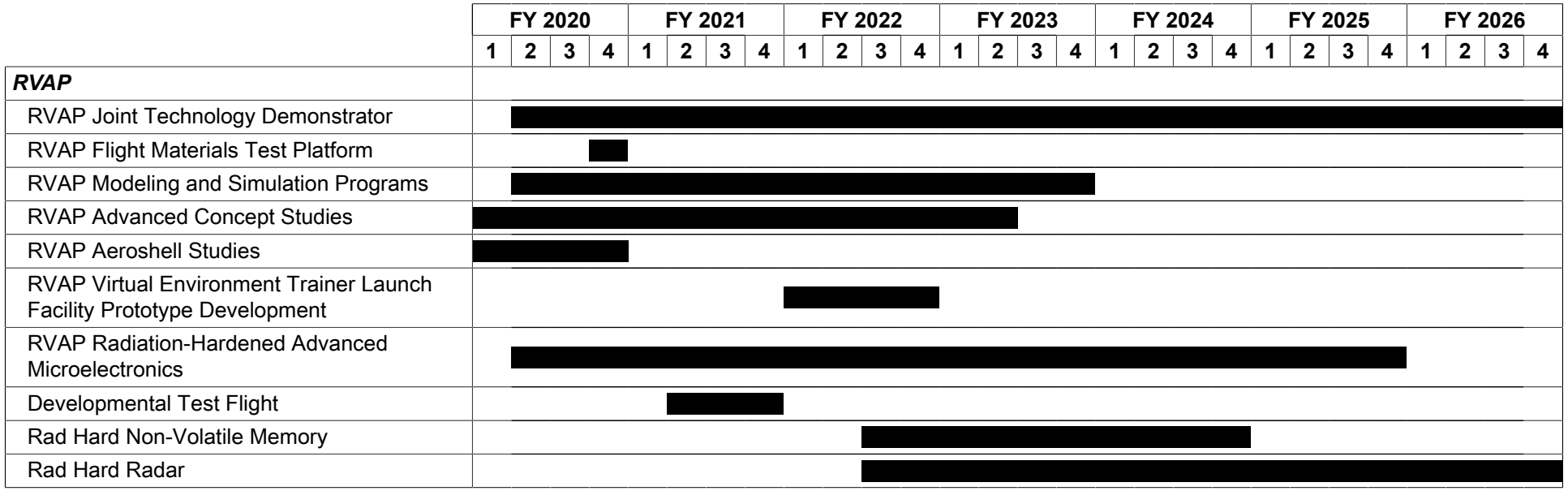

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641022 / *ICBM Reentry Vehicle Applications*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
RVAP				
RVAP Joint Technology Demonstrator	2	2020	4	2026
RVAP Flight Materials Test Platform	4	2020	4	2020
RVAP Modeling and Simulation Programs	2	2020	4	2023
RVAP Advanced Concept Studies	1	2020	2	2023
RVAP Aeroshell Studies	1	2020	4	2020
RVAP Virtual Environment Trainer Launch Facility Prototype Development	1	2022	4	2022
RVAP Radiation-Hardened Advanced Microelectronics	2	2020	4	2025
Developmental Test Flight	2	2021	4	2021
Rad Hard Non-Volatile Memory	3	2022	4	2024
Rad Hard Radar	3	2022	4	2026

Note

Developmental Test Flight transitions to LRP in FY22
Joint Technology Demonstrator and Rad Hard Radar continue past FY26

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	Project (Number/Name) 641024 / *ICBM Command & Control (C2) Applications*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
641024: *ICBM Command & Control (C2) Applications*	-	3.713	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Command and Control Applications Program (C2AP) supports ICBM weapon system connectivity to the President and National Command Authorities. C2AP studies and assesses both legacy and future C2 System technology applications. C2AP evaluates and develops assured, survivable, and secure communications and battlespace awareness between the missile Launch Control Centers and Launch Facilities essential for mission execution. Efforts include identifying and developing current and future technologies, as well as concepts that exploit state-of-the-art communications and information transfer techniques to both current and future ICBM systems. Products include studies, demonstrations and tests such as ICBM Weapon System C2 (WSC2) architectures, networks, and systems to meet nuclear command and control requirements.

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 0605831F. In FY20 $0M was expended for civilian pay expenses in this program element, and in FY21 $0M is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Command and Control Application Program	3.713	0.000	0.000
Description: Examine and develop concepts for transforming ICBM WSC2 to meet current and future requirements. ***FY 2021 Plans:*** N/A ***FY 2022 Plans:*** N/A			
Accomplishments/Planned Programs Subtotals	3.713	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 04 PE 0605230F: *GBSD*	538.643	1,447.113	2,570.442	-	2,570.442	-	-	-	-	-	-

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641024 / *ICBM Command & Control (C2) Applications*

D. Acquisition Strategy

Studies, analyses, limited engineering, will be accomplished; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641024 / *ICBM Command & Control (C2) Applications*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
C2AP Battlespace Awareness Studies	Various	Various : Various	-	1.200	Jan 2020	-		-		-		-	-	-	-
C2AP Cyber Technologies Study	MIPR	Sandia National Lab : Albuquerque, NM	-	2.300	Jan 2020	-		-		-		-	-	-	-
		Subtotal	-	3.500		-		-		-		-	-	-	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
C2AP Program Management	C/FFP	Various : Various	-	0.213	Jan 2020	-		-		-		-	-	-	-
		Subtotal	-	0.213		-		-		-		-	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	3.713		0.000		-		-		-	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641024 / *ICBM Command & Control (C2) Applications*

