DCN: 12358

For Commissioner Coyle

Sir – this is your copy of the Fort Belvoir visit report, which is an addendum to the Fort Monmouth recommendation report. After our visit was completed, the Night Vision Lab sent copies of letters of support, and other papers that they say address questions you asked during the visit. Everything they sent has been included in this package for your perusal as well. They also requested that this report be sent to GEN Hill, but I have not done so yet and I believe that all of the pertinent issues will be covered when we brief all of the commissioners on our analysis. I can forward him a copy, however, if you think it is wise to do so.

Please let me know if you have any comments or anything else you want me to get on this issue.

Wes Hood

7/27/05

SECOND ADDENDUM
FORT MONMOUTH, NEW JERSEY BASE VISIT REPORT

COMMISSIONER VISIT TO THE NIGHT VISION & ELECTRONIC SENSORS DIRECTORATE (COMMONLY KNOWN AS THE NIGHT VISION LAB)

LOCATED AT

FORT BELVOIR, VA

7 JULY 2005

LEAD COMMISSIONER:

Commissioner Philip Coyle

COMMISSION STAFF:

Wesley E. Hood (Army Senior Analyst)

LIST OF ATTENDEES:

Luanne Obert	NVESD-OD	Fenner Milton	NVESD-OD
Aaron LaPointe	NVESD-STD	COL McCOY	NVESD-OD
Kelly Sherbondy	NVESD-STD	Don Reago	NVESD-OD
CPT Nicole Clark	NVESD-OD	Bill Jarvis	NVESD-OD
John Nettleton	NVESD-STD	Jeanna Tendall	Hq AMC Stationing Office
Ken Yosuda	NVESD-STD	Pat Decatur	U.S. Army Garrison Fort Belvoir
Andy Hetrick	NVESD-GCSD	Michael Jennings	NVESD-SPPD
Wayne Antesberger	NVESD-GCSD	Jim Campbell	NVESD-STD
Paul E. Laster	NVESD-GCSD	Fred Petito	NVESD-ANSD
Bill Cronk	NVESD-GCSD	William Ridgeway	NVESD-OPS
Thomas Soyka	NVESD-SPP	Bill Pirowski	NVESD-OPS
Don Jenkins	NVESD-OD	Tim Mikulski	NVESD-OD
David Randall	NVESD-GCSD	Nathan Burkholder	NVESD-OD
John Pollard	NVESD-OD	Al VanLanduyt	NVESD-SPPD
Phil Perconti	NVESD-STD	Pete Howard	NVESD-CMD
Joe Pellegrino	NVESD-STD	Hugh Carr	NVESD-CMD
Jeff Fowler	NVESD-OPSD	Jim Ratches	NVESD-OD

BASE'S PRESENT MISSION:

Fort Belvoir was visited only as it pertains to the movement of the Night Vision and Electronic Sensors Directorate, as provided for in recommendation Army-11, Closure of Fort Monmouth, New Jersey. Fort Belvoir's mission, vision, values and strategic goals are listed below.

Mission – Fort Belvoir exists to:

Operate and maintain our installations.
Provide quality installation support and services to our customers.
Execute mobilization requirements, military operations, and contingency/force protection missions.

Vision – Our vision for Fort Belvoir for the 21st Century is:

A regional center where our customers receive premier support services.
A superior place to work, train and live.
An innovative and professional team that meets the challenges of change, while maintaining harmony with the environment and surrounding communities.

Values:

Well-Being
Professionalism
Stewardship
Teamwork
Innovation
Partnership

Strategic Goals:

Provide a safe and secure environment for Fort Belvoir.
Operate, maintain and develop standard installation quality services and infrastructure.
Manage Fort Belvoir resources through efficient business practices.
Promote and enhance community well-being.

SECRETARY OF DEFENSE RECOMMENDATION:

Close Fort Monmouth, NJ.

Relocate the US Army Military Academy Preparatory School to West Point, NY. Relocate the Joint Network Management System Program Office to Fort Meade, MD. Relocate the Budget/Funding, Contracting, Cataloging, Requisition Processing, Customer Services, Item Management, Stock Control, Weapon System Secondary Item Support, Requirements Determination, Integrated Materiel Management Technical Support Inventory Control Point functions for Consumable Items to Defense Supply Center Columbus, OH, and reestablish them as Defense Logistics Agency Inventory Control Point functions; relocate the procurement management and related support functions for Depot Level Reparables to Aberdeen Proving Ground, MD, and designate them as Inventory Control Point functions, detachment of Defense Supply Center Columbus, OH, and relocate the remaining integrated materiel management, user, and related support functions to Aberdeen Proving Ground, MD. Relocate Information Systems,

Sensors, Electronic Warfare, and Electronics Research and Development & Acquisition (RDA) to Aberdeen Proving Ground, MD. Relocate the elements of the Program Executive Office for Enterprise Information Systems and consolidate into the Program Executive Office, Enterprise Information Systems at Fort Belvoir, VA.

Realign Fort Belvoir, VA by relocating and consolidating Sensors, Electronics, and Electronic Warfare Research, Development and Acquisition activities to Aberdeen Proving Ground, MD, and by relocating and consolidating Information Systems Research and Development and Acquisition (except for the Program Executive Office, Enterprise Information Systems) to Aberdeen Proving Ground, MD.

Realign the Army Research Institute, Fort Knox, KY, by relocating Human Systems Research to Aberdeen Proving Ground, MD.

Realign Redstone Arsenal, AL, by relocating and consolidating Information Systems Development and Acquisition to Aberdeen Proving Ground, MD.

Realign the PM Acquisition, Logistics and Technology Enterprise Systems and Services (ALTESS) facility at 2511 Jefferson Davis Hwy, Arlington, VA, a leased installation, by relocating and consolidating into the Program Executive Office, Enterprise Information Systems at Fort Belvoir, VA.

SECRETARY OF DEFENSE JUSTIFICATION:

The closure of Fort Monmouth allows the Army to pursue several transformational and BRAC objectives. These include: Consolidating training to enhance coordination, doctrine development, and training effectiveness and improve operational and functional efficiencies, and consolidating RDA and T&E functions on fewer installations. Retain DoD installations with the most flexible capability to accept new missions. Consolidate or colocate common business functions with other agencies to provide better level of services at a reduced cost.

The recommendation relocates the US Army Military Academy Preparatory School to West Point, NY and increases training to enhance coordination, doctrine development, training effectiveness and improve operational and functional efficiencies.

The recommendation establishes a Land C4ISR Lifecycle Management Command (LCMC) to focus technical activity and accelerate transition. This recommendation addresses the transformational objective of Network Centric Warfare. The solution of the significant challenges of realizing the potential of Network Centric Warfare for land combat forces requires integrated research in C4ISR technologies (engineered networks of sensors, communications, information processing), and individual and networked human behavior. The recommendation increases efficiency through consolidation. Research, Development and Acquisition (RDA), Test and Evaluation (T&E) of Army Land C4ISR technologies and systems is currently split among three major sites – Fort Monmouth, NJ, Fort Dix, NJ, Adelphi, MD and Fort Belvoir, VA and several smaller sites, including Redstone Arsenal and Fort Knox. Consolidation of RDA at fewer sites achieves efficiency and synergy at a lower cost than would be required for multiple sites.

This action preserves the Army's "commodity" business model by near collocation of Research, Development, Acquisition, and Logistics functions. Further, combining RDA and T&E requires test ranges – which cannot be created at Fort Monmouth.

The closure of Fort Monmouth and relocation of functions which enhance the Army's military value, is consistent with the Army's Force Structure Plan, and maintains adequate surge capabilities. Fort Monmouth is an acquisition and research installation with little capacity to be utilized for other purposes. Military value is enhanced by relocating the research functions to under-utilized and better equipped facilities; by relocating the administrative functions to multipurpose installations with higher military and administrative value; and by co-locating education activities with the schools they support. Utilizing existing space and facilities at the gaining installations, maintains both support to the Army Force Structure Plan, and capabilities for meeting surge requirements.

MAIN FACILITIES REVIEWED:

The site tour included several of the laboratories and facilities operated by the Night Vision Lab.

KEY ISSUES IDENTIFIED

1. If approved, the timing and implementation of this recommendation will be very complicated given the technical functions performed at Ft. Belvoir and the time and cost required to replicate and prove out those facilities at the new Aberdeen location.

2. With the expectation that most personnel will not relocate to Aberdeen, Maryland, there will potentially be a significant loss of intellectual capital.

INSTALLATION CONCERNS RAISED

No installation specific concerns were raised at Fort Belvoir.

COMMUNITY CONCERNS RAISED:

1. Loss of intellectual capital when personnel do not relocate.

2. Disruption and risk (to the Army, the workforce, and the soldier) were not considered.

REQUESTS FOR STAFF AS A RESULT OF VISIT:

1. Questions were left with the installation for their response.

2. Additional questions generated during the staff and Commissioner visits have been forwarded to the clearing house.

3. Additional information was provided by the Night Vision Lab at the time of the base visit briefing, or was submitted to R&A staff after the visit was completed. This information is contained in the attached enclosures to this report, as listed below.

Wes Hood
Senior Analyst
R&A Army Team

Enclosures

1. NVESD Information briefing
2. Briefing on NVESD Support to Operation Enduring Freedom and Operation Iraqi Freedom
3. Detailed facility descriptions for NVESD.
4. Estimated cost to reconstruct NVESD facilities
5. Papers submitted by NVESD showing their beliefs that the recommendation substantially deviates with respect to areas of criterion 1, 2, 4, 5 and two aspects of criterion 7.
6. Letter from FBI in support of Night Vision Lab efforts. (Edited by NVL)
7. Letter from US Secret Service in support of Night Vision Lab efforts. (Edited by NVL)
8. Statement concerning use of Aberdeen Proving Grounds laser range.

The Honorable Philip Coyle Visit to NVESD 7-Jul-05

	Minutes	Looft Conference Room	
14:00 - 14:40	40	BRAC Impact to NVESD	Dr. A. Fenner Milton
14:40 - 15:10	30	War Support Briefing	Dr. A. Fenner Milton
15:10 - 15:15	5	Facility poster review	Dr. A. Fenner Milton
15:15 - 15:25	10	Break / view equipment	
		R3V, PMTV compared to TWS, Fido XT, Helios	Mr. Andy Hetrick
		WFOV goggles, ANVG, Digital Fusion Goggles,	Mr. Wayne Antesberger
		Helios, Wichmann Poster, Cerberus Poster	Dr. Ken Yasuda
		- Static Displays -	Mr. John Nettleton
		Building 305 (Roof Top)	
15:25 - 15:30	5	LRAS3 / MSF3	Mr. Paul Laster
		Building 305 (3rd Floor)	
15:30 - 15:35	5	Tour of Systems Engineering, Analysis, and Integration Lab	Mr. Bill Cronk
		Building 305 (Circle)	
15:35 - 15:40	5	Vehicle Sensor Fusion for IED Detection	Dr. Joe Pellegrino
15:40 - 15:45	5	Combat Periscope	Mr. Wayne Antesberger
		Building 357 (S&T Building)	
15:45 - 15:50	5	MBE Laboratory – Bldg 357	Dr. Joe Pellegrino
15:50 - 16:00	10	Wrap-up	Dr. A. Fenner Milton

Attendees

Site Visit : Night Vision Lab (NVESD) 7 July 2005

Name	Organization
Luanne Obert	NVESD-OD
Aaron LaPointe	NVESD-STD
Kelly Sherbondy	NVESD-STD
CPT Nicole Clark	NVESD-OD
John Nettleton	NVESD-STD
Ken Yosuda	NVESD-STD
Andy Hetrick	NVESD-GCSD
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Bill Jarvis	NVESD-OD
Don Reago	NVESD-OD
COL McCOY	NVESD-OD
Fenner Milton	NVESD-OD

NVESD Support to Operation Enduring Freedom and Operation Iraqi Freedom

An Information Briefing to The Honorable Philip Coyle 7 July 2005

Distribution authorized to U.S. Government agencies and DoD Contractors only, Operational Use, June 30, 2005. Other requests for this document shall be referred to US Army RDECOM CERDEC NVESD, AMSRD-CER-NV-OD ATTN: Dr. Fenner Milton, 10221 Burbeck Road, Fort Belvoir, VA 22060

Dr. A. Fenner Milton
Director
Night Vision & Electronic Sensors Directorate
info@nvl.army.mil

Purpose

- **Describe NVESD's contributions to current operations in Afghanistan and Iraq:**
  - Operation Enduring Freedom (OEF)
  - Operation Iraqi Freedom (OIF)

Leverage Existing S&T Programs

- **Describe NVESD's Near Term Support to the Warfighter:**
  - Quick Reaction Prototypes on demand
  - Night Vision Cave & Urban Assault ACTD
  - New In House Initiatives
  - Counter-IED

Beyond Standard Issue Equipment

We are a Laboratory at War!

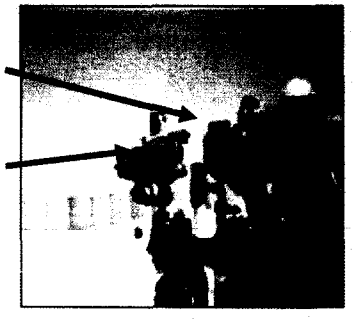
NVESD Employees In The Field Supporting OIF/OEF

17 NVESD employees have been in Iraq and Afghanistan …

NVESD Technology With the Warfighter Today

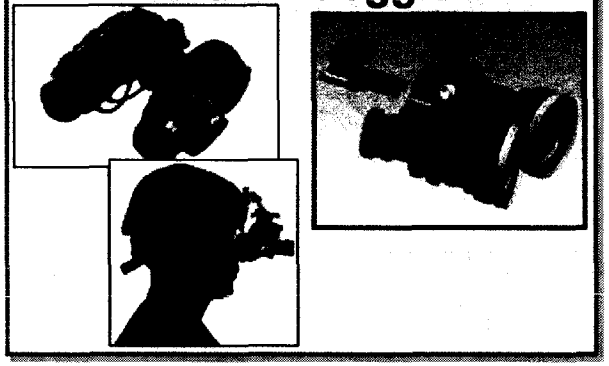
Examples of Quick Reaction Prototypes used by the Warfighter in Iraq and Afghanistan

STORM Laser Rangefinder + Thermal Sight



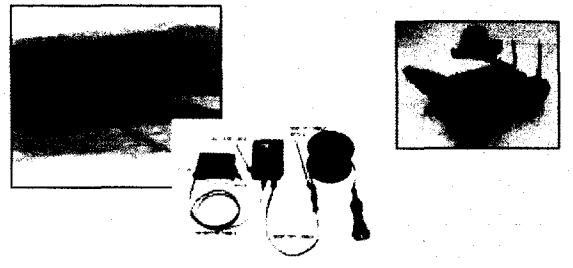
Allows precise direct fire engagements with 105mm Howitzer

Wide Field of View Night Vision Goggle



Visual information for SA and Mobility, Especially in urban environments

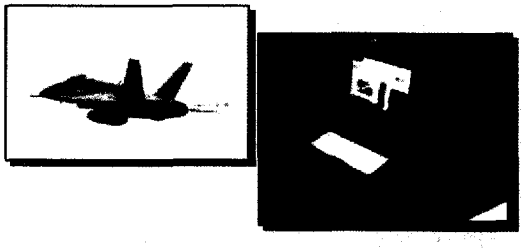
Well Camera*& Remote Robotic Vehicle



**One of AMC's 10 greatest inventions*

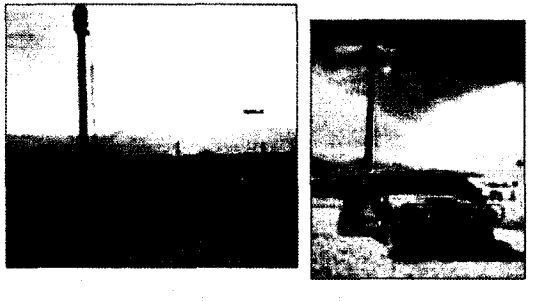
Remotely inspect wells and tunnels for enemy troops and weapon caches

