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Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force **Date:** March 2024

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 1203913SF / <i>NUDET Detection System (SPACE)</i>
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COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
Total Program Element	-	60.429	93.391	83.426	0.000	83.426	76.968	78.552	81.388	82.993	0.000	557.147
672808: <i>Nuc Detonation Det Sys (sensors)</i>	-	60.429	93.391	83.426	0.000	83.426	76.968	78.552	81.388	82.993	0.000	557.147
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The United States Nuclear Detonation (NUDET) Detection System (USNDS) provides a near real-time worldwide, highly survivable/endurable capability to detect, locate, and report any nuclear detonations in the earth's atmosphere or in near space. USNDS supports NUDET detection requirements across five mission areas: Integrated Tactical Warning and Attack Assessment (ITW/AA), Nuclear Force Management (NFM), Space Control, Treaty Monitoring, and a classified mission.

The USNDS program is jointly sponsored and funded by the Department of Defense (DoD), through the Space Force, and the Department of Energy (DOE), through the National Nuclear Security Administration (NNSA) and its Nuclear Detonation Detection (NA-22) office, respectively. NNSA/NA-22 supplies USNDS space sensors as Government Furnished Equipment to the Space Force's USNDS Program Office, which is responsible for all acquisition and Systems Engineering, Integration and Test activities on Space Vehicles (SVs), to include Global Positioning System (GPS) and additional hosts, and their supporting ground control segments. The AF directly funds the development of the USNDS ground segment (described below).

DoD funds their contribution to the USNDS program in Program Element 1203913SF, Research, Development, Test and Evaluation, Space Force (RDT&E, SF), Procurement, Space Force, and Operations and Maintenance.

USNDS consists of space sensors and complex ground segments. The space segment sensors, funded by DOE, consists of three nuclear detection sensor payloads: the Radiation Detection Capability (RADEC) payload for Defense Support Program (DSP) satellites, the Global Burst Detection (GBD) payload for Medium Earth Orbit platforms (GPS satellites), and the Space Atmospheric Burst Reporting System (SABRS) payload for Geosynchronous Earth Orbit (GEO) platforms (classified GEO host), and Space Test Platform 3. Together, these sensors and associated communications capability provided by the host satellites comprise the global NUDET space segment detection capability for the USNDS. Space sensors communicate NUDET indications to the fixed ground segment, the RADEC Data Processor, and the Integrated Correlation and Display System (ICADS), the five deployable mobile ground segment survivable Ground Nuclear Detonation Detection System Terminals (GNTs), and the survivable/endurable Universal Ground NDS Terminals (UGNTs), when operationally accepted. The ground segment provides ground receiving analysis and reporting capabilities to national authorities, commands, and forward users as well as Department of State for the Treaty Monitoring and Verification mission. The ground control segment is being modernized and continuously improved through an incremental, evolutionary acquisition approach.

The upgrades to the GNTs are the survivable/endurable UGNT which are funded with RDT&E in this program. The UGNT provides NUDET Detection Reports to end users through survivable/endurable USNDS communications via MilStar/Future Communication Systems (FCS)/Advanced Extremely High Frequency (AEHF) circuits. The GNT supports ITW/AA and NFM missions. The UGNT program modifies the baseline of the GNT subsystem and deploys as an integral part of the Space Based

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force	Date: March 2024
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Infrared System Survivable (SBIRS) / Endurable Evolution (S2E2) Mobile Ground System (MGS) (SMGS) units also in support of ITW/AA and NFM. The UGNT, when integrated with the SMGS, will perform NUDET event processing with fused NDS data from GPS and DSP. SMGS capability refers to the result of the S2E2 upgrade program for the MGS mission processing capability, including the integration of UGNT. The intended end state of UGNT integration is delivery of enhanced NUDET detection capabilities which meet survivable/endurable attack assessment requirements directed by the President, Secretary of Defense, Joint Staff, USSPACECOM, and USSTRATCOM, delivering long-term, cost effective, multi-role, multi-mission space effects to warfighters across the range of military operations.

ICADS 7 upgrades the ICADS 6 baseline necessary to process future GPS IIF satellites GBD USNDS messages, address technology obsolescence, and meet updated cybersecurity requirements for system resiliency.

This budget line includes systems engineering, research and development, on-orbit and field testing and end-to-end verification of USNDS space sensors, ground analysis and reporting systems in support of the five USNDS mission areas. Sensor integration for GPS III and GPS III Follow-on (IIF) are funded in their respective programs.

