Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force											Date: February 2020	
Appropriation/Budget Activity 3620F: *Research, Development, Test & Evaluation, Space Force* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 1203710SF / *EO/IR Weather Systems*							
COST ($ in Millions)	**Prior Years**	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	-	0.000	0.000	131.000	0.000	131.000	174.000	132.000	94.000	77.000	Continuing	Continuing
643730: *EO/IR Weather System Dev*	-	0.000	0.000	131.000	0.000	131.000	174.000	132.000	94.000	77.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2021, PE 1203710F, EO/IR Weather Systems efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1203710SF, EO/IR Weather Systems from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

In compliance with 2016 National Defense Authorization Act (NDAA) and Joint Requirements Oversight Council (JROC) Memo 062-17, dated 20 Jun 2017, the Air Force has decided to pursue a materiel solution to address Space-based Environmental Monitoring (SBEM) weather Gap 1 - Cloud Characterization (CC) and Gap 2 - Theater Weather Imagery (TWI) as a follow-on to Defense Meteorological Satellite Program (DMSP) operational constellation. The Department of Defense (DoD) requires continued global collection of CC and TWI data to contribute to the space domain awareness. Without the CC and TWI data, AF production of global predictive weather data would be severely impacted, affecting daily air operations and intelligence gathering for strategic mission planning, especially around the contested environment.

Electro-Optical/Infrared (EO/IR) Weather Systems (EWS) is a component of JROC-approved SBEM materiel solutions specifically designed to address CC and TWI needs post-DMSP mission end of life.

Based on recently completed SBEM Capability Assessment and Strategy Review (CASR) in April 2019, the current EWS acquisition strategy focuses on a distributed LEO architecture, for scalability and increased operational resilience. The Space Force will pursue prototyping of latest industry capabilities for simplified sensor designs, while meeting CC and TWI requirements and data latencies in a distributed architecture. The EWS prototyping effort will:

1) Explore low-Size, Weight & Power/simplified EO/IR sensor designs in highly competitive design sprints, utilizing variety of experimental/prototyping contract vehicles
2) Conduct system technology end-to-end demonstrations, from prototype build, Integration & Test, Launch, ground Telemetry/Tracking & Commanding (TT&C) and on-orbit data collection to data processing and dissemination to the Weather Centrals
3) Explore business models for the feasibility of commercially available data.

In addition, the program may integrate sensors into a commercial & Government communication transport layer, leveraging web services to ensure delivery of data products to end users.

Secondary investments may be supported to address weather gaps identified in the SBEM Analysis of Alternatives and validated by the JROC.

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Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver EWS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392SF and 1206398SF.

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.

B. Program Change Summary ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	131.000	0.000	131.000
Total Adjustments	0.000	0.000	131.000	0.000	131.000
• Congressional General Reductions	0.000	0.000			
• 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	0.000	0.000			
• Other Adjustments	0.000	0.000	131.000	0.000	131.000

Change Summary Explanation

FY 2021: $131.000M transferred from RDT&E, Air Force to RDT&E Space Force.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Electro-Optical/Infrared Weather System (EWS)	0.000	0.000	131.000
Description: EWS will pursue multi-phase efforts utilizing rapid experimental/prototype contract vehicles to mature industry EO/IR technologies to provide global LEO coverage to meet SBEM Gaps 1 (CC) and 2 (TWI) and eventual on-ramp to operational EO/IR system to replace DMSP constellation. Space Enterprise Consortium (SpEC) Other Transaction (OT) #1 is the prototyping effort, which will focus on maturing multi-spectral imaging capabilities to collect & disseminate terrestrial atmospheric phenomena to support DoD operations, while assessing industrial capabilities to provide CC and TWI data in a viable commercial business			

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
Appropriation/Budget Activity 3620F: *Research, Development, Test & Evaluation, Space Force I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 1203710SF *I EO/IR Weather Systems*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
model. The program will pursue simplified sensor designs and corresponding lower size, weight and power prototypes potentially hosted on a proliferated LEO mesh network. To minimize risks associated with rapid prototyping effort to replace DMSP constellation, SpEC OT #2 will focus on further developing high maturity EO/IR system designs in competitive design sprints in a parallel path to SpEC OT #1. This path will provide viable on-ramp opportunity to field operational EO/IR system, should prototype demonstrations prove unsuccessful. ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** For EWS Phase II SpEC OT #1, continue prototype system build, integration test and preparation for launch. For SpEC OT #2, continue high-maturity sensor design sprints for the space vehicle, and associated ground development activities to support Preliminary Design Review (PDR). Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Accomplishments/Planned Programs Subtotals	0.000	0.000	131.000

D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• SPAF 01 SPCMOD: *Space Mods*	49.526	-	-	-	-	-	-	-	-	0.000	49.526

Remarks

Reflects PE 1203710F EO/IR Weather Systems portion of shared P-1 line SPCMOD.

E. Acquisition Strategy

The acquisition strategy for EWS is based on validated SBEM CASR recommendations, JROC Memoranda, and subsequent architectural analysis for future weather needs. EWS will initially pursue competitive bids to field technology demonstration EO/IR prototype system capable of fulfilling CC and TWI. Once technology demonstrations of the prototype system has proven successful, the EWS program will transition to fielding operational systems capable of meeting CC and TWI requirements.