Change Detection Workstation



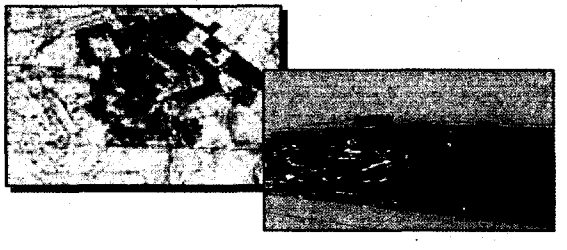
Detect IEDs from the air using existing EO/IR Sensors

SPIDER – Surveillance System



Mobile stabilized panoramic sight for force protection & surveillance

PSDS2 - High Resolution Terrain Simulation

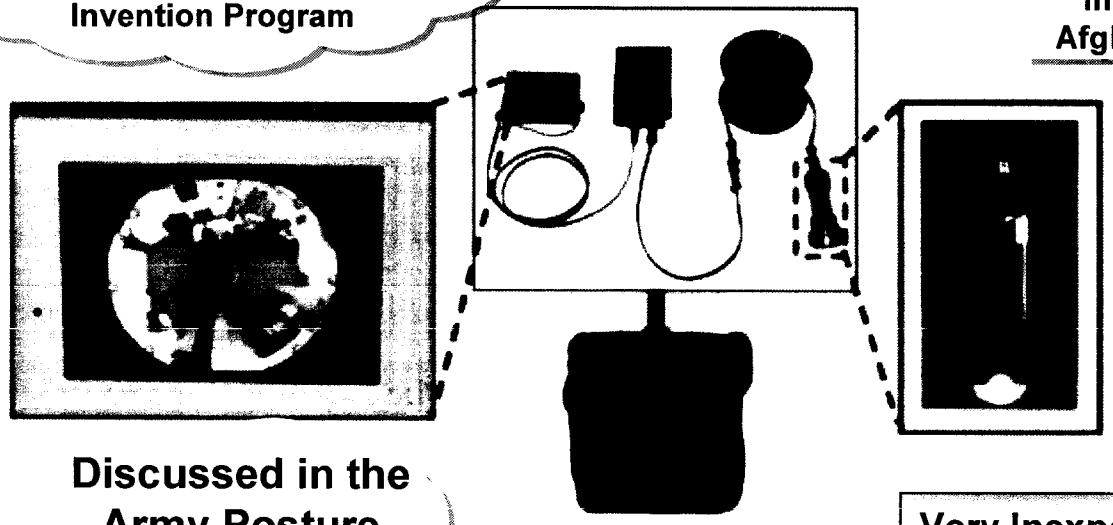


Provide simulation environment to support fielding of PSDS2 system to Iraq

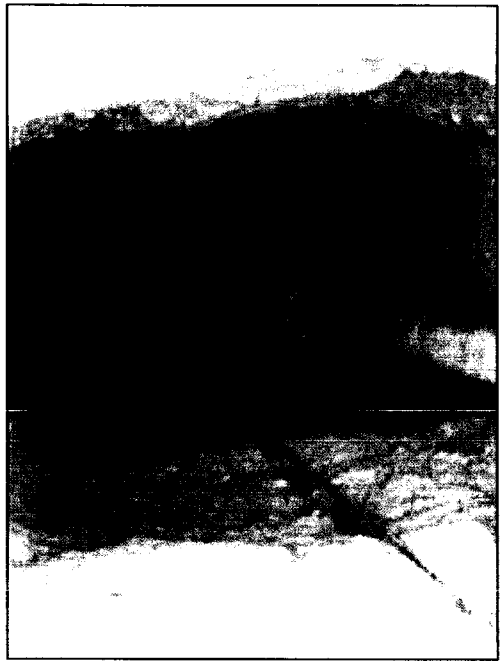
Over 20 quick reactions special projects "fielded" to OIF/OEF
Many more in the works…

Well Cam

2003 Top Ten Winner U.S. Army Greatest Invention Program



Well camera in use in Afghanistan



Discussed in the Army Posture Statement

Very Inexpensive

< $500 each

- Currently being used in Afghanistan
- NVESD designed/developed and fabricated in-house based upon a request from the field
- Equipment is being supported by MANTECH, using NVESD as technical consultant.

- Day/Night operation
- Full 360° Field of View sensor
- Fully Waterproof and Rugged Design
- Inspects wells up to 300' deep, viewing radius of 20'
- Lightweight, Portable System carried in a Shoulder Bag or Butt-Pack

Allows the Warfighter to safely interrogate wells and holes prior to entry

Quick Reaction Support to Warfighter

Name	When "Fielded"	How Funded	Quantity "Fielded"	"Fielded" By	Units With	Function
Well Camera	14 Units deployed to OEF and 3 units to OIF – Fielded FY04/05	NVESD Mission, FAST, REF	17	AMC-FAST (3) REF (14)	In-Theater Units	Allows the Warfighter to safely interrogate wells and holes prior to entry
High Fidelity Terrain and 3-D Visualization for the PSDS2	Mar 05 to OIF and Fort Bragg	PM NV/RSTA NVESD Mission	1	PM NV/RSTA	In-Theater Units	High fidelity terrain and sensor simulation for PSDS2 training & mission planner
NIRF – Neutralizing IEDs with Radio Frequency	2 Trailers Shipped 2004 2 Trailers Due 2005 on schedule	USN	1 (full system)	USN	USMC	NVESD fabricated the power source for the USN NIRF - Neutralization of Road Side IEDs
STORM Laser Rangefinder + Thermal Weapon Sight on 105mm Howitzer	March 2003 to OEF	NVESD Mission, AMC FAST, PM Soldier	200	NVESD	82nd Airborne Division	Targeting system for 105mm howitzer in direct fire role (attacking caves)
Advanced Night Vision Goggles	Prototypes delivered Feb 2005	NVESD Mission	4	NVESD	In-Theater Units	Ultra wide field of view goggles for safer flight and urban operations
WFOV Night Vision Goggle	Early Prototypes fielded	NVESD Mission SOCOM	3	SOCOM PM SP	SF Teams	Wide Field of View (FOV) Goggle for increased visual information for SA and motion, especially in urban operations
Passive Milimeter Wave Camera*	Prototypes to NAV EOD in Fall 2005 – Available for fielding in 120 days	Congressional plus up	1	NAV EOD (USMC)	TBD	Passive Millimeter-wave concealed weapons and suicide vest detector
Personal Miniature Thermal Viewer	7 units to REF in 2005	REF	7	REF	TBD	Small, lightweight, low power thermal viewer with wider FOV for use in urban and complex terrain
SMARTS – Soldier Mobility and Rifle Targeting System	Prototypes to SOF in Fall '05	OSD Defense Emergency Response Funds	12	Prototypes to USASOC	TBD	Fused imagery helmet and weapon-mounted thermal sight for enhanced target detection and engagement capabilities
Remote Robotic Reconnaissance Vehicle	Prototypes to SOF in Fall '05	OSD Defense Emergency Response Funds	4	Prototypes to USASOC	TBD	Integrates Image Fusion technology onto man-portable robotic system

* Congressional Funding

Quick Reaction Support to Warfighter

Name	When "Fielded"	How Funded	Quantity "Fielded"	"Fielded" By	Units With	Function
Disposable Sensors	Prototypes to SOF in Fall "05	NVESD Mission and ATO Funding	100 sensors 25 imaging 75 non-imaging 2 PDA controllers	Prototypes to USASOC	None	Enhanced soldier situational awareness and survivability in urban, restricted, complex and open terrain.
Low Cost Combat Periscope	3 units to REF in June 05 prepared for deployment to OIF	NVESD Mission	3	REF	TBD	Provides mounted forces with enhanced target detection and situational awareness
Laser Warning Device (HELIOS)	Prototypes Delivered May 2005	NVESD Mission	1 REF wants 10+ additional	REF	In-Theater Units	Warning device to induce behavior to reveal intent at energy levels well below damage level
Niitek (Wichmann) GPR on MEERKAT Mine protected vehicle	10 months to field demonstration	NVESD Mission	TBD	PM CCS	TBD	Most capable system available as a contingency if threat shifts to buried mines and IEDs
Baghdad Clicker	Funding Initial concept development – potential fielding in 120 days	NVESD Mission	1 Network Potential	TBD	TBD	Provides simple, covert means of informing authorities of threats such as IED locations or insurgent activities
CERBERUS	CONUS Fielding only - 7 units to Blue Grass Army Depot (BGAD)	RDT&E Funds of Force Protection Sensor Technology	7 8 more TBD	NVESD	BGAD - CONUS	Cerberus is the integrated perimeter Sensor towers that are being deployed to enhance standoff perimeter security
Change Detection Workstation	Jan 05 to OIF	USMC and USJFCOM Funds Leverages OSD TTI	2nd of 5	NVESD	VMFA--224 (USMC – F/A-18D squadron)	New day/night change detection capability with airborne imagery. System supports convoy IED ops and other area surveillance missions
Eagle Eye	Technology Demo Jan 06, deployable May 06	ASA(ALT)	1	INSCOM	TBD	High performance gimbal with day/night sensors to provide IED, persistent surveillance and personnel detection from survivable altitudes
NVESD Support to 555th Maneuver Enhancement Brigade Ft. Lewis, WA	Prototypes selected for deployment Nov 2005 & July 05 train-up	NVESD Mission	12	14th Eng Bn	555 MEB, Ft Lewis, WA	Filling Engineer Route Clearance capability gaps in detecting and neutralizing IEDs

Quick Reaction Support to Warfighter

Name	When "Fielded"	How Funded	Quantity "Fielded"	"Fielded" By	Units With	Function
Nomadics FIDO XT Technology	Field Ready	NVESD ATO Funding	1	TBD	TBD	Real time explosive detection for personnel and vehicle screening
Vehicle Sensor Fusion for IED Detection	Testing YPG and Ft. Belvoir Summer 2005	NVESD Mission	1	TBD	TBD	Increases rate of Advance of Ground Convoys by Decreasing FA & Increasing Pd
IR Spot Light	FY04/FY05 OEF and OIF	NVESD Mission, SOCOM	7 delivered 4 on order	USASOC	In-Theater Units	Illumination of areas during patrols by soldiers in HMMWVs
SETAF AARS – Southern European Task Force After Action Review System	FY04/FY05 to SETAF	NVESD Mission, SETAF	1	SETAF	SETAF, Vicenza, Italy	Provide an ability to easily train troops in taking down a structure in MOUT
ANVIS/Apache Helmet Adapter Kit	OIF/OEF 218 kits in FY04-FY05	PM Apache	218	PM Apache	All Apache Units	Permits usage of ANVIS (Aviator's Night Vision Imaging System) on Apache Helmets
AN/TAS-6 Night Observation Device	FY03-FY05 to OIF and OEF	NVESD Mission	4	USASOC	SOCOM Units	Surveillance of long range targets for possible engagement
TWS Dual Monitor	Fielded to USASOC in FY05	NVESD Mission	6	USASOC	TBD	Provides the gunner in a HMMWV with a heads-down capability if desired
High Magnification Remote Camera System	FY05	NVESD Mission	TBD	EOD	14th Eng Bn	Facilitates stand-off observation of suspected IED sites during route clearance missions
Pointer/ Raven Small Unmanned Aerial Vehicle (SUAV) Sensors	March 2003	In House Funds	42	Natick Soldier Systems Center	10th Mountain Division and SOCOM	Light weight RSTA package for small UAVs
Hand Held Thermal Probe	Deployed in 2004 to OEF and OIF	OSD Defense Emergency Response Funds	3	NVESD	229th Cbt Engr Bn.; USASOC	Provides situational awareness in true dark environments
COMPASS Hyperspectral Sensor	FY04	CENTCOM	1	CENTCOM	CENTCOM	Area Surveillance
Long Range Identification	Prototypes to SOF in Fall '05	OSD Defense Emergency Response Funds	2	Prototypes to USASOC	TBD	Laser Illumination and Short-Wave IR gated imaging for long-range ID precision & targeting

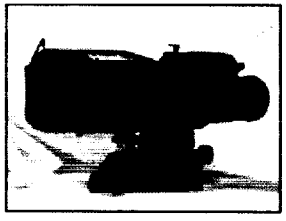
Quick Reaction Support to Warfighter

Name	When "Fielded"	How Funded	Quantity "Fielded"	"Fielded" By	Units With	Function
SPIDER – Stabilized Panoramic Intruder Detection and Recognition System	FY04 to OEF	NVESD Mission	1 + 1 spare	CENTCOM	CJFT-76 and 3rd and 16th Infantry in CENTCOM	Provides a force protection sensor platform for quick response, SA, site security and perimeter surveillance
AN/PSS-14	FY02 to OEF/OIF	NVESD Mission, PM CCS	450	PM CCS	USA In-Theater and USMC	Hand-Held Mine Detector for Metal and Plastic AP Mines
IVMMD – Interim Vehicle – Mounted Mine Detector	Aug 2003 fielded to OIF	NVESD Mission, PM CCS	9	PM CCS	In-Theater Units	US Army Route Clearance Equipment (RCE)
TWS Flexible Mount	Fielded to AMC-FAST for evaluation in FY05	NVESD Mission AMC-FAST	5	AMC-FAST	TBD	Stabilizes the TWS to provide long-range observation in a heads-down configuration
Armored Excavator with ROTAR Sifting Bucket	Fielding to Bagram, Afghanistan	NVESD Mission	3	PM CCS	In-Theater Units	Provides the capability to sift out AP mines in the main rock quarry at Bagram Air Field
Airborne IED Detection (AIED2) Pod	Pod Integration May 05 Testing 3QFY05	NVESD ATO Funding	TBD	TBD	TBD	1st generation pod system for day/night IED detection not tied to a specific aircraft
Buffalo	FY04/FY05 to OEF and OIF	NVESD Mission, PM CCS	46	PM CCS	In-Theater Units	Mine protected clearance vehicle
Night Capability for Bomb Disposal Explosive Ordinance Suit	FY05	NVESD Mission	1 for FAST (funded) 50 for TSWG (UFR)	EOD	TBD	Allows for operation at night without exposing face to munitions

Quick Reaction Support to Warfighter

Examples of limited quantity prototypes "fielded"...