This program may include necessary civilian pay expenses required to manage, execute, and deliver NUDET Detection System (SPACE) weapon system capability. The use of such program funds is in addition to the civilian pay expenses budgeted in programs 1206392SF and 1206398SF.

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.

B. Program Change Summary (\$ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	60.429	93.391	86.481	0.000	86.481
Current President's Budget	60.429	93.391	83.426	0.000	83.426
Total Adjustments	0.000	0.000	-3.055	0.000	-3.055
• 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	-3.055	0.000	-3.055

Change Summary Explanation

FY 2025: -0.022M; Withheld for higher priorities

FY 2025: The FY 2025 funding request was reduced by \$3.2 million to account for the availability of prior year execution balances.

FY 2025: +.124M; AF inflation rate

UNCLASSIFIED

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2023	FY 2024	FY 2025
<p>Title: Integration with SBIRS S2E2 Mobile Ground Terminals (SMGTs)</p> <p>Description: Support the Integration and test activities between UGNTs and the SMGTs, which together provide NUDET Detection Reports and missile warning data to end users through survivable/endurable USNDS communications via MilStar/FCS/AEHF circuits. The UGNTs deploy as an integral part of the SMGS units also in support of ITW/AA and NFM. Support program scope analyzation for USNDS receiver and NUDET Decryption Unit (NDU) components. Additional support costs includes such activities as; receiver system engineering support, conceptual hardware and software design, check-out/support, testing, and system engineering.</p> <p>FY 2024 Plans: N/A</p> <p>FY 2025 Plans: N/A</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: N/A</p>		3.400	0.000	0.000
<p>Title: ICADS 7</p> <p>Description: ICADS 7 consists of satellite ground data processing systems that accommodate the new NDS payload on GPS IIIF SVs and is an upgrade to the current ICADS 6 system. ICADS 7 includes new software, hardware and cybersecurity capabilities and NDS Analysis Package Ground Station (NAPGS) ground systems. The effort includes, but not limited to, the upgrade of two new ICADS 7 test beds, the replacement of the NDU, Enhanced Receiver Subsystems (ERS), and Automated Data Processors (ADP). A non-recurring Engineering effort is required to design the replacements for the NDUs, ERSs and ADPs currently on USNDS tests beds and fielded systems. The ICADS upgrade includes data processing changes to support the new USNDS optical sensor, known as Spectral Imaging Geolocation Hyper-Temporal Sensor (SIGHTS), that will be hosted on the GPS IIIF SVs.</p> <p>FY 2024 Plans: Continue to ramp up ICADS 7 preparation for Milestone B decision and Engineering & Manufacturing Development (EMD) phase leading up to Critical Design Review (CDR). Continue system development, including NDU, ERS, and software and hardware to support the USNDS payloads on GPS IIIF SVs. Continue systems engineering and test planning for GPS IIIF Mission Readiness Campaign, GPS IIIF Early Integration to include signal verification/data processing, on-orbit USNDS sensor integration, and Functional Configuration Audit/Physical Configuration Audit. Support next generation USNDS receiver development in collaboration with National Security Agency for crypto enclosure framework/algorithms. Continue upgrade of ICADS testbeds, ground modifications to USNDS sensor payload command plans for GPS IIIF, and NAPGS integration and testing. Rapidly</p>		57.029	93.391	83.426

UNCLASSIFIED

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
<p>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, and activities that may leverage commercial and international opportunities.</p> <p>FY 2025 Plans: Continue ICADS 7 development during EMD phase, including completion of CDR. Focus on development of new cryptographic devices NDU and Receiver, preparing for certification by respective NSA and GPS organizations. Program will increase efforts on software development for main database and processing subsystem, algorithm integration for optical, X-Ray and EMP sensors across multiple prime contractor developers and completion of testbed development. Deliver hardware to support the USNDS payloads on GPS IIIIF SVs, continued systems engineering and test planning for GPS IIIIF Mission Readiness Campaign, GPS IIIIF Early Integration to include signal verification/data processing, on-orbit USNDS sensor integration, and Functional Configuration Audit/Physical Configuration Audit. Ensure commonality across ICADS testbeds and planned ICADS 7 operational systems, ground modifications to USNDS sensor payload command plans for GPS IIIIF. Development, integration and testing of Sandia Data Analysis and Display System and NAPGS subsystems. 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, and activities that may leverage commercial and international opportunities.</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: Funding decreases due to anticipated surge in CDR support ramping down after mid FY25.</p>			
Accomplishments/Planned Programs Subtotals	60.429	93.391	83.426

