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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 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 1206422SF I Weather System Follow-on
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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	2.526	0.000	2.526	2.583	1.413	0.000	0.000	0.000	6.522
65A038: SSA Environmental Monitoring	-	0.000	0.000	2.526	0.000	2.526	2.583	1.413	0.000	0.000	0.000	6.522
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206422F, Weather System Follow-on, Project 65A038, SSA Environmental Monitoring efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206422SF, Weather System Follow-on, Project 65A038, SSA Environmental Monitoring from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

The Space Situational Awareness Environmental Monitoring (SSAEM) program is a non-ACAT, Class D technology demonstration project to support the international Constellation Observing System for Meteorology, Ionosphere and Climate 2 (COSMIC-2) mission. The SSAEM program provides the acquisition, development and launch/on-orbit support of 18 space/terrestrial weather sensors to COSMIC-2 partnership in coordination with National Oceanic and Atmospheric Administration (NOAA) and Taiwan's National Space Organization (NSPO). COSMIC-2 is launching six satellites in an equatorial, Low Earth Orbit (LEO) with 3 SSAEM sensors in each spacecraft by FY 2019. The sensor types are Tri-Global Navigation Satellite System (Tri-GNSS) Radio occultation System (TGRS), Ion Velocity Meter (IVM) and Radio Frequency Beacon (RFB). The SSAEM sensors will address three distinct Joint Requirement Oversight Committee (JROC)-approved Category A weather gaps, specifically Gap #4 (Ionospheric Density), Gap #7 (Equatorial Ionospheric Scintillation) and Gap #12 (Electric Field), to provide additional space meteorological data to improve forecast capabilities and improve warfighter navigation/communication capabilities.

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 WSF 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 program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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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	2.526	0.000	2.526
Total Adjustments	0.000	0.000	2.526	0.000	2.526
• 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	2.526	0.000	2.526

Change Summary Explanation

FY 2021: +\$2.256M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Space Situational Awareness Environmental Monitoring (SSAEM)	0.000	0.000	2.526
Description: The SSAEM program is a non-ACAT, Class D technology demonstration project to support international Constellation Observing System for Meteorology, Ionosphere and Climate 2 (COSMIC-2) mission. The SSAEM program provides the acquisition, development and launch/on-orbit support of 18 space/terrestrial weather sensors to COSMIC-2 partnership in coordination with National Oceanic and Atmospheric Administration (NOAA) and Taiwan's National Space Organization (NSPO). On June 25th, 2019 COSMIC-2 successfully launched six satellites in an equatorial, Low Earth Orbit (LEO) with 3 SSAEM sensors in each spacecraft. The sensor types are; Tri-GNSS Radio occultation System (TGRS), Ion Velocity Meter (IVM) and Radio Frequency Beacon (RFB). The SSAEM sensors will address three distinct Joint Requirement Oversight Committee (JROC)-approved Category A weather gaps, specifically Gap 4 (Ionospheric Density), 7 (Equatorial Ionospheric Scintillation) and 12 (Electric Field), to provide additional space meteorological data to improve forecast capabilities and improve warfighter navigation/communication capabilities.			
FY 2020 Plans: N/A			
FY 2021 Plans: Complete sensor data cal/val effort for all three sensor types. Complete RF Beacon ground receiver cyber hardening for connecting with Ionospheric Scintillation Total Electron Count (TEC) observer (ISTO) sites. Field RF Beacon ground receiver units for connection into ISTO network. Provide continuous on-orbit sensors health check and anomaly resolution support until the			

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
satellites reach their designed mission EoL. 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, prototyping, etc. FY 2020 to FY 2021 Increase/Decrease Statement: N/A			
Accomplishments/Planned Programs Subtotals	0.000	0.000	2.526

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

N/A

Remarks

E. Acquisition Strategy

SSAEM post-launch and cal/val support contract is the sole-source contract to University Corporation Atmospheric Research due to their expertise in radio occultation and space weather monitoring for SSAEM sensors. The Justification & Approval (J&A) was approved in June 2018 and the Request for Proposal was released on August 1st, 2018. The contract was awarded in July 2019 for 5-years of post-launch cal/val and on-orbit support.

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 65A038 / <i>SSA Environmental Monitoring</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space Situational Awareness Environmental Monitoring</i>				
SSAEM Sensors Cal/Val	1	2021	2	2021
On Orbit Activities	2	2021	2	2024