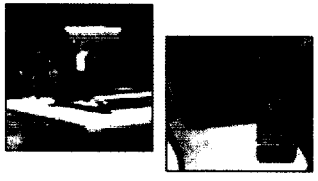
TWS Remote Display



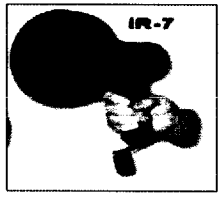
AN/TAS-6 w/ 2X Lens

ANVIS/Apache Adapter Kit

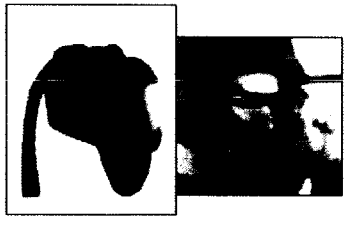
High Mag Remote Camera System



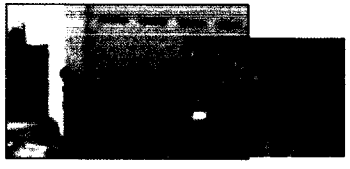
IR Spotlight



Night Capability for EOD Suit



MOUT After Action Review System



IR Sensors for Small UAVs

COMPASS Hyperspectral Sensor

Concealed Weapons Detector

Wide FOV I^2 Goggle Systems

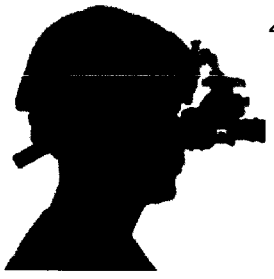
Thermal Probes

NVESD is leveraging its in house expertise and on-going R&D programs to deliver limited quantity special prototypes to AMC FAST, REF and SOCOM

Wide Field of View Night Vision Goggle for Ground Operations (WFOV NVG)

Increased visual information for SA and mobility, especially in urban operations

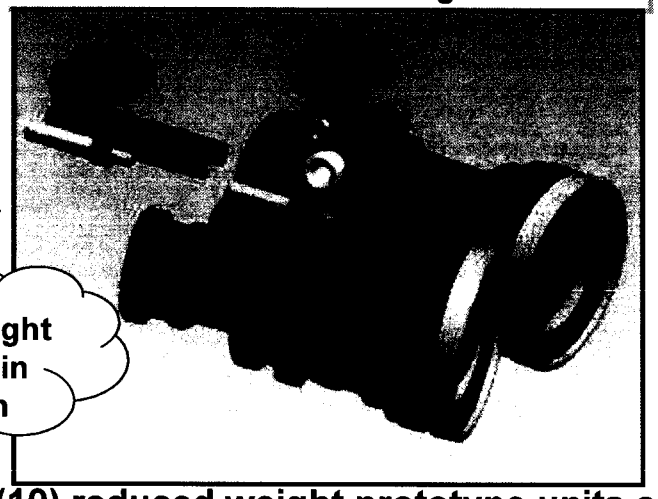
Prototypes "fielded" to Afghanistan and Iraq with SOCOM SF Teams



Increase Field of View from 40° to 55°

Reduced weight prototypes in fabrication

Affordable 2 tube configuration



Two 55° Circular FOV Tubes w/ 40° Central Overlap (70° H x 55° V)

- NVG system with a 2.5x increase in FOV
- Leverages improved tube performance in resolution and reduced halo size.
- Increased on-foot and vehicular mobility and SA
- Reduced fatigue due to reduced head scanning

Ten (10) reduced weight prototype units are funded:

- 1 oz heavier than current goggles
- 70° FOV, ruggedized design
- Interchangeable mounts for interoperability
- Cost goal: $9.5K/system

Schedule:

1QFY06: Delivery of LRIP Hardware
2QFY06: User Evaluations & Operational Testing
3QFY06 Transition to SOCOM

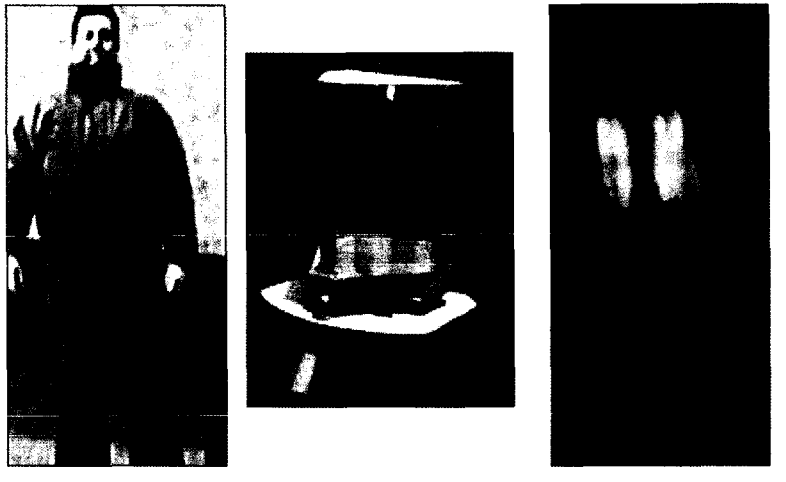
Historic breakthrough in FOV 40°→ 55°at no increase in weight and cost
Dramatic Increase to Individual Soldiers Situational Awareness and Significantly Enhances his ability to Maneuver on the Battlefield

Passive Millimeterwave Camera (PMC) Concealed Weapons & Explosives Detection (CWED)/Sentinel 150

Finally the best use of passive mmW

Concealed Weapons Detection for Force Protection/Physical Security

Available for fielding in 120 Days



Standoff Protection from Personnel Borne Threats

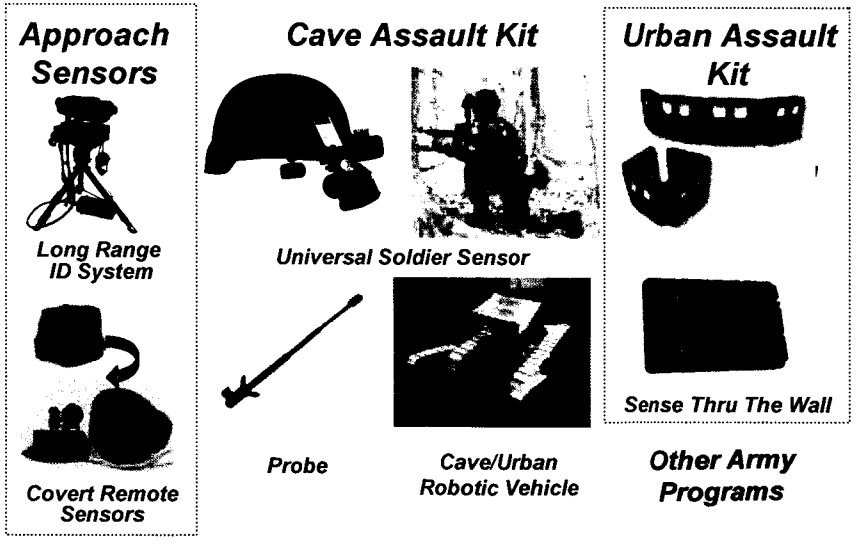
- Defense Threat Detection Agency (DTRA) and Technical Support Working Group (TSWG) have purchased units for evaluation
- NVESD funded PMC technology development and is actively testing the system
- Passive millimeter-wave imaging sensor
- Provides standoff detection of concealed weapons and explosives hidden under clothing

NVESD worked with Trex (Congressionally Funded Program) to change existing helicopter sensor to near term force protection sensor

Night Vision Cave & Urban Assault ACTD

NVESD Managed ACTD to demonstrate relevant *near term* capabilities

$42.2M Total Program



First "Operational" experience with IR on the head

- **What is the problem we are trying to address?**

U.S. forces lack adequate man portable sensors for long range surveillance/ID and dismounted assaults in urban and subterranean environments

- **End item deliverables**

-Prototype suite of lightweight, soldier-borne sensors providing decisive overmatch for dismounted assault in subterranean and urban environments

-New CONOPs and TTPs to exploit sensor capabilities

- **Where is need identified?**

-Military Need validated by JROC, ACTD approved and funded by OSD

- **What is the specific objective of this effort?**

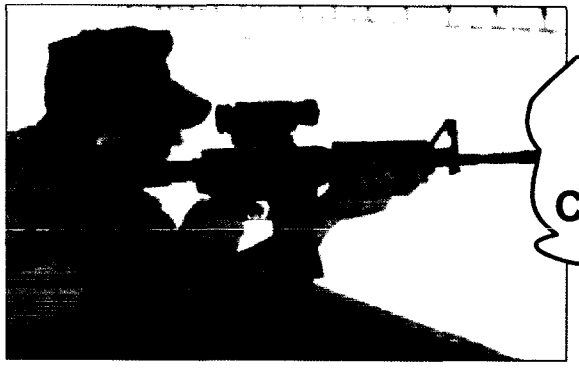
- Determine Military Utility of prototype sensors
- Provide ACTD residuals to USASOC
- Transition systems for acquisition

Sensors & CONOPS to support dismounted operations in complex/urban terrain

Night Vision CUA ACTD: Personal Miniature Thermal Viewer

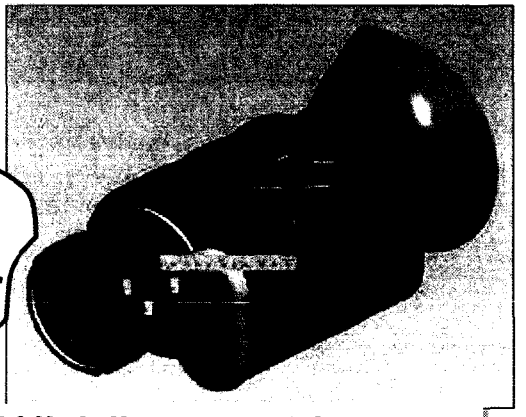
Provides the warfighter with a small, low power, light weight thermal imager for use in urban and complex terrain – rifle sight, leadership viewer, pocket scope.

Delivered to REF in 2005



Also:

"Leadership Viewer" (on lanyard) endorsed by CG TRADOC Infantry Center



PMTV II delivered in 3Q FY05

•NVESD Concept for extremely small clip on thermal sight and as a hand held pocket scope for use in urban and complex terrain

•Where is it being used now?

- •7 PMTV were delivered to the Rapid Equipping Force (REF) for evaluation in Iraq and Afghanistan. PMTV II will participate in the CUA ACTD in 4Q FY05.

•What is it?

- •Small, lightweight (11.5oz), low power handheld or weapon mounted 40° and 20° FOV 320x240 and 640x480 uncooled thermal imagers with no thermoelectric cooler or shutter for high reliability (no moving parts) that will run continuously for 6+ hours (320x240) on 2 AA lithium batteries.

•What capability does it provide?

- •Allows the warfighter to have thermal capability for handheld or weapon mounted use in urban and complex terrain that is smaller, lighter, and lower power than currently fielded systems.

Smallest, lightweight, low power thermal viewer with wide FOV for use in urban and complex terrain.

NVESD's New Initiatives for the War Fighter

New Initiative: Low Cost Combat Periscope

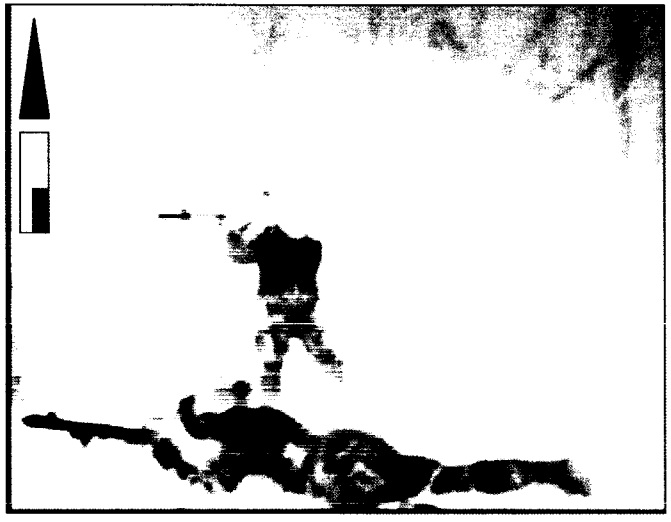
Low Cost Mast Mounted Sensor for uparmored HMMWV

3 units prepared for deployment to OIF

Straight ahead

Down slightly from level

Improved viewing angle (over roof etc.) while Staying under armor



- NVESD funded and constructed 3 units for REF (Jan/Feb 05) - $40K
- Initial prototype demonstrated to REF (Jan 05)
- Complete 3 additional systems having software modifications for directional indicator. (May 05)
- Available for deployment by REF (Jun 05)

- Vehicle Mounted IR. Low cost uncooled microbolometer (320x240) imager in gimbal, mounted on extendable pole 3 to 10 ft.

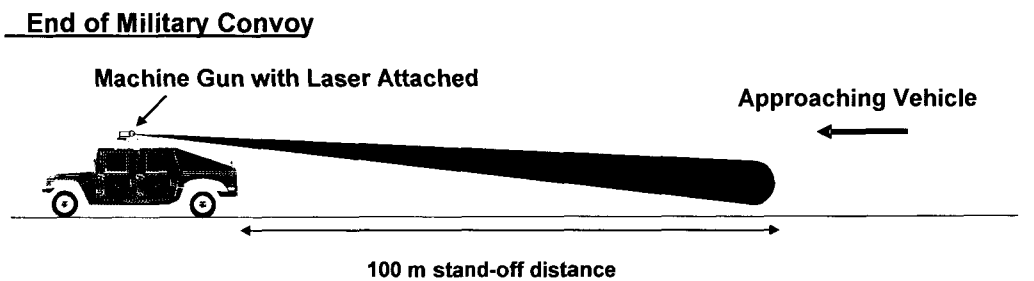
- The Combat Periscope system provides increased close in Situational Awareness, with passive target detection of threat forces without external illumination.

Provides mounted forces with enhanced urban target detection and situational awareness while maintaining armor/vehicle "closed hatch" protection

Laser Warning Light (HELIOS)

Totally non-lethal

CG AMC took prototype to Iraq - May 05
Great Feedback - Field wants the capability NOW



Deter non-hostile approaching vehicles—assess intent before firing!

- NVESD Concept and Design
- NVESD Prototype Funded
- 12 weeks from design to prototype to fielding
- REF Funded additional 10 prototypes

NVESD In-House Design

- Seven (7) Commercial 70mW Pointers – Class 3B
- Laser Wavelength: 532 nm (Green)
- Laser Output: ~ 500 mW
- Continuous Wave (CW)
- Battery powered: 1-2 hrs continuous operation
- Weight: < 2 lbs
- Cost: < $8k per unit
- Safety: Eye Safe Range > 6 m

Laser Bundle approach good for thermal management and eye safety

Gun mounted multifunctional system - Helps to identify approaching vehicle with hostile intent, possible suicide bombers, RPG gunners, etc… useful at check points

New Initiative: Baghdad Clicker

What is it…

A small very low cost, covert communications device distributed to trusted locals for reporting and locating insurgent activities (works with tower network for position location)

Potential Fielding in 120 Days

Transmitter (Clicker)

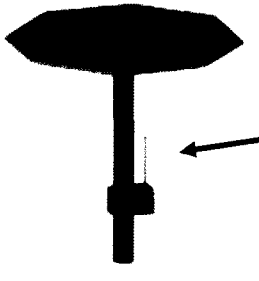
- Very low cost <$20/each
- Reasonable Range
  - 3-4 km Open Terrain
  - 1-2 km Urban
- COTS Components
- Capacitor-driven power

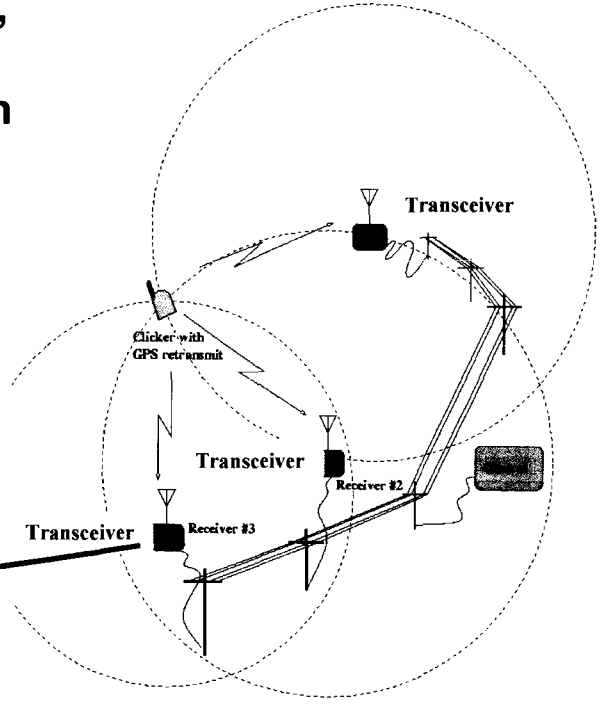
Provides ID code, and rudimentary threat information (four buttons)

Receiver

- Network of land-based radio direction Finding receivers
- Receives Clicker signal and measures Angle of arrival

Transceiver





NVESD will do initial demo and then transfer program to DARPA

Small, Low-Cost Threat Location Device to empower the population in Urban Areas

Force Protection / Perimeter Defense Initiative

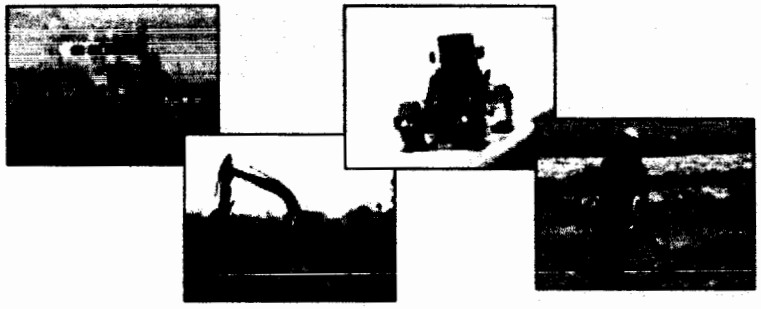
7 CERBERUS Units Deployed at CONUS Chem/Demil Depot Sites for Enhanced Perimeter Security.

