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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force										Date: May 2017		
Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development					R-1 Program Element (Number/Name) PE 1203913F I NUDET Detection System (SPACE)							
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	14.403	21.093	31.508	0.000	31.508	19.927	17.100	14.269	14.561	Continuing	Continuing
672808: Nuc Detonation Det Sys (sensors)	-	14.403	21.093	31.508	0.000	31.508	19.927	17.100	14.269	14.561	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY2018, PE 0305913F, NNUDET Detection System efforts were transferred to PE 1203913F, NUDET Detection System due to the creation of a new Major Force Program for Space. FY2016 and FY2017 funding is now documented in the exhibits for PE 1203913F.

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 (SC), Treaty Monitoring (TM), and a classified mission.

The USNDS program is jointly sponsored and funded by the Department of Defense (DoD), through the US Air Force (AF), 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 (GFE) to the AF's USNDS Program Office, which is responsible for all acquisition and systems engineering, integration and test (SEIT) 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 NDS program in Program Element (PE) 1203913F with RDT&E, SPAF, and O&M.

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 (MEO) platforms (GPS satellites), and the Space Atmospheric Burst Reporting System (SABRS) payload for Geosynchronous Earth Orbit (GEO) platforms (classified GEO host). 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 (RDP) and the Integrated Correlation and Display System (ICADS)), the deployable mobile ground segment (survivable Ground NDS Terminals (GNTs)), and the survivable/endurable Universal Ground NDS Terminals (UGNTs), when fielded. The ground segment provides ground receiving analysis and reporting capabilities to national authorities, commands, and forward users as well as Department of State (DOS) for the Treaty Monitoring and Verification mission. The ground control segment is being modernized and continuously improved through an incremental, evolutionary acquisition approach.

UNCLASSIFIED

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The upgrade to the GNT is the survivable/endurable Universal Ground NDS Terminal, funded with AF Research, Development, Test & Evaluation (RDT&E) in this PE. The UGNT provides NUDET Detection Reports to end users through survivable and endurable USNDS communications via Milstar/Advanced Extremely High Frequency (AEHF) circuits. The GNT supports ITW/AA and NFM missions. The UGNT program modifies the baseline of the GNT program and deploys as an integral part of the Space Based Infrared System (SBIRS) Survivable / Endurable Evolution (S2E2) Mobile Ground System (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, SECDEF, Joint Staff, and USSTRATCOM, delivering long-term, cost effective, multi-role, multi-mission space effects to the war fighter across the range of military operations.						
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 IIF and GPS III are funded in their respective PEs.						
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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget		14.403	21.093	31.418	0.000	31.418
Current President's Budget		14.403	21.093	31.508	0.000	31.508
Total Adjustments		0.000	0.000	0.090	0.000	0.090
• 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	0.090	0.000	0.090
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2016	FY 2017	FY 2018
Title: UNIVERSAL GROUND NDS TERMINALS (UGNT)				9.627	12.078	21.655
Description: Delivers enhanced missile warning and NUDET detection capabilities that meet survivable/endurable tactical warning and attack assessment requirements directed by the President, SECDEF, Joint Staff and USSTRATCOM delivering long-term, cost effective, multi-role, multi-mission space effects to the warfighter across the range of military operations.						
FY 2016 Accomplishments:						

UNCLASSIFIED

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C. Accomplishments/Planned Programs (\$ in Millions)								FY 2016	FY 2017	FY 2018	
<p>Completed contractor and Air Force DT&E of UGNTs. Began final testing and integration of hardware and software into the third UGNT trailer.</p> <p>FY 2017 Plans: Deliver first, second and third UGNT trailers to the SBIRS S2E2 program for integration into the S2E2 Force Package (FPAK). Commence integration and testing of UGNT 3.</p> <p>FY 2018 Plans: Deliver, Integrate, and test fourth and fifth UGNT trailers. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, etc.</p>											
<p>Title: Systems Engineering/On-Orbit Support & Testing</p> <p>Description: Support costs included such activities as, on-orbit NDS sensor integration, check-out/support, testing and system engineering.</p> <p>FY 2016 Accomplishments: Provided SE&I, technical support and program technical support for the five NDS mission areas. Delivered GBD for GPS III SV04, SV05, and supported SV integration activities. Supported GPS IIF-11 and IIF-12, integration checkout of NDS sensors during on-orbit activities.</p> <p>FY 2017 Plans: Provide SE&I, technical support and program technical support for the five NDS mission areas. Deliver GBD for GPS III SV06 and SV07.</p> <p>FY 2018 Plans: Deliver GBD for SV08. Launch activate/checkout NDS payloads on GPS III SV01.</p>								4.776	9.015	9.853	
Accomplishments/Planned Programs Subtotals								14.403	21.093	31.508	
D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>FY 2018</u> <u>Base</u>	<u>FY 2018</u> <u>OCO</u>	<u>FY 2018</u> <u>Total</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPAF:BA03:Line Item # NUDETS: <i>Nudet Detection Sys Space</i>	5.095	4.395	6.370	0.000	6.370	6.469	6.583	6.701	6.838	Continuing	Continuing
Remarks											

