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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>					R-1 Program Element (Number/Name) PE 1203710F / <i>EO/IR Weather Systems</i>							
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	-	121.723	0.000	0.000	0.000	0.000	-	-	-	-	-	-
643730: <i>EO/IR Weather System Dev</i>	-	121.723	0.000	0.000	0.000	0.000	-	-	-	-	-	-
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 solution 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 pivots focuses on a distributed LEO architecture, for scalability and increased operational resilience. The Air 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 demonstration, 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) has transformed 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 1206392F and 1206398F.

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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	125.964	0.000	0.000	0.000	0.000
Current President's Budget	121.723	0.000	0.000	0.000	0.000
Total Adjustments	-4.241	0.000	0.000	0.000	0.000
• 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	-4.241	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 643730: *EO/IR Weather System Dev*

Congressional Add: *Transfer from SpRCO (Line 72)*

	FY 2020	FY 2021
Congressional Add Subtotals for Project: 643730	24.742	-
Congressional Add Totals for all Projects	24.742	-

Change Summary Explanation

FY 2020: +24.742M: Congressional add for transfer from line 72 (SpRCO)

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: Electro-Optical/Infrared Weather System (EWS)</p> <p>Description: 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 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.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p>	96.981	0.000	0.000
Accomplishments/Planned Programs Subtotals	96.981	0.000	0.000

	FY 2020	FY 2021
Congressional Add: Transfer from SpRCO (Line 72)	24.742	-
FY 2020 Accomplishments: Transfer from Line 72 for EO/IR prototyping effort		
Congressional Adds Subtotals	24.742	-

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

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.

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<p>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.</p> <p>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.</p> <p>In order to minimize risks to DMSP constellation coverage, the Air 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.</p> <p>Following the acquisition strategy approval and assessment of the simplified sensors' performance with the AF weather mission, the AF plans to assess costs to ramp production in future phase III to reduce revisit time to maximize warfighter utility.</p>		

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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 1203710F / EO/IR Weather Systems	Project (Number/Name) 643730 / EO/IR Weather System Dev
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Phase I	C/CPAF	AFRL : Fairfax, VA	-	5.100	Feb 2020	-		-		-		-	-	-	-
Phase II	C/Various	Various : Various, CA	-	103.587	Apr 2020	-		-		-		-	-	-	-
Phase II Risk Mitigation	MIPR	NASA : TBD	-	3.031	Aug 2020	-		-		-		-	-	-	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	-	1.466	Jan 2020	-		-		-		-	-	-	-
Enterprise Systems Engineering & Integration	C/CIPIF	Engility Corp : Andover, MA	-	1.606	Mar 2020	-		-		-		-	-	-	-
Subtotal			-	114.790		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	RO	Aerospace Corp : El Segundo, CA	-	2.851	Apr 2020	-		-		-		-	-	-	-
A&AS	Various	Various : Various	-	3.971	Mar 2020	-		-		-		-	-	-	-
Other Support	Various	Various : Various	-	0.111	Jun 2020	-		-		-		-	-	-	-
Subtotal			-	6.933		-		-		-		-	-	-	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	-	121.723	0.000	-	-	-	-	-	N/A

Remarks

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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 1203710F / <i>EO/IR Weather Systems</i>	Project (Number/Name) 643730 / <i>EO/IR Weather System Dev</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>EO/IR Weather Systems (EWS)</i>	
EWS Phase I Weather Satellite	
EWS Phase II Spec OT #1 System Prototype Solicitation Dev & Award	
EWS Phase II SpEC OT #1 System Prototype Design	

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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 1203710F / <i>EO/IR Weather Systems</i>	Project (Number/Name) 643730 / <i>EO/IR Weather System Dev</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>EO/IR Weather Systems (EWS)</i>				
EWS Phase I Weather Satellite	2	2020	4	2020
EWS Phase II Spec OT #1 System Prototype Solicitation Dev & Award	1	2020	2	2020
EWS Phase II SpEC OT #1 System Prototype Design	2	2020	4	2020