NVESD integrated sensors onto tower

Counter-IED Support

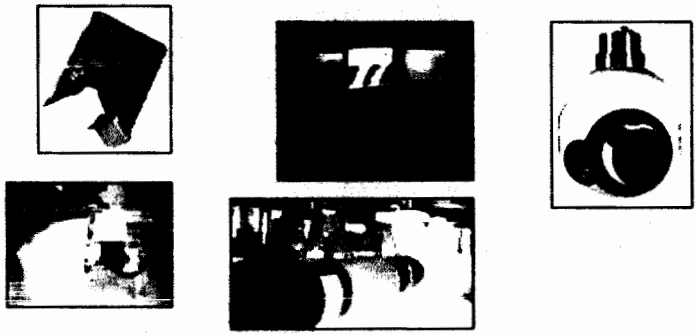
Multiple efforts to address the complex nature of the mine/IED threat

Mine Protected Vehicles and Sensors



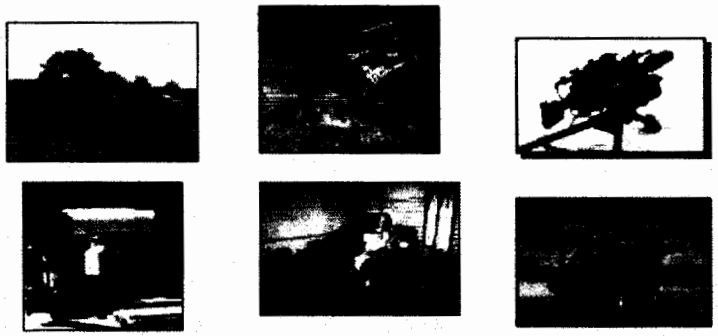
Support to PM CCS for Rapid Fielding and Training to EOD and Combat Engineering Clearance Teams

Airborne IED Detection



Sensors and Signal Processing to Detect IEDs from Army Airborne Platforms

Ground IED Detection/Route Clearance



Support to Units Performing Route Clearance & EOD Missions-Detect & Neutralize

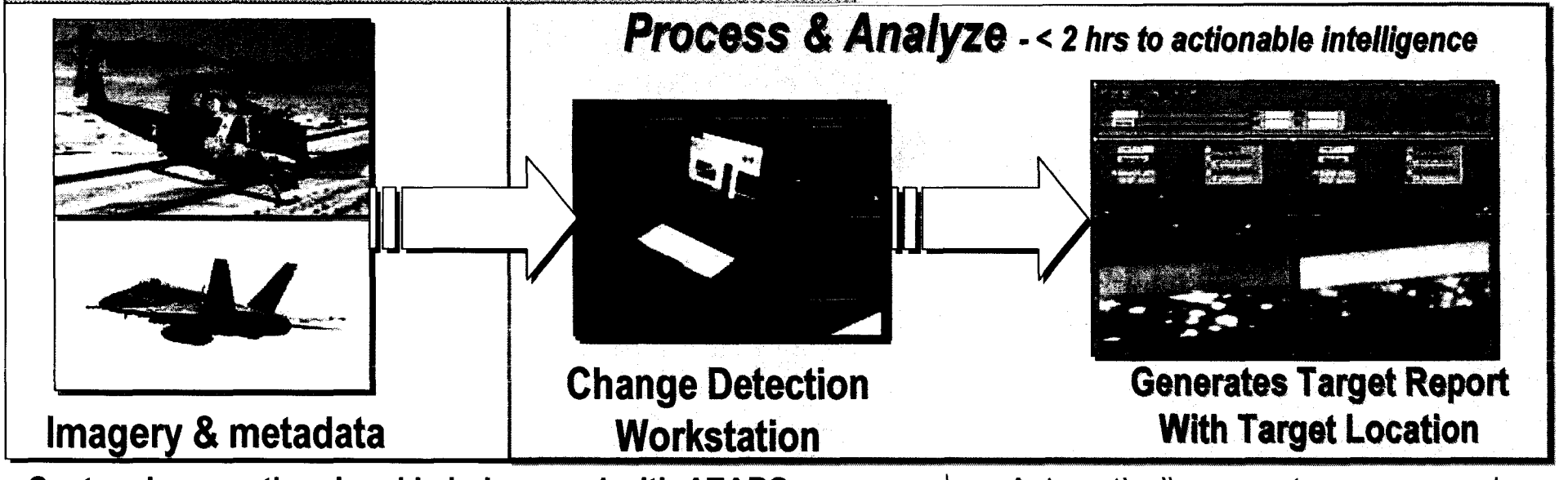
I^2WD not NVESD develops Jammers for RF activated IED's

Leverage NVESD's Countermine Mission To Develop Quick Reaction IED Countermeasures

Change Detection Workstation

Used with airborne sensors to locate changes on the battlefield and IEDs along routes

First of Five Systems "Fielded" to OIF in JAN 2005



- **System is operational and is being used with ATARS (Advanced Tactical Air Reconnaissance System) in Iraq at Al Asad Airbase with USMC**

- NVESD, teamed with USJFCOM and USMC, developed system and CONOPs. System training conducted CONUS prior to deployments. System spares and contractor support available to units in theater as required.
  - 9 months to interpreted capability
- Follow-on squadrons rotating into ops also have capability

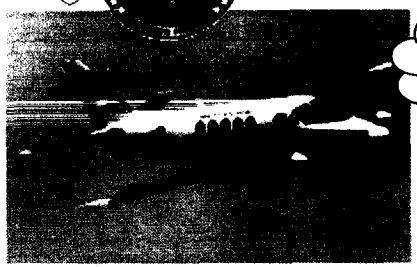
- Automatically generates geo-synced mosaics of imagery collected at different times for comparison.

- Comparison of different images allows USMC analysts to identify important changes.

- Developed under NVESD Joint Area Clearance ACTD

A new change detection capability is operational in OIF with USMC F/A-18 aircraft and ATARS sensors.

Eagle Eye: Near Term High Altitude Sensor Suite

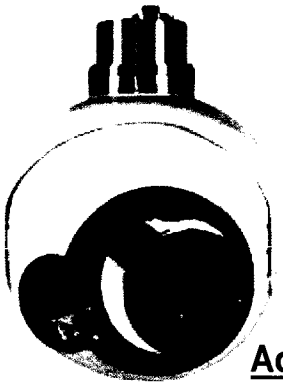


Eagle Eye now funded

NVESD working with DARPA - developed patented gimbal technology providing a breakthrough in line-of-sight stability (2 urad) – this allows for high quality imagery at great distances as seen below

Can search multiple roads within 128 km^2 Field of Regard

2" GSD at 21,000' AGL



Up to 45° off nadir

Description:

- Highly Stabilized Gimbal with HDTV & 640x512 MWIR cameras and 10 Hz step stare for High Altitude Detection Integrated with Onboard Change Detection Workstation for IED detection, ISR and small area persistent surveillance – **8,000 ft. night and 20,000 ft. day**

Performance:	TV	IR
Resolution	Nadir: 1" GSD at 20,000' 45° Offset: 2" GSD at 20,000'; AGL	Nadir: 2" GSD at 9,200' 30° Offset: 2" GSD at 8,000'; AGL
Step Stare Rate	10 Hz	10 Hz
Road Coverage	294 km/hr at 2" GSD follow road w/ step/stare gimbal motion	296 km/hr at 2"GSD follow road w/ step/stare gimbal motion
Field of Regard	128 km^2 at 2" GSD	6.2 km^2 at 2" GSD
Persistent Surveillance (1Hz revisit)	With near term optics upgrade – 8km^2 at 1m GSD	With near term optics ad camera upgrade – 9km^2 at 1m GSD

Advantages:

- Provides 2" GSD at Altitudes above MANPADS Threat
- Day/Night Capable
- Real-time IED Detection reporting – (Text Message) no Video Datalink for manual platform
- Multipurpose - can contribute to conventional ISR and small area persistent surveillance (step stare provides growth to large area persistent surveillance / vehicle tracking)

Limitations:

- Relatively expensive platform (manned aircraft or large UAV – 230lbs gimbal payload)
- Cloud obscuration

Platform:

- Near Term: ARL or C-12 – Pressurized and Available
- Far Term: ACS or I-GNAT UAV

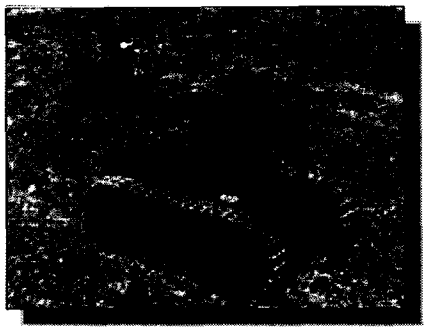
Schedule and Funding:

6 Months/$7M to Procure, Integrate and Test Sensor Payload, Payload Control Station and Change Detection Workstation

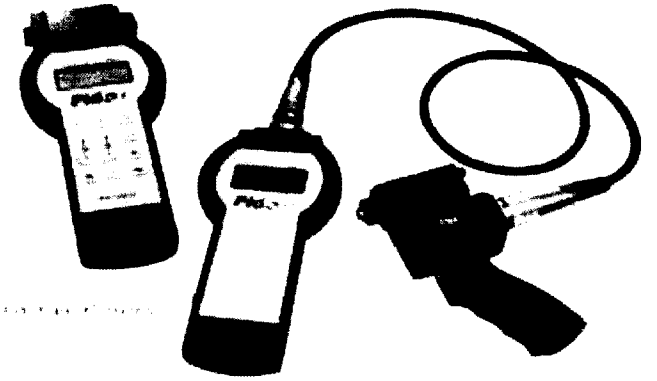
Near term day/night IED and personnel detection from survivable altitudes – avoids following the road at dangerous altitudes – Funded by Supplemental

Nomadics FIDO XT Technology: Product of NVESD Sensors for Explosive Detection ATO

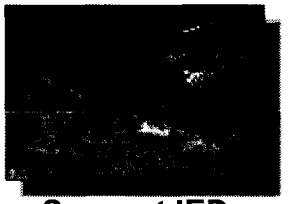
Real time explosive detection for IED verification and vehicle screening



FIDO integrated on iRobot PackBot & Foster Miller Talon



Personnel screening



Suspect IED Interrogation

Vehicle Inspection

Significant improvement over previous generation sensors – Rapidly detects TNT, Comp B

Capabilities:

- Detect explosives emanating from following threats:
  - VBIEDs, roadside IEDs, building & personnel screening, checkpoints, others
- Effective for handheld operations as well as robotic platform.

Specifications:

- Responds in real time to TNT, DNT, and other explosive material. Currently no capability against RDX.
- Small package design with easy to read display. (even in direct sunlight)
- Lightweight package ~1.5 pounds w/ battery; Battery lifetime = 4 hours
- Capillary tubes and Teflon swipes are the only consumables.
  - Costs: ~$7.00/capillary & $2.50/4-pack of swipes
- Extremely sensitive: parts per trillion.

Important advancement in explosive sniffer capability in last 12 months – now "field ready"

Vehicle Sensor Fusion for IED Detection

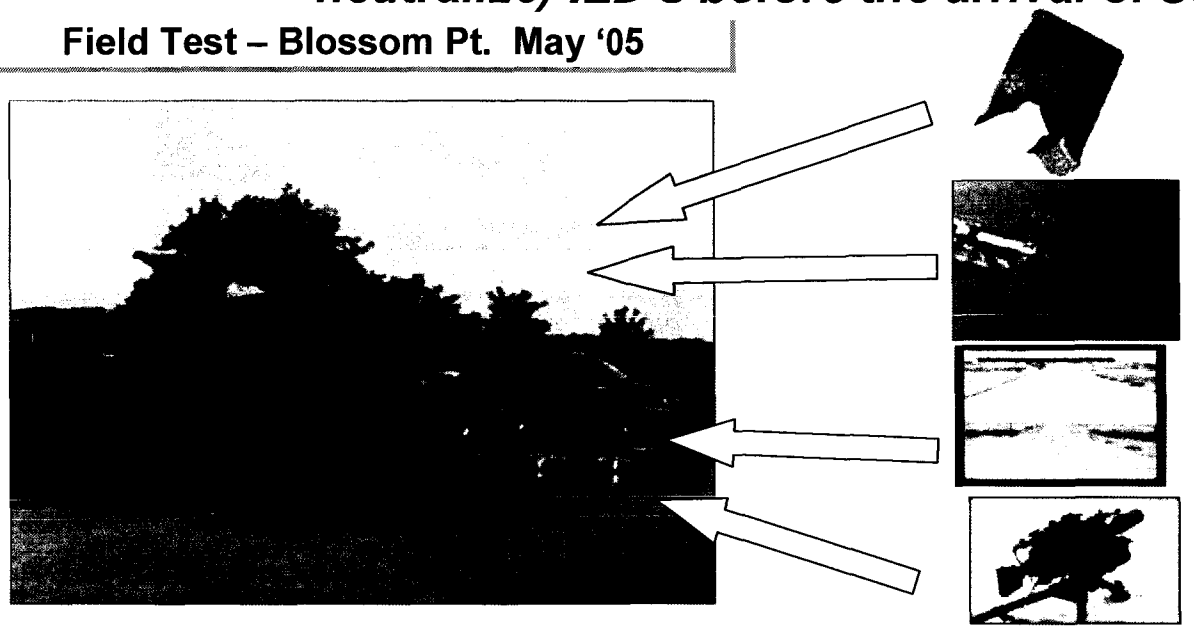
New Convoy Escort Vehicle Concept

Vehicle Sensor Fusion for IED Detection

New Convoy Escort Vehicle Concept

Multi-Sensor Suite for high speed armored lead vehicle to detect (and neutralize) IED's before the arrival of softer vehicles

Field Test – Blossom Pt. May '05



Forward looking 2 color uncooled IR sensor – detect disturbed dirt

Magnetometer – detects metallic objects from 3m-10m

Split screen video w/GPS for display of recorded video

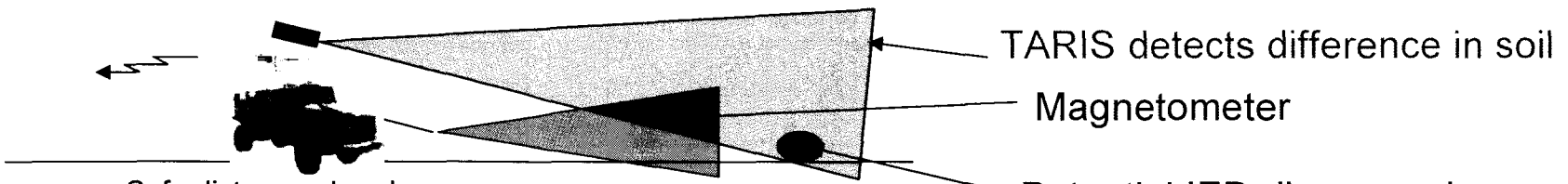
Telepresent Remote Aiming Platform (TRAP) – direct fire for Surface Munition Disruption (SMUD)

- Actively being tested at YPG and Ft. Belvoir Summer '05
- NVESD developing and testing prototype sensors – Totally New TTP developed by NVESD
- Potential for rapid deployment with low cost sensors
- Inexpensive sensor suite for IED detection:
  - Small, lightweight 3-band sensor specifically tuned to detect disturbed earth
  - Magnetometer for metallic objects (155mm shells) out to 10m – in conjunction with PM CCS
  - Split screen video with GPS for change detection and sensor display
- Provides detection along road edges for route clearance operations

