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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2013 Army	<b>DATE:</b> February 2012
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<b>APPROPRIATION/BUDGET ACTIVITY</b>				<b>R-1 ITEM NOMENCLATURE</b>							
2040: <i>Research, Development, Test &amp; Evaluation, Army</i> BA 5: <i>Development &amp; Demonstration (SDD)</i>				PE 0604870A: <i>Nuclear Arms Control Monitoring Sensor Network</i>							
<b>COST (\$ in Millions)</b>	<b>FY 2011</b>	<b>FY 2012</b>	<b>FY 2013 Base</b>	<b>FY 2013 OCO</b>	<b>FY 2013 Total</b>	<b>FY 2014</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	7.017	7.391	7.922	-	7.922	7.806	7.790	8.059	8.371	Continuing	Continuing
SE1: <i>NACT SENSOR ENGINEERING</i>	7.017	7.391	7.922	-	7.922	7.806	7.790	8.059	8.371	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

This project provides Research, Development, Testing & Evaluation (RDTE) to meet technology requirements in support of implementation, compliance, monitoring and inspection for existing and emerging nuclear arms control activities and dual use technology for missile defense integration activities. The project addresses requirements validated by the Office of the Under Secretary of Defense, Acquisition, Technology & Logistics (OUSD AT&L). This project conforms to the administration's research and development priorities as related to Weapons of Mass Destruction (WMD) arms control and disarmament. Technical assessments are made to provide the basis for sound project development, evaluate existing programs and provide the data required to make compliance judgments and support US policy, decision-makers and negotiating teams. Technology developments and system improvement projects are conducted to ensure that capabilities for monitoring systems are available when required.

Primary emphasis is on improved sensor capabilities and improved detection and assessment capabilities against a wide range of threat origins.

The program includes development of equipment and procedures for data exchanges, inspections and monitoring capability and analysis. The technologies and procedures developed in the arms control technology program provide an invaluable source of information on equipment and procedures that is extensively used by US and international agencies. This project also supports the warfighting capability area of combating Weapons of Mass Destruction (WMD).

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2011</b>	<b>FY 2012</b>	<b>FY 2013 Base</b>	<b>FY 2013 OCO</b>	<b>FY 2013 Total</b>
Previous President's Budget	7.276	7.398	7.837	-	7.837
Current President's Budget	7.017	7.391	7.922	-	7.922
Total Adjustments	-0.259	-0.007	0.085	-	0.085
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.217	-			
• Adjustments to Budget Years	-	-0.007	0.085	-	0.085
• Other Adjustments 1	-0.037	-	-	-	-
• Other Adjustments 2	-0.005	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2013 Army									DATE: February 2012		
APPROPRIATION/BUDGET ACTIVITY 2040: Research, Development, Test & Evaluation, Army BA 5: Development & Demonstration (SDD)				R-1 ITEM NOMENCLATURE PE 0604870A: Nuclear Arms Control Monitoring Sensor Network				PROJECT SE1: NACT SENSOR ENGINEERING			
COST (\$ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
SE1: NACT SENSOR ENGINEERING	7.017	7.391	7.922	-	7.922	7.806	7.790	8.059	8.371	Continuing	Continuing
Quantity of RDT&E Articles											

**A. Mission Description and Budget Item Justification**

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The program includes development of equipment and procedures for data exchanges, inspections and monitoring capability and analysis. The technologies and procedures developed in the arms control technology program provide an invaluable source of information on equipment and procedures that is extensively used by US and international agencies. This project also supports the warfighting capability area of combating Weapons of Mass Destruction (WMD).