Phase I will leverage ongoing experimental EO/IR prototype development projects under AFRL's SBIR contracts to understand operational utility of available and developing EO/IR sensors.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
Appropriation/Budget Activity 3620F: *Research, Development, Test & Evaluation, Space Force I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 1203710SF *I EO/IR Weather Systems*

Phase II SpEC OT #1 will involve competitive bids for multiple system designs using SpEC OT contracts for rapid prototyping effort to fulfill CC and TWI requirements, while exploring valid commercial business models for industry to provide weather data as a service.

In order to minimize risks to DMSP constellation coverage, the Space Force will also pursue SpEC OT #2 for risk mitigation, pursuing competitive bid on low- risk, high-maturity system-level solutions in a parallel effort to the prototyping effort, that can fully address CC and TWI requirements as part of the Family of Systems comprised of civil and International partnerships. This risk mitigation option will carry two vendors to PDR level design and include assessment of prototype system performance and potential for transition to operations.

Following the acquisition strategy approval and assessment of the simplified sensors' performance with the SF weather mission, the SF plans to assess costs to ramp production in future phase III to reduce revisit time to maximize warfighter utility.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203710SF / *EO/IR Weather Systems*	Project (Number/Name) 643730 / *EO/IR Weather System Dev*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Phase II Risk Mitigation System	C/CPAF	TBD : TBD	-	-		-		27.300	Dec 2020	-		27.300	Continuing	Continuing	-
Phase II	C/CPAF	TBD : TBD	-	-		-		79.400	Dec 2020	-		79.400	Continuing	Continuing	-
Phase III to IOC	C/CPAF	TBD : TBD	-	-		-		0.300	Mar 2021	-		0.300	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	-	-		-		11.000	Nov 2020	-		11.000	Continuing	Continuing	-
Enterprise Systems Engineering & Integration	C/CPIF	Engility Corp : Andover, MA	-	-		-		2.000	Nov 2020	-		2.000	Continuing	Continuing	-
		Subtotal	-	-		-		120.000		-		120.000	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FFRDC	RO	Aerospace Corp : El Segundo, CA	-	-		-		4.800	Nov 2020	-		4.800	0.000	4.800	-
A&AS	Various	Various : Various	-	-		-		3.700	Nov 2020	-		3.700	0.000	3.700	-
Other Support	Various	Various : Various	-	-		-		2.500	Jun 2021	-		2.500	0.000	2.500	-
		Subtotal	-	-		-		11.000		-		11.000	0.000	11.000	N/A

	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		0.000		131.000		-		131.000	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3620F / 4	**R-1 Program Element (Number/Name)** PE 1203710SF / *EO/IR Weather Systems*	**Project (Number/Name)** 643730 / *EO/IR Weather System Dev*

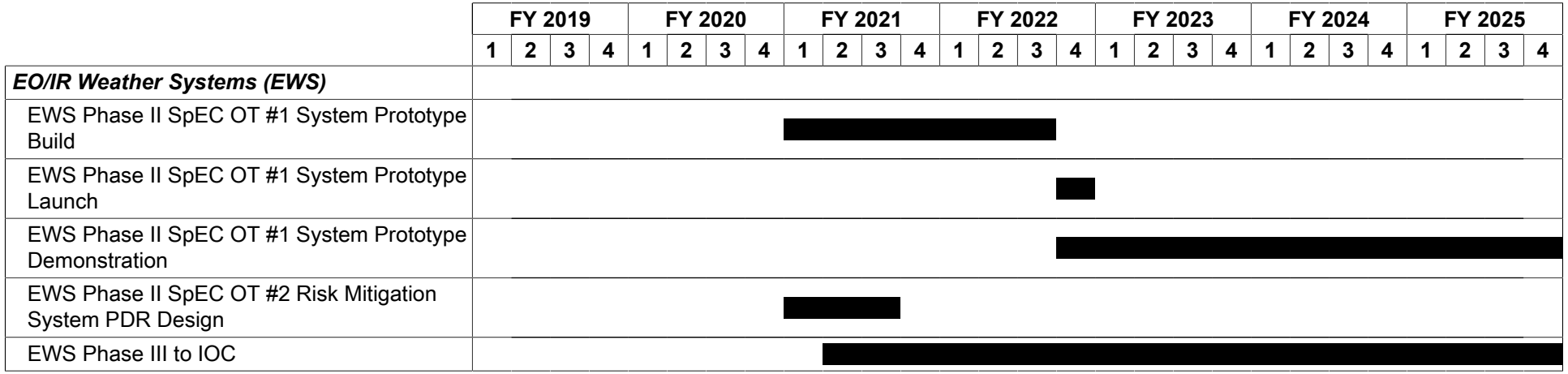

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3620F / 4	**R-1 Program Element (Number/Name)** PE 1203710SF / *EO/IR Weather Systems*	**Project (Number/Name)** 643730 / *EO/IR Weather System Dev*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
EO/IR Weather Systems (EWS)				
EWS Phase II SpEC OT #1 System Prototype Build	1	2021	3	2022
EWS Phase II SpEC OT #1 System Prototype Launch	4	2022	4	2022
EWS Phase II SpEC OT #1 System Prototype Demonstration	4	2022	4	2025
EWS Phase II SpEC OT #2 Risk Mitigation System PDR Design	1	2021	3	2021
EWS Phase III to IOC	2	2021	4	2025