Change Detection on the Ground to provide warning to softer vehicles

Tactics, Techniques & Procedures (TTPs) for the IED Sensor Vehicle

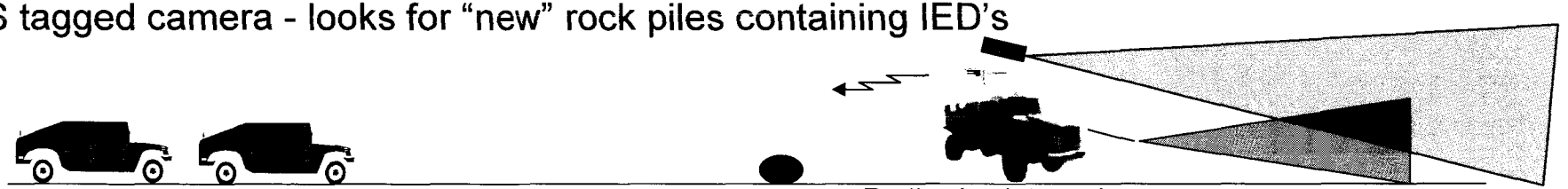
Heavily Armored IED Sensor Vehicle – ahead of convoy searching with TARIS (2 color IR Sensor) and Magnetometer – 45-75 km/hr – using change detection ATR



Safe distance ahead
so convoy with softer vehicles can stop
before reaching a suspected IED

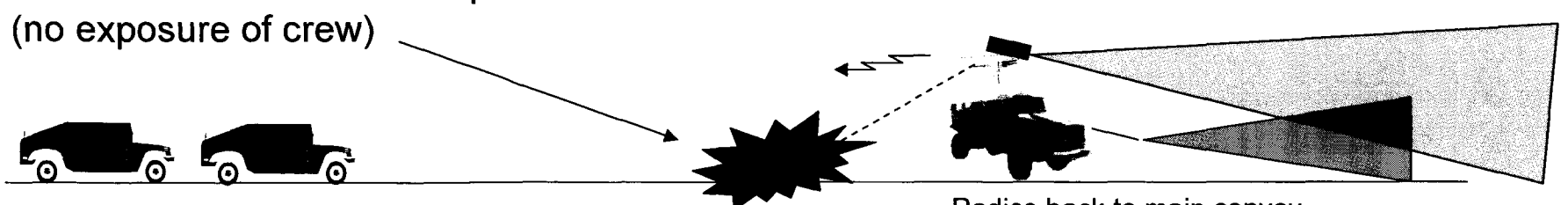
ATR Biggest Risk

Alarm Sounds when the ATR detected a change – due to rate of speed vehicle has passed IED. Operator confirms location of IED from TARIS and Magnetometer Data (either moving or stopped) and by observing split screen video recorded at two different times from on board high resolution GPS tagged camera - looks for "new" rock piles containing IED's



Radios back to main convoy
to stop to at a safe distance

IED Sensor Vehicle – Once IED presence is confirmed – IED Neutralized with TRAP Neutralization Gun (no exposure of crew)



Radios back to main convoy
IED Neutralized so convoy can proceed safely

Conclusion

NVESD employees are…

- *In the field*

In-House innovation and quick reaction capability

- *Providing Affordable Combinations of technology*

Adapting to new threats… Urban and IED's

- *That supports the warfighter <u>today!</u>*

An Information Briefing to The Honorable Philip Coyle 7 July 2005

Dr. A. Fenner Milton
Director
Night Vision & Electronic Sensors Directorate
info@nvl.army.mil

Distribution authorized to U.S. Government agencies and DoD Contractors only, Operational Use, June 30, 2005. Other requests for this document shall be referred to US Army RDECOM CERDEC NVESD, AMSRD-CER-NV-OD ATTN: Dr. Fenner Milton, 10221 Burbeck Road, Fort Belvoir, VA 22060

US ARMY RDECOM CERDEC

NIGHT VISION ELECTRONICS SENSORS DIRECTORATE

Dr. A. Fenner Milton
Director
Night Vision & Electronic Sensors Directorate
fenner.milton@nvl.army.mil

The Night Vision and Electronic Sensors Directorate (NVESD)

As Army employees we support the recommendations of the BRAC report but believe that in the case of NVESD these recommendations present certain challenges that the BRAC commission should understand in depth.

The Night Vision and Electronic Sensors Directorate (NVESD)

Bottom Line Up Front

519 Federal Employees to be moved to Aberdeen, MD

- NVESD's products have changed the way our forces fight and given them an unparalleled advantage in combat
- NVESD is DoD's recognized world-class center for EO/IR sensor system R&D
- NVESD possesses extraordinary human capital; a uniquely skilled, multi-disciplinary workforce (university training is not enough)
- The relocation of NVESD will cause serious, possibly irreparable harm to its capabilities – a long time to reconstitute
- We may lose our advantage in sensor technology
- This result may be contrary to BRAC Military Value Principles and the goals of the Department/Army Transformation

High Risk to Military Value

BRAC Challenges

The bottom line.

NVESD View:

• The prolonged disruption of the NVESD RDT&E mission due to the loss of human capital will adversely affect the pace of technology innovation, to the detriment of the warfighter, and our ability to fight and win.

"Disrupts key advantage"

• There are no cost savings, only outlays in the sum of approximately $330M, associated with the realignment of NVESD

For the technology of NVESD, there is no current military value at Aberdeen, MD

NVESD Mission

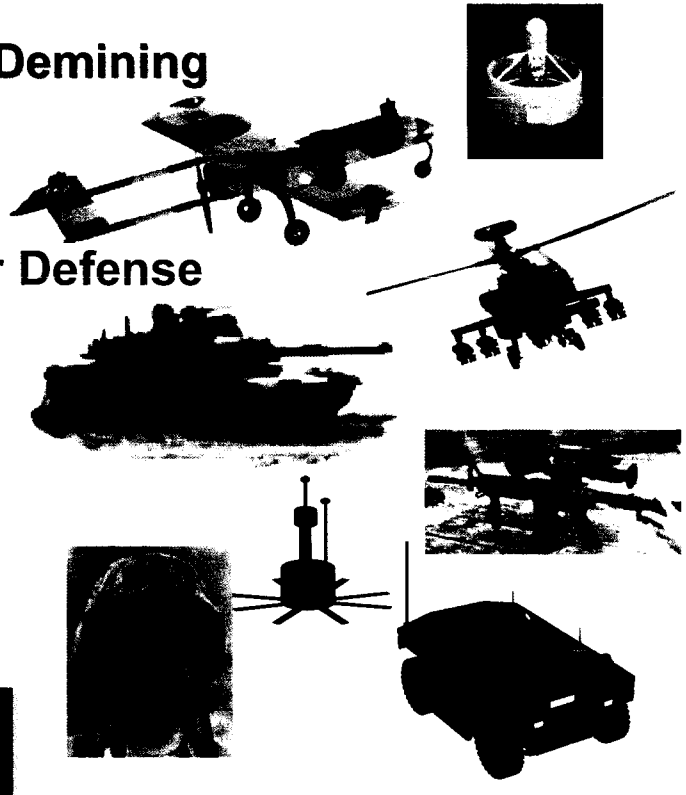
- Research and Development in Advanced Sensors – Military Specific Technology

OWN THE NIGHT

EO/IR and Electronic Sensors/lasers for:

- **Surveillance**
- **Targeting**
- **Countermine/Humanitarian Demining**
- **Night Pilotage/Driving**
- **CCD**
- **Force Protection / Perimeter Defense**
- **Counter Reconnaissance**

Sensor Fusion



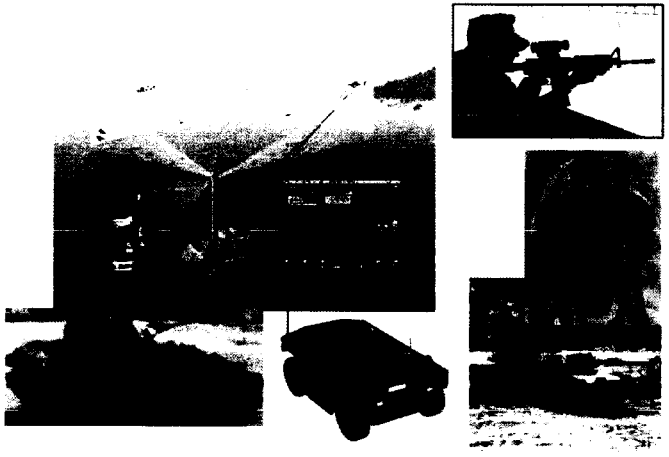
DOD CENTER FOR IR AND COUNTERMINE

6.2 + 6.3 +Transition Technology to PMs for Future Force

NVESD Business Areas

Ground Combat Systems

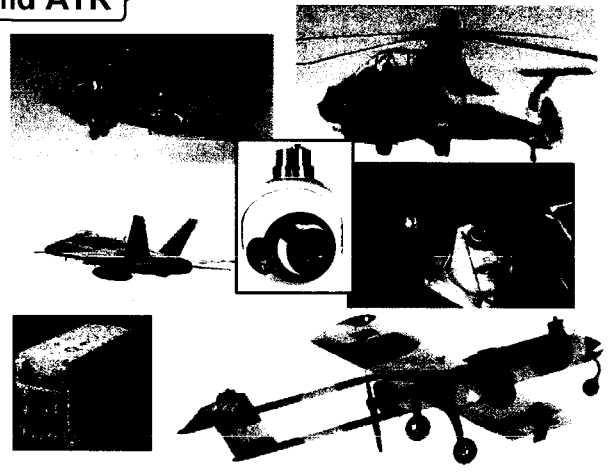
Develop combat vehicle, soldier, UGS and UGV sensor systems to acquire and target enemy forces and for night fighting and driving



Air & Netted Sensors

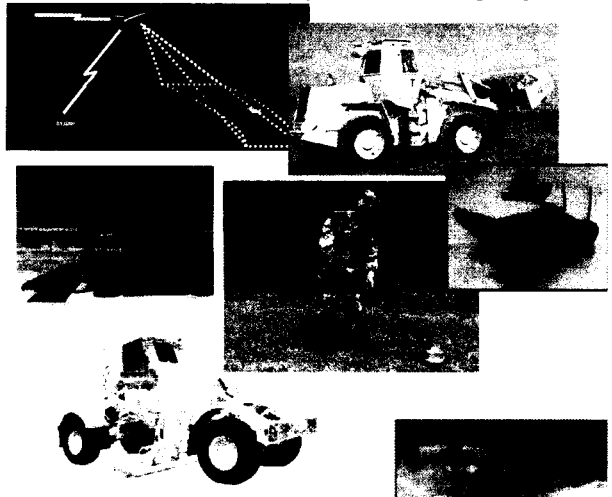
Develop rotocraft and UAV sensor systems to acquire and target enemy forces and for pilotage

Fusion and ATR



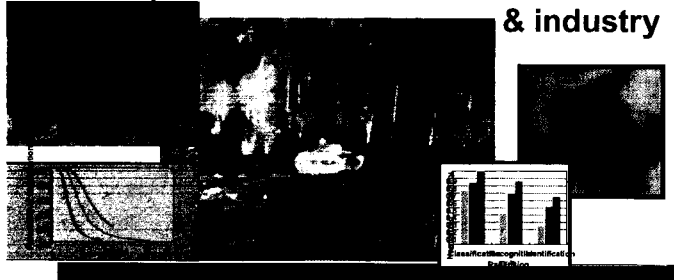
Countermine

Develop systems to detect and neutralize mines, minefields, IED's and unexploded ordnance for military and humanitarian demining operations
Minefield breaching for military ops.



Modeling & Simulation

Develop models and simulations and perform sensor component and system performance analyses
EO/IR performance modeler for all DoD & industry

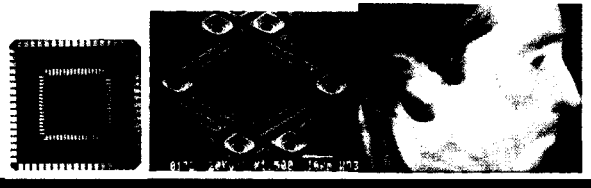


Science & Technology

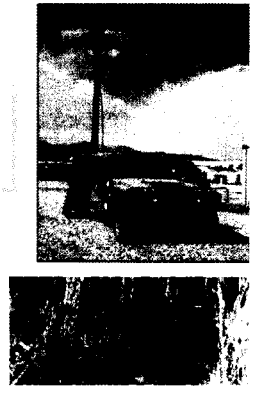
Conduct research and foster maturation of EO/IR and countermine sensor components and of ATR / signal processing

FPAs, IR (SWIR, MWIR, LWIR), lasers

Distributed sensor networks



Special Products & Prototyping



Sensors for special ops forces, force protection /perimeter defense

MASINT sensors for intel

Develop, test, and calibrate EO sensors for signature collection in support of DOD intelligence

NVESD has primary responsibility for DoD Electro-Optic Sensors

All customer funded

NVESD Legacy – Changing the Way We Fight Wars

The US Now Prefers to Fight At Night To Utilize Our Night Vision Advantage

Image Intensifiers (I^2) –

Vision sensors for a night maneuver force (soldiers, vehicles, helos)

>500,000 I^2 Systems Fielded
Gen I, II, III

The US Owns The Night

Thermal Systems (FLIRs) –

Long range improved day/night target contrast and smoke/dust penetration

>70,000 FLIR Systems Fielded
Gen I, II, Uncooled

Countermine –

Detect buried landmines and IEDs for safe maneuver

>15,000 Systems Fielded

Greatest Ongoing Contribution

Uncooled Infrared Imaging

Small / Cheap
IR Everywhere
Revolutionize Land Warfare

Tactical Lasers – Locate and designate targets for standoff engagement by precision weapons

>40,000 Systems Fielded

Also Firefighters

"Our night vision capability provided the single greatest mismatch of the war"
- MG Barry McCaffrey, CG 24th ID, Desert Storm

"The Army is using its advanced Night Vision sensors in Iraq and Afghanistan 24 hours a day, seven days a week. The capabilities of these critical combat tactical sensors are vital in the asymmetrical fight against terrorism." *- COL Curtis McCoy, US Army G8 Office*

NVESD: Contribution to Transformation

Technology	Warfighting Opportunity	NVESD Internal Involvement
High Performance Uncooled IR	Very low cost missile seekers & threat warning 360° distributed aperture sensors for urban ops; Lightweight IR imagers for the dismounted warfighter	Very High
Gen 3 Dual Band IR On Si Substrate	Low cost long range passive ID, wide area search with dual band ATR	Very High
Short Wave Infrared	Detection of camouflage, active imaging at very long ranges, future video replacement for direct view I^2 devices	High
Lightweight Laser Range-Finder/Designator	3x weight reduction for hand held soldier and Class 2 UAV designators – critical enabler for future ops	Very High
On-the-Move Countermine Ground Penetrating Radar	Detection of buried plastic and metal mines and IEDs at reasonable rates of advance (10x today's rates)	High
Airborne IED Detection	Automated detection of IEDs and buried mines along convoy routes from airborne platforms	High

Aggressive NVESD research will reduce the **cost** of future warfighting opportunities

- Sensors are a key component of Network Centric Warfare -

With the Warfighter In Iraq Today

Examples of Quick Reaction Prototypes in use by the Warfighter in Iraq and Afghanistan

STORM Laser Rangefinder + Thermal Sight

10x thermal weapon sight

Multi-function Laser System

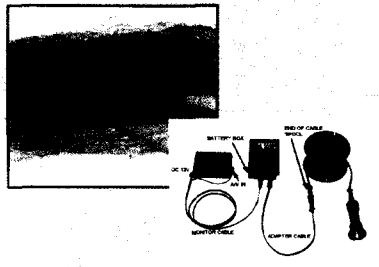
Allows precise direct fire engagements with 105mm Howitzer

Laser Warning Light

Taken May 05 to Iraq by Gen Griffin, CG AMC

Gun mounted laser to determine intent and protect convoys from car bombs

Well Camera*& Remote Robotic Vehicle

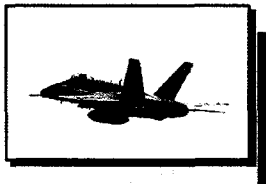


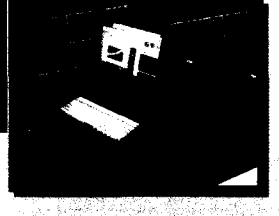
Highlighted in Army Posture Statement

**One of AMC's 10 greatest inventions*

Remotely inspect wells and tunnels for enemy troops and weapon cachets

Change Detection Workstation



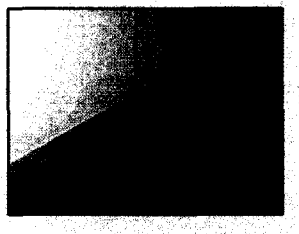


Detect IEDs from the air using existing EO/IR Sensors

SPIDER – Surveillance System

Mobile stabilized panoramic sight for force protection & surveillance

Hand Held Thermal Probe



Was used at the World Trade Center

Standoff search with FLIR in MOUT and collapsed building/rubble piles.