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2011</b>	<b>FY 2012</b>	<b>FY 2013</b>
<b>Title:</b> Support OSD Treaty Manager	0.476	0.566	0.667
<b>Articles:</b>	0	0	
<b>Description:</b> .			
<b>FY 2011 Accomplishments:</b> Participated and supported the joint U.S. / Provisional Technical Secretariat (PTS) technology conferences / exchanges (i.e. Workshop on Medical Isotope Production (WOSMIP) II, PTS / U.S. Technology Working Group 2nd Annual Conference; PTS Public Key Infrastructure (PKI) / Command & Control experiment; U.S. / Great Britain technology / operations interchange meetings). Provided technical and operational support for the PTS / U.S. sponsored monitoring technology developments, standard reliability and operations /maintenance profile conference. Prepared / Supported International Monitoring System (IMS)			

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>			<b>FY 2011</b>	<b>FY 2012</b>	<b>FY 2013</b>
technology overview briefings (Deputy Assistant Secretary of Defense (DASD) Threat Reduction & Arms Control (TRAC)) in preparation for interagency meetings.  <b>FY 2012 Plans:</b> Plan / Support joint U.S. / PTS technology conferences / exchanges (i.e. Workshop on Medical Isotope Production (WOSMIP) III, PTS / U.S. Technology Working Group 3rd Annual Conference; PTS PKI / Command & Control experiment; U.S. / Great Britain technology / operations interchange meetings). Provide technical and operational support for the PTS/U.S. sponsored monitoring technology developments, standard reliability and operations /maintenance profile conference. Prepare / Support IMS technology DASD (TRAC) overview briefings in preparation for interagency meetings.  <b>FY 2013 Plans:</b> Plan / Support joint U.S. / PTS technology conferences / exchanges (i.e. Workshop on Medical Isotope Production (WOSMIP) IV, PTS / U.S. Technology Working Group 4th Annual Conference; PTS PKI / Command & Control experiment; U.S. / Great Britain technology / operations interchange meetings). Provide technical and operational support for the PTS/U.S. sponsored monitoring technology developments, standard reliability and operations / maintenance profile conference. Prepare / Support DASD (TRAC) IMS technology overview briefings in preparation for interagency meetings.					
<b>Title:</b> Prototype Sensor Development  <b>Description:</b> .  <b>FY 2011 Accomplishments:</b> Deployed next generation infrasound sensors for field and operational testing within the PTS sponsored Sayarim infrasound experiment. Coordinated the event with the government of Israel and the PTS to gather propagation model data for the Middle East region and to evaluate scaling laws for validation against the existing Sayarim summer 2009 event data. Deployed next generation sensors for dynamic operational performance testing at the Utah Test and Training Range (UTTR) ordinance disposal site. Deployed the next generation infrasound sensors to the PTS Conrad Site for dynamic performance testing against the Comprehensive Nuclear-Test-Ban Treaty (CTBT) performance and acceptance requirements. Completed the Transportable Xenon Laboratory (TXL) site survey in Jakarta, Indonesia for a potential location for moving the TXL for the purpose of conducting International Xenon background measurements efforts.  <b>FY 2012 Plans:</b> Work continues on insuring the deployability of the Transportable Xenon Laboratory (TXL) to Jakarta, Indonesia with specific focus on improvements in satellite data communication capabilities and ruggedizing the Swedish Automated Unit for Noble Gas Analysis (SAUNA) systems installation. Operations and maintenance perform in advance of the TXL/SAUNA foreign deployment will be performed to establish an operations baseline for the SAUNA and provide additional opportunity to diagnose and resolve			1.141 0	1.445 0	1.500