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2025</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>FY 2029</u>	<u>Cost To</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	
• SPSF 01 01 Space Force	7.062	0.000	0.000	-	0.000	0.000	-	-	-	0.000	7.062
NUDETS: <i>Nudet Detection Space</i>											

Remarks

E. Acquisition Strategy
The USNDS Acquisition Strategy is to develop, integrate, field and sustain USNDS satellite sensors and USNDS ground data processing and distribution hardware and software as well as mission operational and technical program support to sustain the USNDS capability on GPS, DSP, Alternate Host, and SBIRS; funding is sent by Military Interdepartmental Purchase Request (MIPR) from DoD and DOE to Sandia, Los Alamos National Laboratories and other agencies on existing DOE/NNSA contracts. The ICADS 7 Acquisition Strategy was approved in September 2021 and the sole source prime contract awarded in June 2022. USNDS ICS funding for

UNCLASSIFIED

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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 1203913SF / <i>NUDET Detection System (SPACE)</i>	
Ground Technology Program System of Systems will continue until UGNT is delivered at the end of FY 2023. USNDS requirements are defined in the Operational Requirements Document dated January 21, 2004.		

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Air Force **Date:** March 2024

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203913SF / NUDET Detection System (SPACE)	Project (Number/Name) 672808 / Nuc Detonation Det Sys (sensors)
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Product Development (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 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			
USNDS ICADS, GNT/UGNT, and Integration Support	MIPR	Sandia National Laboratory : Albuquerque, NM	-	3.400	Nov 2022	-		-		-		-	Continuing	Continuing	-
USNDS Technical Mission Analysis	RO	Aerospace : El Segundo, CA	-	0.142	Nov 2022	1.085	Nov 2023	1.043	Nov 2024	-		1.043	Continuing	Continuing	-
USNDS Enterprise SE&I	Various	TASC : El Segundo, CA	-	1.133	Nov 2022	4.322	Nov 2023	2.555	Nov 2024	-		2.555	Continuing	Continuing	-
Classified Development	TBD	Classified : Classified	-	-		-		-		-		-	Continuing	Continuing	-
ICADS 7	MIPR	Sandia National Laboratory : Albuquerque, NM	-	47.379	Nov 2022	75.970	Nov 2023	69.503	Nov 2024	-		69.503	Continuing	Continuing	-
Subtotal			-	52.054		81.377		73.101		-		73.101	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 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			
USNDS On-orbit Sensor Testing	MIPR	Various : LANL, SNL, NM	-	3.706	Nov 2022	4.464	Nov 2023	4.023	Nov 2024	-		4.023	Continuing	Continuing	-
Subtotal			-	3.706		4.464		4.023		-		4.023	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 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			
USNDS FFRDC	RO	Aerospace, MITRE : El Segundo, CA	-	2.329	Nov 2022	3.735	Nov 2023	3.368	Nov 2024	-		3.368	Continuing	Continuing	-
USNDS A&AS	Various	Various : Various	-	2.291	Nov 2022	3.735	Nov 2023	2.854	Nov 2024	-		2.854	Continuing	Continuing	-
USNDS Other Support	Various	Various : Various	-	0.049	Nov 2022	0.080	Nov 2023	0.080	Nov 2024	-		0.080	Continuing	Continuing	-
Subtotal			-	4.669		7.550		6.302		-		6.302	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203913SF / <i>NUDET Detection System (SPACE)</i>	Project (Number/Name) 672808 / <i>Nuc Detonation Det Sys (sensors)</i>

FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028				FY 2029			
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

UGNT	
Integration between UGNTs and the S2E2 SMGTs	
ICADS 7	
ICADS 7 Development	
System Requirements Review (SRR)	
Preliminary Design Review (PDR)	
Milestone B	
Critical Design Review (CDR)	
Test Readiness Review (TRR)	

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203913SF / <i>NUDET Detection System (SPACE)</i>	Project (Number/Name) 672808 / <i>Nuc Detonation Det Sys (sensors)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
UGNT				
Integration between UGNTs and the S2E2 SMGTs	1	2023	4	2023
ICADS 7				
ICADS 7 Development	1	2023	4	2029
System Requirements Review (SRR)	1	2023	1	2023
Preliminary Design Review (PDR)	4	2023	4	2023
Milestone B	2	2024	2	2024
Critical Design Review (CDR)	2	2025	2	2025
Test Readiness Review (TRR)	2	2027	3	2027