Over 20 quick reactions special projects fielded to OIF/OEF
Many more in the works…

cker

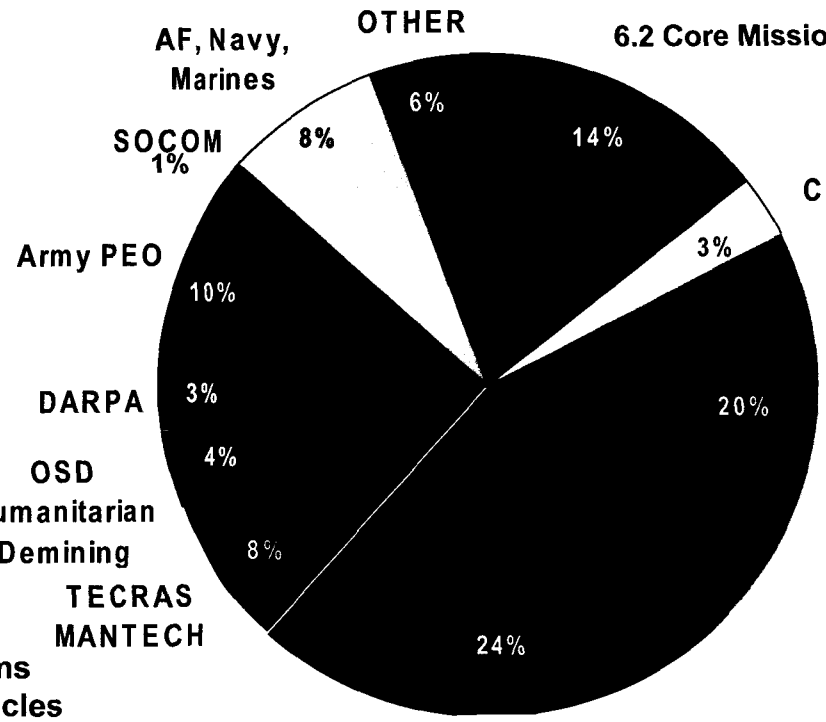
Changing the Way Wars are Fought and Reducing Cost

New Technical Warfighting Concepts That Have Recently Originated at NVESD and Transitioned to Industry

- **Monoblock Lasers** – smallest possible laser rangefinder and designators for individual soldiers and UAV's
- **Multi-Laser Warning Device** – reveals intent of suicide car bombers and RPG gunners
- **Cost Effective Targeting System** – provides much lower cost targeting sensor suite for vehicles
- **Well Camera** – help search wells and caves, highlighted in Army posture statement, one of AMC's 10 greatest inventions
- **Thermal Probes** – used in rescue operations in 9-11& in Iraq to search for threats without compromising soldiers
- **Wide Field of View I2 Goggles** – much improved situation awareness for pilots and infantry at no additional weight
- **WerWolf Mine Protected Vehicle Sensor Suite** – supports detection of IEDs at convoy speeds
- **Breakthrough Material Processing to Produce Small Detector Structures** – enable the world's first Gen 3 IR Sensors
- **Uncooled Reststrahlen Camera for Countermine** – detect buried mines and IEDs from small UAV ahead of convoys
- **Wichmann GPR** (some industry) – first reliable sensor to detect plastic landmines

"... Effectively place superior technology in the hands of the Warfighter"
(BRAC 2005 Policy Memorandum Two, Oct 14 2004)

FY05 Funding



R&D Partnerships/ Leveraging:

- ARO
- ARL TPAs/Fed Labs
- MURI
- Tri-Service DTOs
- CRADAs w/Industry
- DARPA

Our most important Customers

PEO/PM Customers:

- PEO Soldier
- PEO Aviation
- PM Unit of Action
- PM NV/RSTA
- PM Close Combat Systems
- PM Medium Tactical Vehicles
- PM Signal Warfare
- PEO Ground Combat Support System
- PM Robotic and Unma
- PM Target Identificatio ological Sensors
- PM Light Armor Vehicle (M)
- PM Special Projects
- PM Intelligence & Effects
- PM Lower Tier (TACOM)
- PM MEP2
- PM Force Protection Systems
- PM FBCB2
- PEO STRICOM

519 Government Personnel

Total FY05: $339,092M
76% to industry

NVESD S&T Program Portfolio Success

- NVESD has 17% of the Army Approved S&T Programs (24 of 141 non-medical programs)
  - We're only 3% of the Army S&T Workforce
  - Our % of the total Army portfolio has been growing for the last 5 years

- NVESD has executed 3 Advanced Concept Technology Demonstrations in the last 4 years and has been a major contributor to others
  - Currently executing the Night Vision Cave & Urban Assault ACTD to support the War and Transformation – SOCOM Sponsor

Directly on the Path to Transformation

12 Technology Transition Agreements with PM FCS and 8 with PM CCS to support the Transformation

NVESD has <u>more approved Army S&T programs</u> than any other non-medical organization

NVESD is the DoD Center of Mass for EO/IR Technologies

EO System Modelers for all of DOD and Industry

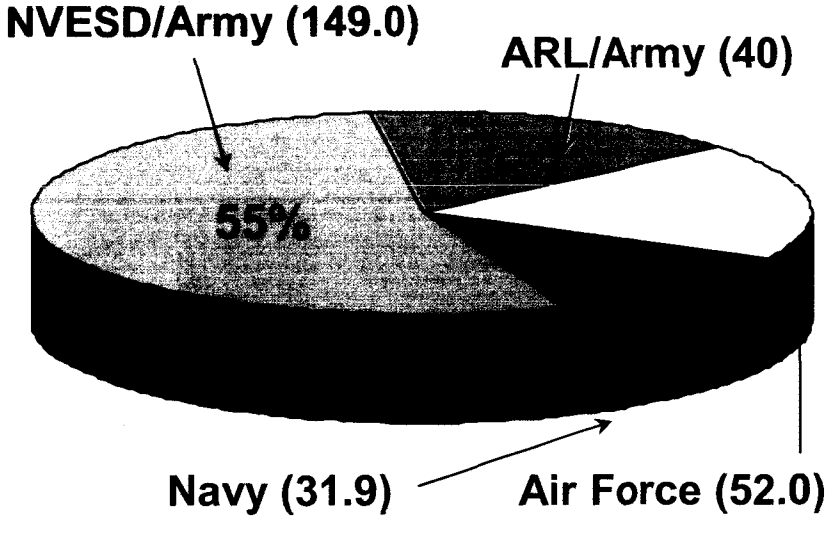
International Leadership:

NATO SET Panel, Army Member 5 of 7 Task Groups
NATO SCI Panel, Countermine Technology

TTCP – SEN Group, National Representative 3 of 7 Tech Panels 2 of 3 Action Group

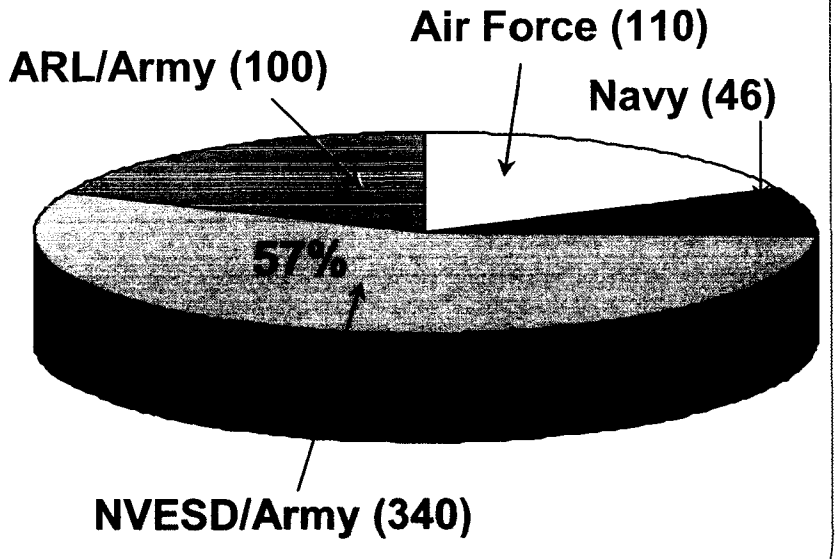
Budget (E/O) – 6.2 and 6.3
FY 2005

Funding Estimates from Reliance S&T Process



Total: 272.9M

People (E/O)
FY 2005

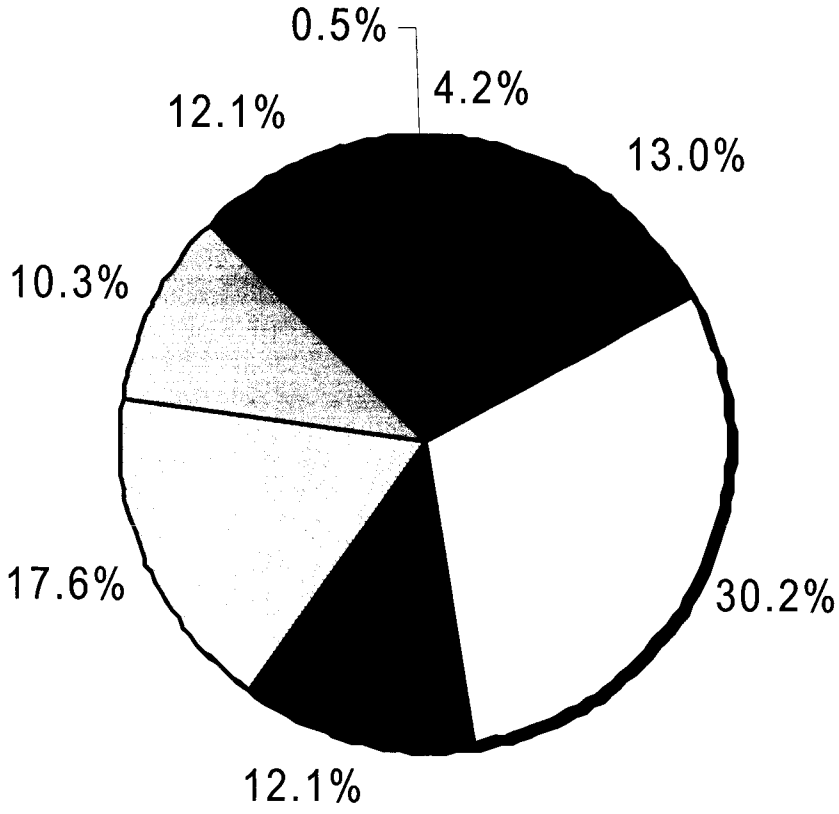


Total: 596

NVESD has significant classified funds $6M that will change the way we fight

Half the funds / Half the Experts of DoD

NVESD Serves the DoD Community



- Air Force
- Navy/USMC
- DARPA
- OSD
  - SOLIC - Humanitarian Demining
  - ACTD
- DoD Agencies
- Other

NVESD FY04 Non Army Funding: $74M

Testimonials

SOCOM

"SOCOM relies on the experienced, in-house expertise that only the Night Vision Electronic Sensors Directorate (NVESD) can provide... Infrared and Image Intensifier technologies, pioneered and developed by the personnel of NVESD, provide the technological edge required by SOCOM operations. SOCOM depends on NVESD's quick reaction capability to remedy immediate battlefield needs. It is imperative that SOCOM retain this mission critical support." – *J. Frank Wattenbarger, Director, Advanced Technology, US Special Operations Command*

DARPA

"In these partnerships DARPA has relied on the unique in-house expertise resident at NVESD. If that expertise were to disappear, I do not know where I would turn to replace it." - *Tony Tether, Ph.D, DARPA Director*

NAVY/USMC

"...The Navy S&T community relies on NVESD expertise for technology development in the field of imaging infrared target acquisition sensors for personnel, ground vehicles and helicopters." - *Keith Krapels, Ph.D., Office of Naval Research, code 313*

WARFIGHTER SUPPORT - IRAQ

"The truth is, NVESD is already one of the most responsive labs in the RDECOM." - *LTC Ken Copeland, RDECOM Science, Technology and Acquisition CORPs advisor to multi-national force Iraq MNF-I*

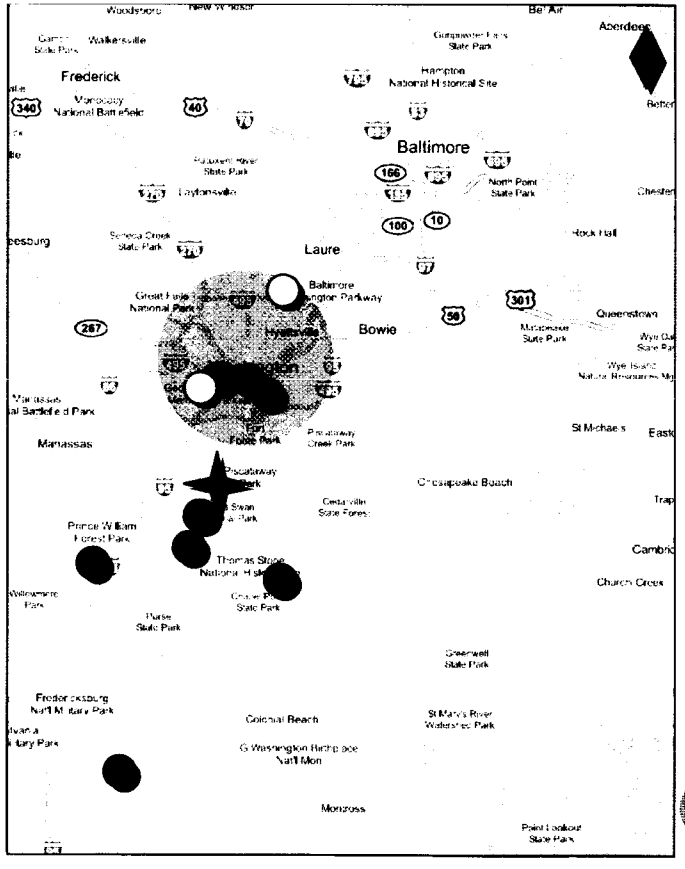
TRANSFORMATION BATTLE LAB FOR THE ARMY (UAMBL)

"With the Army currently at war and with the potential for world-wide commitment for the foreseeable future, it is imperative NVESD development must continue uninterrupted. The best minds... must be kept working on this critical capability. Without them we risk marginalizing the advantage we've worked hard to attain." - *Joe Hughes, BFD Director of Force Development*

A "Joint" Center of Excellence Already Exist in the Virginia and DC Area

•The concentration of ARL, NRL, USMC Quantico, DARPA, SO/LIC and NAVEOD within the Virginia/DC Area already provides a powerful synergy for NVESD in EO/IR and countermine sensor developments for the Warfighter

•Local facilities at: Quantico, Indian Head, Ft. AP Hill, Blossom Point and Davison Army Airfield provide cooperative opportunities.



- NVESD
- Aberdeen Proving Grounds
- DARPA
- Naval Research Lab
- Army Research Lab
- Naval Explosive Ordnance Disposal Technology Ctr
- Special Operations / Low Intensity Conflict
- USMC Quantico
- Ft. AP Hill
- Blossom Point
- Indian Head
- Institute for Defense Analyses
- Beltway

•Defense Research Engineering Network (DREN) connectivity is like Network Centric Operations. NVESD now conducts distributed simulations and experimentation with Army Battle Labs and RDT&E partners.