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>		<b>FY 2011</b>	<b>FY 2012</b>	<b>FY 2013</b>
any remaining operational concerns with TXL and/or the installed SAUNA. Continue to deploy next generation infrasound sensors for dynamic operational performance testing at the UTTR ordinance disposal site. Continue testing of deployed next generation sensors to the PTS Conrad Site for dynamic performance measurements against the CTBT performance and acceptance requirements.  <b>FY 2013 Plans:</b> Continue station calibration & metrology planning. Continue development of station array element calibration with focus on in-situ array calibration systems and array performance measurements. Plan and carry-out signal capture & identification efforts to include signal clutter source studies, noise source studies, participate in exercises to collect field source data, develop field clutter rejection methodology / algorithms, and False Alarm Rejection Methodology and continue analysis. Initiate planning to evaluate options for performing an experiment to evaluate measurement performance of IMS stations from a planned underground or under water detonation. The explosion will be non-nuclear in nature and will be configured to include the release of radioactive noble gasses in concentrations acceptable to environmental regulations and of a nature suitable to challenge IMS measurement technology.				
<b>Title:</b> Radionuclide Particulate / Xenon Gas Sensor System Development  <b>Description:</b> .  <b>FY 2011 Accomplishments:</b> Deployed and field tested the field portable Xenon gas system within the European Union (EU) project for global Xenon background characterization. Continued acceptance / operational performance testing for the next generation radionuclide particulate system's detector / cryogenic cooler replacement system. Continued developing single-isotope Xenon calibration standards production methods (i.e. Xenon detection system calibration standards). Defined Xenon gas detection analysis and characterization algorithms  <b>FY 2012 Plans:</b> Deploy and field test the field portable Xenon gas system within the EU project for Global Xenon background characterization. Continue acceptance / operational performance testing and deploy the next generation particulate system's detector / cryogenic cooler replacement system. Continue developing single-isotope Xenon calibration standards production methods (i.e. Xenon detection system calibration standards). Plan and develop methods for measurements to better determine the world-wide concentration of radioxenon. These measurements are necessary to design and test a Xenon spectrum categorization scheme that is applicable to U.S. and other monitoring stations. The measurements will better enable IMS stations to remove the influence of background Xenon concentrations not associated with nuclear explosions.  <b>FY 2013 Plans:</b>		0.400 0	0.397 0	0.465

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2011	FY 2012	FY 2013
Continue Xenon gas systems research. Study and evaluate Xenon backgrounds & transport - Xenon categorization, data analysis & interpretation & Xenon transport from underground/underwater. Implement a study of past detection schemes and compare current and future detections options with a focus on best pathways to improve sensitivity, selectivity (radon daughters vs. fission products), and reliability. The study will pay close attention to timeline and feasibility of implementation of detection alternatives.				
Title: Information Management Systems Enhancements  Description: .  FY 2011 Accomplishments: Implemented extended infrasound propagation models including the Naval Research Laboratory's (NRL) atmospheric propagation models.  FY 2012 Plans: Continue development of Infrasound propagation models to improve detection, identification, and location of sources of interest. Conduct field experiments to collect and provide data to constrain and refine the models. Develop Portable Infrasound Calibrator.  FY 2013 Plans: Continue Infrasound propagation models development for purposes to improve detection, identification, and location of sources of interest. Continue field experiments to collect data to constrain and refine models. To make contact with the data, models will include fine-scale atmospheric conditions, topography, 3D winds and effects of non-linear propagation. Plan development of a portable / rapid deployable infrasound array and standard sound source for calibrating Infrasound stations / arrays.		Articles: 1.500 0	1.496 0	1.525
Title: Continue Research & Development support system  Description: .  FY 2011 Accomplishments: Conducted radionuclide technology development projects. Projects focused on: improving International Monitoring System (IMS) Xenon samplers' detection systems, improved information on the background levels of fission products in the atmosphere, and technology to decrease the effluent from medical isotope production plants that cause large backgrounds of radionuclides for IMS samplers. Conducted measurements using a Radionuclide Aerosol Sampler-Analyzer (RASA) and a Swedish Automatic Unattended Noble gas Analyzer (SAUNA) located in the Eastern Washington and at locations in the U.S. and globally to monitor for nuclear releases from the damaged Fukushima nuclear station for the purpose of understanding the network capabilities and limitations based on a real world nuclear event. Continued waveform (infrasound / seismic) development program focused on		Articles: 0.900 0	0.897 0	0.950