UNCLASSIFIED

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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, and an Alternate Host; funding is sent by Military Interdepartmental Purchase Request (MIPR) from DoD and Department of Energy (DOE) to Sandia, Lawrence Livermore, Los Alamos National Laboratories and other agencies on existing DOE/NNSA contracts.		
F. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.		

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Air Force												Date: May 2017			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 1203913F / NUDET Detection System (SPACE)				Project (Number/Name) 672808 / Nuc Detonation Det Sys (sensors)					
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
USNDS ICADS and GNT/UGNT	MIPR	Sandia National Laboratory : Albuquerque, NM	-	9.627	Jan 2016	12.078	May 2017	21.655	Nov 2017	0.000		21.655	Continuing	Continuing	-
USNDS Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	1.566	Nov 2015	1.813	May 2017	1.882	Nov 2017	0.000		1.882	Continuing	Continuing	-
USNDS Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	-	1.460	Dec 2015	1.140	Dec 2016	1.140	Dec 2017	0.000		1.140	Continuing	Continuing	-
Subtotal			-	12.653		15.031		24.677		0.000		24.677	-	-	-
Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-
Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
USNDS Testing	Various	17th Test Squadron, JITC : Schriever AFB, CO	-	0.307	Dec 2015	0.313	May 2017	0.692	Dec 2017	0.000		0.692	Continuing	Continuing	-
USNDS On-orbit Sensor Testing	MIPR	Various : LANL, SNL, NM	-	0.000		2.900	Jun 2017	3.200	Dec 2017	0.000		3.200	Continuing	Continuing	-
Subtotal			-	0.307		3.213		3.892		0.000		3.892	-	-	-

UNCLASSIFIED

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Management Services (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
USNDS FFRDC	Various	Aerospace, MITRE : El Segundo, CA	-	0.733	Nov 2015	0.818	May 2017	0.879	Nov 2017	0.000		0.879	Continuing	Continuing	-
USNDS A&AS	Various	Various : Various	-	0.082	Nov 2015	1.951	Jun 2017	1.980	Nov 2017	0.000		1.980	Continuing	Continuing	-
USNDS Other Support	C/CPAF	Various : Various	-	0.628	Nov 2015	0.080	Nov 2016	0.080	Nov 2017	0.000		0.080	Continuing	Continuing	-
Subtotal			-	1.443		2.849		2.939		0.000		2.939	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	14.403		21.093		31.508		0.000		31.508	-	-	-

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force																Date: May 2017			
Appropriation/Budget Activity 3600 / 7								R-1 Program Element (Number/Name) PE 1203913F / NUDET Detection System (SPACE)								Project (Number/Name) 672808 / Nuc Detonation Det Sys (sensors)			

	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	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 1 Integration & Delivery																												
UGNT 2 Integration & Delivery																												
UGNT Test Readiness Review																												
UGNT 1&2 to SBIRS Mobile Ground System																												
UGNT 3 Integration & Delivery																												
UGNT 3 to SBIRS Mobile Ground System																												
UGNT 4-5 Integration & Delivery																												
UGNT Initial Operations Capability																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 1203913F / <i>NUDET Detection System (SPACE)</i>	Project (Number/Name) 672808 / <i>Nuc Detonation Det Sys (sensors)</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
UGNT 1 Integration & Delivery	1	2016	1	2017
UGNT 2 Integration & Delivery	2	2016	1	2017
UGNT Test Readiness Review	1	2016	1	2016
UGNT 1&2 to SBIRS Mobile Ground System	1	2017	1	2017
UGNT 3 Integration & Delivery	4	2016	4	2017
UGNT 3 to SBIRS Mobile Ground System	4	2017	4	2017
UGNT 4-5 Integration & Delivery	3	2018	4	2018
UGNT Initial Operations Capability	2	2019	2	2019