•The integration of organizations without their people will not create a center of excellence.

Excellence is embodied in the people.

Note:

- Major customers or NVESD remain at Ft. Belvoir: PEO Soldier, PM Force Protection, REF, PM Special Programs, & INSCOM
- PM CCS (Countermine) only moves if NVL moves

Extensive Tri Service Synergy in EO/IR Technology in Northern VA, DC Area – Nothing near Aberdeen, MD

Quicker

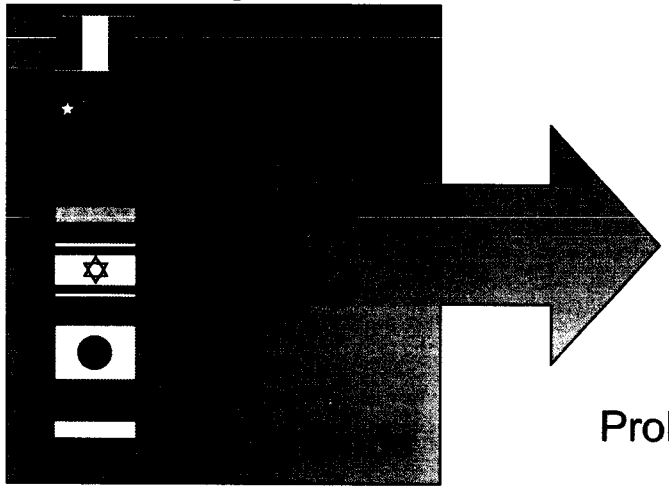
International Threat to US Technology Dominance

International view of the state of sensor technology (from DTRA)

- Over the last 10 years, the US has been losing its technological advantage in sensors due to intense overseas research and development and production efforts – **Gap is closing**.

Key Technology Areas: Uncooled & Cooled IR, Lasers, Image Intensifier, SWIR

Competing Nations



Will catch up if NVESD disrupted by BRAC relocation

Rest of the industrial world about 3-5 years behind US…

Some exceptions

Problem: We do not control their export policies

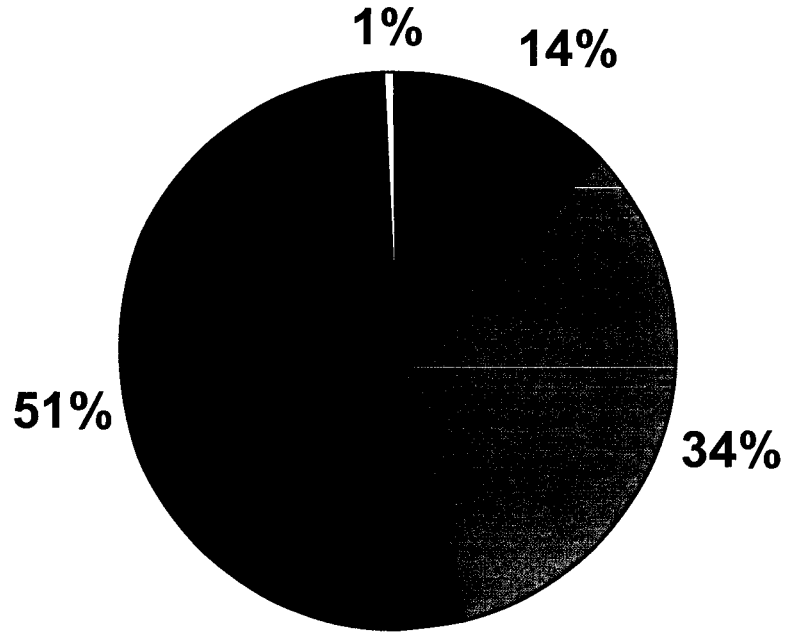
If the championing of this technology by NVESD is disrupted, better technologies will be available on the world wide market than will be available from the US

Any disruption caused by BRAC will erode US lead in EO/IR and level the playing field resulting in reduced night vision advantages for the war fighter.

FY05 NVESD Education Distribution

Engineers & Scientists
Education Breakout

Plus 40 more
E&S employees
now pursing
graduate degrees



■ PhD ■ MS ■ BS □ Assoc

Total 340

NVESD Workforce Specialization

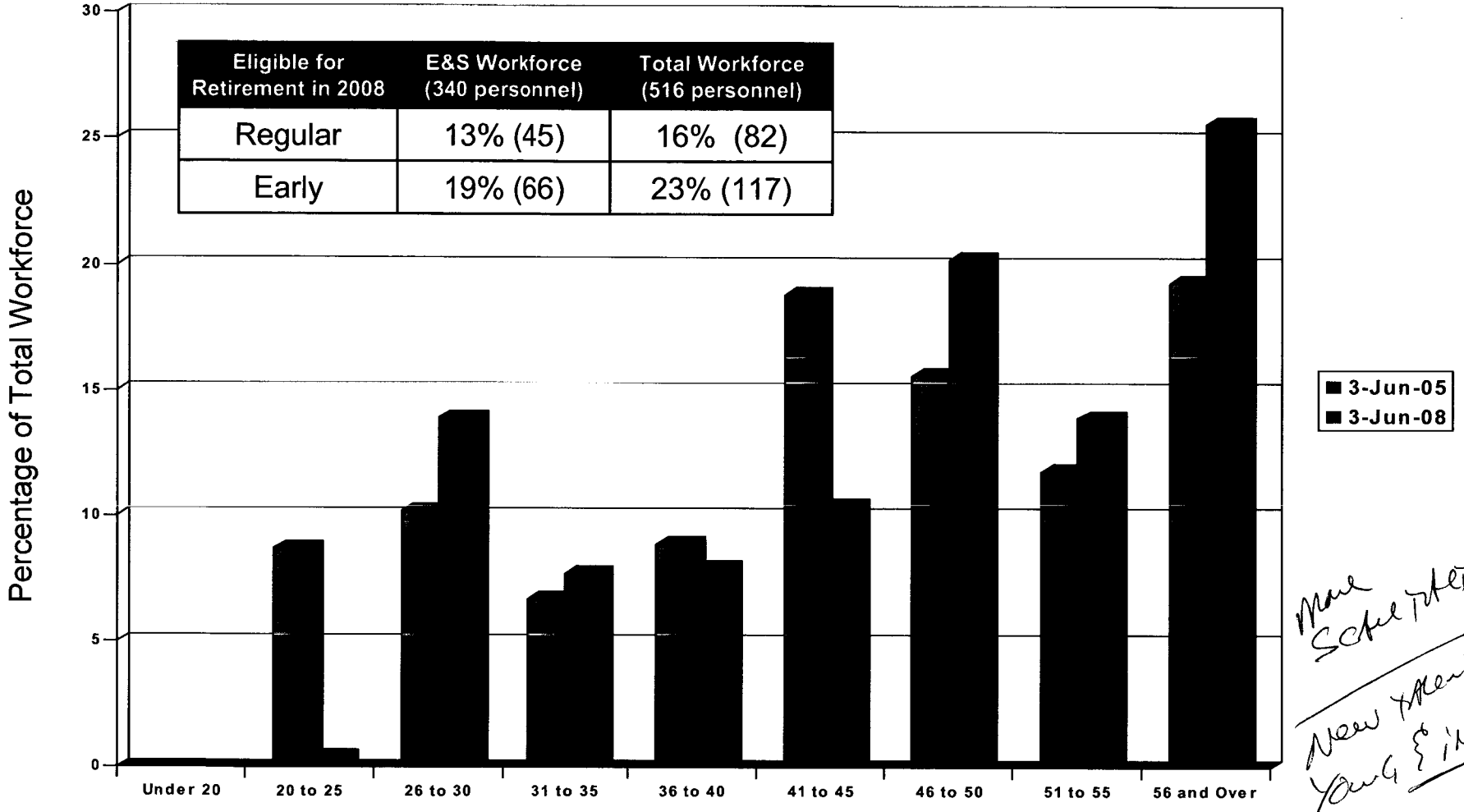
Non Unionized

Workforce Specialization	Number of Employees
Focal Plane Arrays (FPA)	
Molecular Beam Epitaxy/Grower (Materials Scientist)	3
Detector Processor/Etching	5
FPA Device Design & Materials Testing	9
FPA Manufacturing	2
EO/IR Electronics Design & Modeling	47
Uncooled Camera/FPA and Devices	2
Cryogenic Coolers/Dewars	2
Sensor Protection	1
Read Out IC Development/Design and Test	1
Lasers	
Laser Source Design	22
Laser Radar Systems	6
Laser Rangefinder/Designator Design	17
Optics	
IR Sensor Optical Design	3
Miniature Display Design/Testing	5
Optical Design	1
Optical Testing	3
Image Intensification	
I2 Tube Design and Fabrication	7
I2 Device Engineering	16
I2 Technology and Testing	2
Signal Processing	
ATR Algorithm Evaluation	22
Real Time Image Signal Processing Engineering	20
Image Fusion Algorithms	11
Countermine	
Ground Penetrating Radar Engineer	19
Nuclear Quadrupole Resonance Expert	3
Explosive Detection Chemist	4
Explosive Neutralization Expert	28
CM Field Testing	1
Electro-magnetic Sensor Expert	3
High Power Microwave Expert	2
Countermine System Integration	5
Chemical Neutralization Expert	4
Modeling	
Radiometry/Atmospheric Propogation	6
Linear Systems Analysis	10
Psycophysics (Perception Testing)	14
Image Generation & Rendering	22
E-O Sensor Systems Engineer	
IR Sensor System Development	60
Hyperspectral System Development	21
Stabilization and Pointing Accuracy	4
Prototyping	
NV Systems Prototyping	36

Critical Mass of Technical/Scientific Expertise Consisting of Many Specialists

NVESD Age Distribution

Eligible for Retirement in 2008	E&S Workforce (340 personnel)	Total Workforce (516 personnel)
Regular	13% (45)	16% (82)
Early	19% (66)	23% (117)



More Scholarships
New talent is young & inexperienced

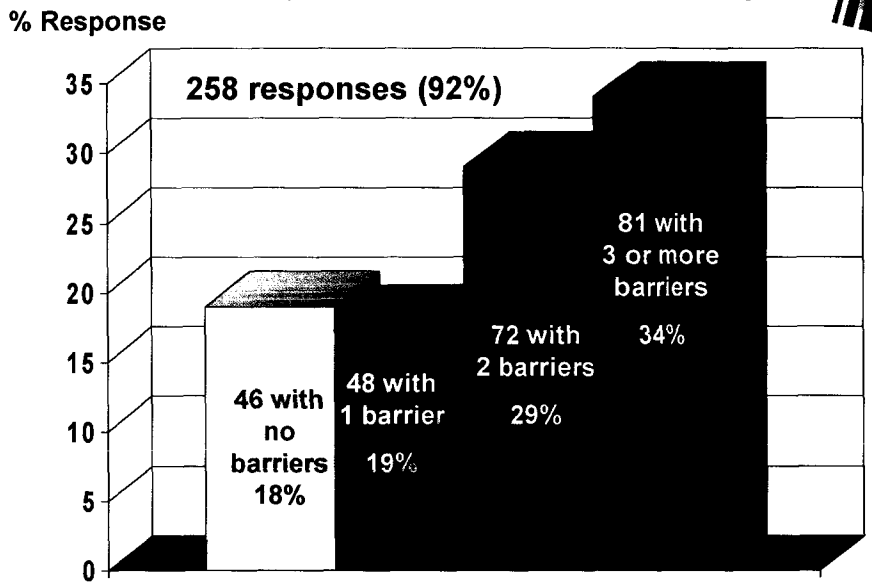
BRAC will likely be a catalyst for many early retirements among senior mentors who are needed to train and mature new talent

NVESD Employee Survey

Survey: Do you anticipate any significant personal barriers to re-locating?

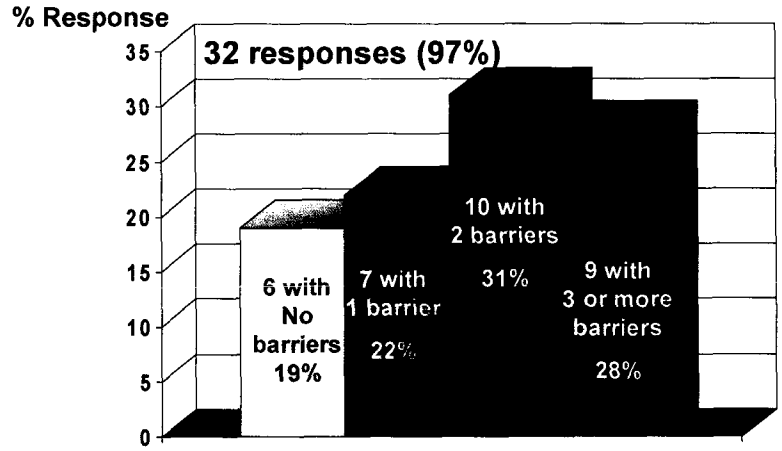
Survey Assumptions:
- **Identical work environment in Aberdeen**
- **All relocation costs adequately covered**

E&S - 5 to 40 yrs on-the-job training (excludes interns)
DB03-04(GS12-15), ST and DB05 (ST Equiv)



E&S "Technical Specialists" Subset
- SMEs, MIJs, ST, Band DB05

"Cream of the Crop" - Almost Impossible to Find



~ 60% of Specialized Workforce Has 2 or More Barriers to Relocation

Significant Personal Barriers

151 – Local community or neighborhood involvement
132 – Spousal career
88 – Children in school
73 – Family ties to area
64 – Participation in Virginian Education or College Tuition Assistance Plans

Aberdeen, MD is an impossible commute

Experience suggests only about 25% of the workforce will move

Historical Examples of Attrition

- Vint Hill, VA -
1993 BRAC relocated Signal Warfare Lab from Faquier, VA to Ft. Monmouth, NJ

Impact

- 18 of 463 moved to NJ – 4%
- Only 1 Division Chief (GS-15) and 1 Branch Chief (GS-14 Ops) relocated.
- No support infrastructure (Management/Program/Budget Analysts) relocated.