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>			<b>FY 2011</b>	<b>FY 2012</b>	<b>FY 2013</b>
infrasound sensor / station calibration and metrology, on digital infrasound sensor development and on infrasound data collection and analysis.  <b>FY 2012 Plans:</b> Continue radionuclide technology development projects focused on: improving International Monitoring System (IMS) Xenon samplers' detection systems, improved information on the background levels of fission products in the atmosphere, and technology to decrease the effluent from medical isotope production plants that cause large backgrounds of radionuclides for IMS samplers. Continue waveform (infrasound / seismic) development program focused on infrasound sensor / station calibration and metrology, on infrasound sensor development and on data collection and analysis.  <b>FY 2013 Plans:</b> Plans are to collect and prioritize requirements from Station Operators and design-build-test highest priority upgrades. Focus areas are nuclear detector (including cooling); filtration medium and sample head; and electronic controls.					
<b>Title:</b> Continue "On-Location" Infrasound Event Calibration Research  <b>Description:</b> .  <b>FY 2011 Accomplishments:</b> Continued calibration and metrology research and development (R&D) at established engineering and development test centers (EDTC) - Operations & Maintenance at Sandia National Laboratory (SNL) O&M test bed; Research & Development at Pennsylvania State University (PSU) R&D test bed; U.S. IMS state-of-health (SOH) performance and data quality metrics at the University of Alaska-Fairbanks (UAF), Pennsylvania State University (PSU), and University of Mississippi (UM). Deployed / implemented the U.S. developed infrasound array.  <b>FY 2012 Plans:</b> Continue calibration and metrology research and development (R&D) at established engineering and development test centers (EDTC) - Operations & Maintenance at Sandia National Laboratory (SNL) O&M test bed; Research & Development at Pennsylvania State University (PSU) R&D test bed; U.S. IMS state-of-health (SOH) performance and data quality metrics at the University of Alaska-Fairbanks (UAF), Pennsylvania State University (PSU), and University of Mississippi (UM). Deployed / implement the U.S. developed infrasound array.  <b>FY 2013 Plans:</b>			<b>Articles:</b> 0.500 0	0.497 0	0.605

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2011	FY 2012	FY 2013
Continue planning and developing the EDTC. The test beds will be utilized for research, testing and evaluations relevant to station shut downs; configuration changes; and invasive procedures. These test beds will allow for evaluation of R&D primary array developments of new technologies and their associated field testing.				
Title: Continue U.S. IMS Sensor Event Signal Identification Technique Development  Description: .  FY 2011 Accomplishments: Planned / supported / participated in the Israeli wintertime Sayarim infrasound experiment. Implemented / validated the enhanced infrasound propagation models (Sayarim; UTTR). NACT Program deployed the next generation infrasound sensor at UTTR for purposes of (data collection; source location; event analysis; performance, validation, and reliability testing). Conducted clutter, false alarms and noise mitigation analysis (USArray studies; catalogue persistent sources; noise studies; wind noise physics; false alarm rejection). Conducted joint U.S./Commissariat a l'Energie Atomique (CEA) / Département Analyse, Surveillance, Environnement of the Direction des Applications Militaires (DASE) collaboration (test against US and European network).  FY 2012 Plans: Continue efforts for deploying the Transportable Xenon Laboratory (TXL) to Jakarta, Indonesia with specific focus on improvements in satellite data communication capabilities and ruggedizing the SAUNA installation. Deploy next generation digital infrasound sensor at UTTR (data collection; source location; event analysis; performance, validation, reliability testing). Continue clutter, false alarms and noise mitigation analysis (US Array studies; catalogue persistent sources; noise studies; wind noise physics; false alarm rejection). Continue joint U.S./CEA (DASE) collaboration (test against US and European network).  FY 2013 Plans: Continue operating the TXL and SAUNA systems in advance of deployment. Operations and maintenance performed in advance of the TXL/SAUNA foreign deployment will establish an operations baseline for the SAUNA and provide additional opportunity to diagnose and resolve any remaining operational concerns. Continue evaluating the memory effect that occur when highly polarizable Xenon atoms attach to surfaces used in beta-gamma detection systems, or diffuse into the plastic cell wall. Continue infrasound event signal clutter, false alarms and noise mitigation analysis (U.S. Array studies; catalogue persistent sources; noise studies; wind noise physics; false alarm rejection).		Articles:  1.300 0	1.296 0	1.360
Title: Continue U.S. IMS Radionuclide Detection & Measurement Development  Description: .  FY 2011 Accomplishments:		Articles:  0.800 0	0.797 0	0.850