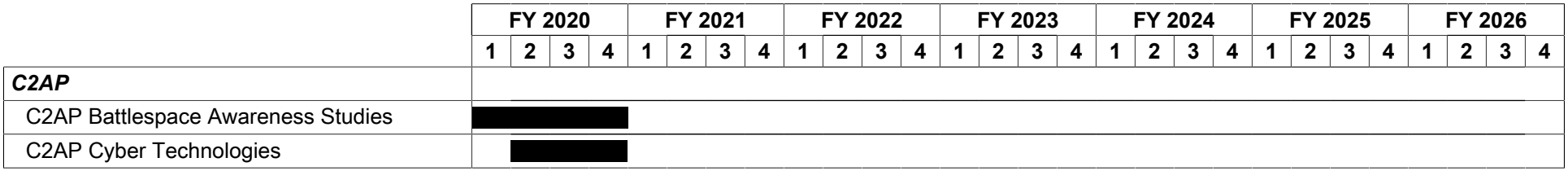

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 641024 / *ICBM Command & Control (C2) Applications*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
C2AP				
C2AP Battlespace Awareness Studies	1	2020	4	2020
C2AP Cyber Technologies	2	2020	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	Project (Number/Name) 644209 / *Long Range Planning (LRP)*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
644209: *Long Range Planning (LRP)*	-	3.924	0.000	23.433	0.000	23.433	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Long Range Planning (LRP) effort identifies and analyzes potential modifications to current and future Intercontinental Ballistic Missile (ICBM) Weapon Systems required to meet objectives relative to executing flight tests, long-term sustainment, technology insertion, battle space awareness, employment, force structure and future systems. The studies will focus on system supportability, operability, reliability, innovation and maintainability. Options/concepts generated by these studies are evaluated for feasibility, system impacts, and cost. The LRP supports and conducts testing, and future weapon systems development and deployment. Pre-milestone activities may be conducted for current or future ICBM weapon systems to include entry criteria for milestone activities.

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 0605831F. In FY20 $0M was expended for civilian pay expenses in this program element, and in FY21 $0M is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Long Range Planning	3.924	0.000	23.433
Description: Analyze, study and plan current and future ICBM activities to meet requirements for long-term sustainment, technology insertion, employment force structure and future systems. Note: This is not a New Start. Funding for developmental test flight activities was included in Project 641021 (Propulsion Applications) and Project 641022 (Reentry Vehicle Applications) in Fiscal Year 2021. ***FY 2021 Plans:*** N/A ***FY 2022 Plans:*** •Continue developmental test flight capabilities that were started in Reentry Vehicle Applications and Propulsion Applications. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funds increased due to the ramp up of the developmental test flight efforts.			
Accomplishments/Planned Programs Subtotals	3.924	0.000	23.433

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 644209 / *Long Range Planning (LRP)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 04 PE 0605230F: *GBSD*	538.643	1,447.113	2,570.442	-	2,570.442	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Analysis will be accomplished; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 644209 / *Long Range Planning (LRP)*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LRP Radiation-Hardened Advanced Microelectronics	Various	Various : Various	-	3.892	Jan 2020	-		-		-		-	-	-	-
Virtual Environment Trainer	C/CPAF	By Light Professional IT : Orlando, FL	-	0.000	Oct 2020	-		-		-		-	-	-	-
Developmental Flight Test	Various	Various : Various	-	-		-		23.433	Nov 2021	-		23.433	-	-	-
		Subtotal	-	3.892		-		23.433		-		23.433	-	-	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LRP Program Management	Various	Various : Various	-	0.032	Jan 2020	-		-		-		-	-	-	-
		Subtotal	-	0.032		-		-		-		-	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	3.924		0.000		23.433		-		23.433	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 644209 / *Long Range Planning (LRP)*

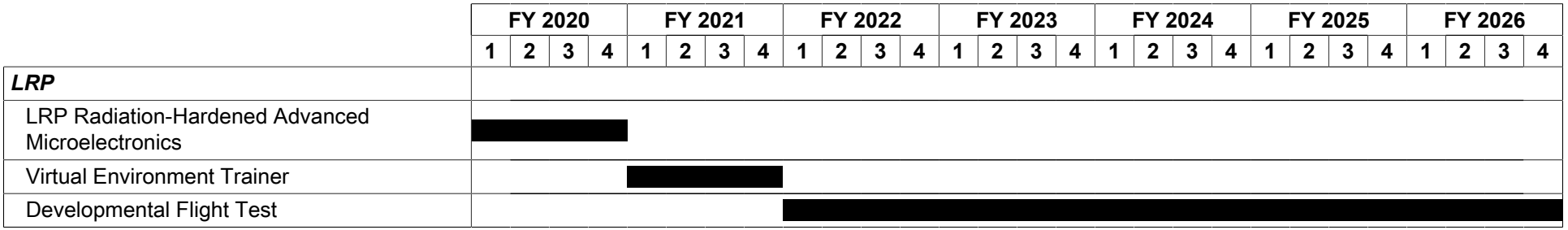

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0603851F / *Intercontinental Ballistic Missile - Dem/Val*	**Project (Number/Name)** 644209 / *Long Range Planning (LRP)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
LRP				
LRP Radiation-Hardened Advanced Microelectronics	1	2020	4	2020
Virtual Environment Trainer	1	2021	4	2021
Developmental Flight Test	1	2022	4	2026

Note

Developmental Flight Test started in FY21 in BPACs PAP and RVAP; continues past FY26