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>		<b>FY 2011</b>	<b>FY 2012</b>
<p>Advanced Xenon separation modeling and simulation methods development continued for next generation Xenon detection and monitoring systems (i.e. life cycle and obsolescence management planning). The Transportable Xenon Laboratory (TXL) was deployed to Argentina for the International Xenon Inventory Measurements (IXIM) campaign (Q4CY10). Conducted RL-16 laboratory gas analysis system performance and validation testing for use as a secondary, laboratory-based radioxenon spectrometer.</p> <p><b>FY 2012 Plans:</b> Continue advanced Xenon separation modeling and simulation methods development for next generation Xenon detection and monitoring systems (i.e. life cycle and obsolescence management planning). Deploy Transportable Xenon Laboratory (TXL) to Argentina for the International Xenon Inventory Measurements (IXIM) campaign (Q4CY10). Continue U.S. IMS Radionuclide Laboratory (RL-16), laboratory gas analysis system performance and validation testing for use as a secondary, laboratory-based radioxenon spectrometer. Continue evaluating detector performance.</p> <p><b>FY 2013 Plans:</b> Continue Xenon gas systems research. Evaluate gas yield and detection limits. PTS requirements indicate that the RL-16 gas system requires additional capability to meet the requirements. Develop test methods to increase yield and to improve detection efficiency. The processing train will be updated to improve transfer efficiency and to reduce dead volumes. To assure the RL-16 gas system is making a high precision measurement, the samples will be sent to a certified laboratory for part of the calibration. Development of a robust, high precision method to calibrate the nuclear detectors effectively is needed. This is a complex problem that requires expertise in gas handling, radionuclide quantification, beta-gamma detector theory of operation and analysis software development. Task will develop the calibration methods to obtain the absolute calibration of the nuclear detector.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>		7.017	7.391
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A			
<b>D. Acquisition Strategy</b> Not applicable for this item.			
<b>E. Performance Metrics</b> Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.			



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Exhibit R-3, RDT&E Project Cost Analysis: PB 2013 Army											DATE: February 2012			
APPROPRIATION/BUDGET ACTIVITY 2040: Research, Development, Test & Evaluation, Army BA 5: Development & Demonstration (SDD)				R-1 ITEM NOMENCLATURE PE 0604870A: Nuclear Arms Control Monitoring Sensor Network				PROJECT SE1: NACT SENSOR ENGINEERING						
Management Services (\$ in Millions)				FY 2012		FY 2013 Base		FY 2013 OCO		FY 2013 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
SMDC Support	SS/CPFF	Various:Various	2.366	0.566		0.667		-		0.667	Continuing	Continuing	Continuing	
Subtotal			2.366	0.566		0.667		-		0.667				
Product Development (\$ in Millions)				FY 2012		FY 2013 Base		FY 2013 OCO		FY 2013 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Product Development Program	SS/CPFF	UM, MS, PNNL, WA:Various	19.039	4.832		5.125		-		5.125	0.000	28.996	0.000	
Subtotal			19.039	4.832		5.125		-		5.125	0.000	28.996	0.000	
Support (\$ in Millions)				FY 2012		FY 2013 Base		FY 2013 OCO		FY 2013 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
SMDC Support	SS/CPFF	SMDC:AL, DC	5.762	1.496		1.525		-		1.525	Continuing	Continuing	Continuing	
Subtotal			5.762	1.496		1.525		-		1.525				
Test and Evaluation (\$ in Millions)				FY 2012		FY 2013 Base		FY 2013 OCO		FY 2013 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Test and Evaluation	SS/CPFF	Various:Various	2.102	0.497		0.605		-		0.605	Continuing	Continuing	Continuing	
Subtotal			2.102	0.497		0.605		-		0.605				
			Total Prior Years Cost	FY 2012		FY 2013 Base		FY 2013 OCO		FY 2013 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals			29.269	7.391		7.922		-		7.922				
Remarks														