- St. Louis, MO -
1993 BRAC relocated Aviation Troop Command ATCOM to Huntsville, AL

Impact

- 37% Moved

Loss of personnel will start in September disrupting support to the war

Most of the people do not move

Reconstitution Difficulties

Difficulty in Replacing Specialized NVESD Expertise

Active Recruiting Campaign (FY00-FY05) – generates about 11 experienced personnel hires/year

- Higher demo salaries from lab personnel demo program
- Attractiveness of VA-DC Metro area, a major plus

Can only hire US citizens eligible for clearance. Technical graduate programs often dominated (2/3) by foreign students

Impediments to reconstitution of expert workforce

- Bureaucracy associated with time required to make offers
- Inability to offer competitive salaries to senior technical experts and managers

Even with lab demo and NSPS, civil service constraints are a major impediment to hiring

Will take **10 - 19 years** (19 years without sacrificing quality) to replace our expertise, compounded by:

- Mentors lost through early retirement (many one-of-a-kind)
- Disruption of on-going graduate studies due to relocation (40 employees)
- Universities don't teach EO/IR – need 5 years of on the job training

NVESD's expertise is "Developed" not Hired – Hard to replace

Faces of NVESD Expertise

J Nettleton, MS
Lt Wt Lasers
Age: 46
23 Yrs exp
20 Patents
20 Papers
AMC Eng Yr +20
2 Barriers

B Schilling,PhD
Lt Wt Lasers
Age: 37
15 yrs exp
4 Patents
10 Papers
RDA Awds +3
0 Barriers

T Nguyen,PhD
Lasers
Age: 38
15 yrs exp
2 Patents
11 Papers
Army Inv Yr
3 Barriers

J Vizgaitis,MS
Optics
Age: 29
6 yrs exp
1 Patent
10 Papers
CERDEC Empl Yr +3
1 Barrier

J Dewitte,MS
Spectral Img
Age: 27
2 yrs exp
7 Papers
1 Barrier

W Mason,PhD
IR Materials
Age: 36
9 yrs exp
23 Papers
3 Barriers

R Samuels,BS
IR Components
Age: 41
21 yrs exp
1 Patent
18 Papers
Dist Serv Awd
3 Barriers

T Broach,PhD
CM/GPR
Age: 58
30 yrs exp
30 Papers
Cmds Awd
no Barriers

R Rupp,BS
CM/EO Sens
Age: 44
18 yrs exp
8 Papers
2 Barriers

R Wright,BS
3rd Gen FLIR
Age: 48
25 yrs exp
4 Patents
3 Papers
NV Empl Yr
1 Barrier

M Schatten,MS
Airborne CM
Age: 30
5 yrs exp
10 Papers
RDA Awd
5 Barriers

T Almeida,PhD
IR Materials
Age: 38
10 yrs exp
1Patent
35 Papers
RDA Awd
2 Barriers

J Reynolds,PhD
Hyperspectral
Age: 39
2 yrs exp
7 Papers
2 Barriers

K Dang,MS
ROICs
Age: 39
16 yrs exp
3 Patents
12 Papers
RDA Awd
3 Barriers

S Bishop,MS
Signal Proc
Age: 46
22 yrs exp
1 Patents
35 Papers
RDA Awd +2
1 Barrier

G Newsome,BS
IR FPAs
Age: 51
27 yrs exp
25 Papers
DoD DUST Awd
1 Barrier

L Ramboyong,BS
Spec Prototyping
Age: 30
8yrs exp
3 Barriers

D Bryski,MS
Hyperspectral
Age: 41
20 yrs exp
3 Papers
2 Barriers

E Efkeman,BS
EOIR Sys Int
Age: 59
37 Yrs exp
1 Patents
6 Papers
NV Empl Yr
2 Barriers

R Hott, MS
Spec Prototyping
Age: 36
12 yrs exp
1 Barriers

F Petito,BS
EOIR Sys Int
Age: 58
37 Yrs exp
5 Patents
12 Papers
2 Barriers

T Bowman,MS
FLIR Systems
Age: 46
23 Yrs exp
2 Patents
2 Papers
Civ Sup Perf Awd
1 Barriers

S Horn,PhD
EO/Cryogenics
Age: 59
38 Yrs exp
26 Patents
60 Papers
DoD DUST Awd +3
2 Barriers

P O'Shea, PhD
EOIR Mod/Sim
Age: 32
8 yrs exp
24 Papers
R&D 100 Awd
2 Barriers

F. Pantuso,PhD
Uncooled IR
Age: 64
30 Yrs exp
4 Patents
>100 Papers
2 Barriers

J Shaffer,BS
IR Sensor Dev
Age: 47
23 Yrs exp
1 Patents
5 Papers
CECOM Top 10 +2
2 Barriers

D. Randall,MS
EOIR Soldier Sys
Age: 44
21 Yrs exp
3 Patents
2 Papers
Army SBIR Awd +4
1 Barrier

R Driggers,PhD
EOIR Sys Mod/Sim
Age: 42
21 Yrs exp
3 Patents
125 Papers
Top 10 Fed Eng Awd +5
0 Barriers

B O'Kane,PhD
Research Psychol
Age: 54
16 yrs exp
1 Patents
40 Papers
Cmd Top 10 Awd
3 Barriers

B Kowalewski,BS
IR Sys Dev
Age: 44
22 yrs experience
1 Patent
6 Papers
3 Barriers

L Goldberg,PhD
Lasers
Age: 54
25 Yrs exp
30 Patents
220 Papers
OSD Fellow +2
4 Barriers

P Perconti,MS
Img/Signal Proc
Age: 43
24 Yrs exp
2 Patents
30 Papers
Army Ach Med
2 Barriers

M Self,BS
EOIR Sim
Age: 43
21 Yrs exp
5 Papers
NV Empl Yr
1 Barrier

D Weaver,MS
Countermine
Age: 58
34 Yrs exp
15 Papers
RDA Awd +2
2 Barriers

D Reago,PhD
EO Sensor Fus
Age: 42
19 Yrs exp
25 Papers
MSS Fellow +2
1 Barrier

P Laster,MS
FLIR Sys
Age: 44
21 Yrs exp
6 Papers
Ach Med Civ Ser
5 Barriers

I Martinez,MS
EO Simulation
Age: 36
12 Yrs exp
2 Papers
NV Empl of Yr
3 Barriers

B Jarvis,MS
FLIR Sys Eng
Age: 44
21 Yrs exp
1 Paper
RDEC Emp Yr
3 Barriers

E Bender,MS
Image Inten
Age: 52
30 yrs exp
5 Patents
45 papers
1 Barrier

J Brooks,BS
IR Sys Integ
Age: 46
20 Yrs exp
4 Papers
Cmds Awd
4 Barriers

T Soyka,BS
Sys Int SOCOM
Age: 42
20 Yrs exp
2 Patents
2 Papers
NV Empl Yr
5 Barriers

M Jennings,MS
EOIR Sys Integ
Age: 52
13 Yrs exp
1 Patent
8 Papers
RDEC Empl Yr +3
3 Barriers

E Jacobs,PhD
Electro-physics
Age: 45
16 Yrs exp
30 Papers
Army RDE Awd
0 Barriers

S Chinn,PhD
Lasers
Age: 62
30 Yrs exp
10 Patents
100 Papers
IEEE Senior Member
0 Barriers

G Klager,MS
Robotics
Age: 44
21 Yrs exp
7 Papers
3 Barriers

K Sherbondy,MS
Electro-
magnetics
Age: 37
16 Yrs exp
1 Patent
>60 Papers
2 Barriers

M Stocker,BS
Physical Security
Age: 45
20 Yrs exp
3 Barriers

Legend
X = ≥ 2 Barriers
? = 1 Barrier
(Barriers to Moving)

Reconstitution Difficulties

Job Opportunities in the Virginia-DC Area for EO/IR Technologists

- NRL
- ARL
- TEC
- ONR
- DARPA
- DTRA
- DHS
- FBI
- CIA
- DIA
- NGA
- PEO Soldier

- IDA
- RAND
- SAIC
- Northrop-Grumman
- General Dynamics
- EO/IR
- DCS
- Fibertek
- Aerospace Corp
- Booze Allen Hamilton

Every single one of these organizations has recruited from NVESD

Tremendous Local Employment Opportunities for the Workforce

In-House Technical Expertise is a Critical DoD Asset

Benefits of In-House Expertise:

The Warfighter: • Leads to new concepts and ideas through innovation, new products and quick reaction solutions - Enables both Transformation and immediate support in wartime – TTP's and technology are developed together, working with TRADOC

DoD: • Makes DoD a smart customer – Example: NVESD is the EO/IR system performance prediction modeler for all of DoD and industry

Industry: • Provides an honest broker – Encourages use of the best technology from multiple companies – no monopoly, equipment evaluations are fair with standardized test procedures developed by NVESD

The Taxpayer: • Fosters cost reduction – Through informed competition of ideas across industry and NVESD pressure on contractors to use low cost approaches

The Community: • DoD assets can be instantly redirected in the event of a crisis
- More flexible responses than industry e.g. NVESD support after 9/11

Other Partners: • Provides interface to Government service agencies, foreign nations – NVESD dominates TTCP SEN and NATO SET– Only a DoD organization has such access

The Department must attract, develop and retain… civilian and contractor personnel who are highly skilled and educated… - *BRAC 2005 Policy Memorandum Two, Oct 14, 2004*

Industry Testimonials

DRS

"The team at NVESD has provided the capability and guidance to the Electro-Optical Infrared (EO/IR) military and industrial community required to develop the many night vision devices and other electronic sensors so vital to our ground, sea and air forces."

"I'm very disturbed to hear that the NVESD is in the BRAC plan to be moved to Aberdeen, MD. This will, I am sure you'll agree, result in the loss of many very good and talented people. So many, I fear, that your organization will be severely damaged and become dysfunctional. This should be unacceptable to the Department of Defense, the U.S. Army, and the taxpayers of America!"
– Fred L. Marion, President of DRS Technologies

NVESD developes EO/IR models used by all US industry

ITT

"The technical personnel in NVESD are critical to the success of the Army's Night Vision programs and has been instrumental in resolving problems related to both technical and management issues in a timely manner allowing the Army to always have the capability to own the night."
- Larry Curfiss, Vice President and Director Business Development, ITT Industries Night Vision

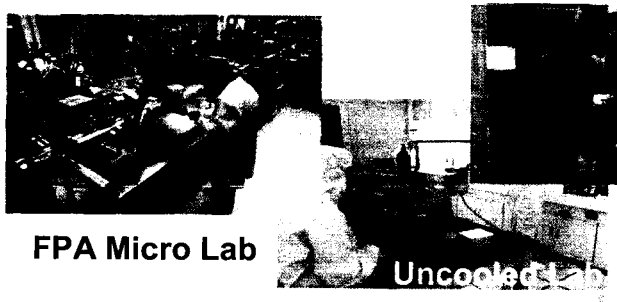
RAYTHEON

"The collaboration with NVESD helped Raytheon Vision Systems achieve significant reductions of detector leakage current in a timely manner. NVESD continues to be a critical resource for advancements both in fundamental research and manufacturing technology for infrared focal plane arrays." *– John J. Thornburg, Raytheon Vision Systems, R6s Expert / General Manager*

NVESD Expertise Essential to Industry

NVESD In House Major and Unique Laboratories – Facilities - Ranges

S&T Component Development Labs



- **One of a kind MBE and laser facilities**
- Development for transition to industry

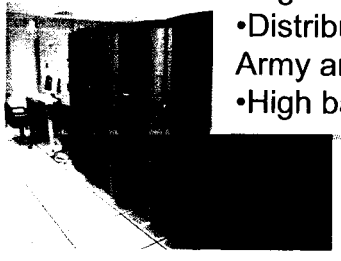
System Prototyping, Fabrication and Integration Facilities

Mine Lanes Facility

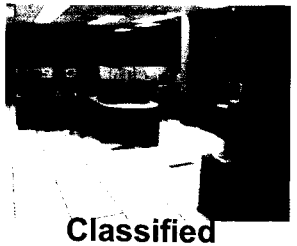
- Unique enclosed indoor mine facility with 3 axis computer-controlled positioning and moisture system
- Six representative unique soil types spanning mineralized soils to road bed materials
- **Green house portion is the only facility in the world that is enclosed that allows solar loading and moisture experimentation**

Virtual Prototyping and Simulation Facility

- High fidelity sensor simulation
- Distributed exercises including Intra-Army and Joint exercises
- High bandwidth secure networks



High – End Computers Enable Physics Based Sensor Simulations



Classified Simulation Area

Field Testing and Demonstrations

- Unique instrumented range for EO sensors with 5 km line of sight
- **Live calibrated minefields**
- **Certified 5km laser range for eye damaging lasers**
- Light-controlled firing range

Indoor Firing Range

NVESD Relocation Costs

22 BUILDINGS = 429,000 SQUARE FEET BUILDING SPACE = $85M TO RECONSTRUCT

45 MAJOR & UNIQUE RDAT&E FACILITIES/LABORATORIES/RANGES WITH A TOTAL REPLACEMENT COST OF OVER $185M (does not include freight costs for shipping equipment)

$330M to rebuild, refit, and relocate NVESD

- 13 MAJOR & UNIQUE RDAT&E FACILITIES
  - VIRTUAL PROTOTYPING & SIMULATION FACILITY
  - DETECTOR FABRICATION & INTEGRATION FACILITY
  - IMAGE INTENSIFIER TEST FACILITY
  - ADVANCED SENSOR EVALUATION FACILITY
  - AVIATION TEST FACILITY
  - HIGH BAY INTEGRATION/NIGHT VISION DEVICE REPAIR FACILITY
  - AUTOMATED SENSOR & PROCESSOR EVALUATION CENTER (AUTOSPEC) FACILITY
  - IR DETECTOR MICROFACTORY
  - CLEANROOM
  - MINE LANES FACILITY
  - LASER TEST TUNNEL
  - PENTHOUSE TESTING FACILITY
  - DISTRIBUTED SENSORS INTEGRATION FACILITY (DSIF)
- 15 MAJOR & UNIQUE RDAT&E LABORATORIES
  - SYSTEMS ENGINEERING, ANALYSIS & INTEGRATION LAB (SEAIL)
  - PROTOTYPE IR FPA & IR CHARACTERIZATION LAB
  - CYRO-COOLER LAB/AUTOMATED COOLER TEST FACILITY (ACTF)
  - ELECTRIC MOBILITY TRANSPORT CHARACTERIZATION LAB
  - COUNTERMINE CHEMICAL SENSOR LAB
  - COUNTERMINE RADAR & EMI LAB
  - UNMANNED AERIAL VEHICLE (UAV) LAB
  - NEAR/SHORT-WAVE INFRARED SENSOR PERFORMANCE CHARACTERIZATION LAB
  - DISPLAY AND IMAGE FUSION LAB
  - HUMAN TEST & PERCEPTION LAB
  - OPTICS LAB
  - LASER LAB
  - COUNTERMINE SYSTEMS LAB
  - COUNTERMINE ACOUSTIC LAB
  - DETECTOR EVALUATION LAB

BRAC Committee only considered costs of single laboratory buildings exceeding $3M (that is why BRAC costs are lower)

- 4 MAJOR & UNIQUE RDAT&E RANGES
  - INDOOR FIRING/PHOTOMETRIC RANGE
  - DROP ZONE OBSERVATION RANGE
  - 5km LINE OF SIGHT – SECURE LASER RANGE (FOR EYE DAMAGING LASERS – BIGGEST ON ENTIRE EAST COAST)
  - RANGE 71 (COUNTERMINE/JUXOCO)

WORKFORCE RELOCATION COSTS $60M

Facilities we will probably never be able to replicate at APG

- In vacuum, IR detector microfactory – delicate MBE
- Live (but inoperable) minefields with controlled dielectric soils
- Mine lanes facility with controlled climate and no metal in construction below ground level (foundation, retaining walls, etc…)
- Fully instrumented, secure 5km laser range for eye damaging lasers (fenced off)
- Instrumented EO test range with large search area and long lines of sight – NVESD needs uninterrupted access
- Airspace to overfly 80+ square miles of land and roads plus UAV testing – not available at APG

Vibration from gun firings at APG may impact laser labs

Nighttime Light Levels: **AP Hill, VA** **1x10-4 ftL**
Aberdeen, MD **5x10-4 ftL**

Time to AP Hill
Ft. Belvoir - 2 hr
APG - 4 hr

No local travel to AP Hill from APG

APG, MD nighttime light level is 5X brighter than Fort AP Hill – Can not measure night vision goggle or camera performance under true starlight conditions, due to light pollution from populated areas

Conclusion

"The purpose of transformation is to extend key advantages and reduce vulnerabilities."

– BRAC Volume I, page 6

Care should be taken to preserve the NVESD culture:

Avoid disrupting support to the Warfighter

innovation, work ethic, and service…

---

or we will squander our advantage and create vulnerabilities

Issue is loss of human capital at no savings to the taxpayer and at no long term advantage

- Center of mass for sensors is in Northern VA – no reason to move -

NVESD Facility Description

Night Vision & Electronic Sensors Directorate
info@nvl.army.mil

As of 7 July 05

NVESD Facilities/Laboratories & Test Ranges		
	Facilities /Laboratories	Page
1	Advanced Sensor Evaluation Facility (ASEF)	2
2	Automated Sensor and Processor Evaluation Center (Autospec) Facility	4
3	Aviation R&D Sensors Test & Evaluation Facility	6
4	Building 305 High Bay Integration Facility/Night Vision Device Repair Facility	9
5	Building 331 Fabrication and Integration Facilities	13
6	Building 380 Sensitive Compartmented Information Facility (SCIF)	19
7	Countermine Acoustics Laboratory	21
8	Countermine Chemical Sensor Laboratory	23
9	Countermine Prototype Systems Laboratory	24
10	Countermine Radar and EMI Laboratory	25
11	Countermine Systems Laboratory	26
12	Detector Fabrication Cleanroom Facility	29
13	Display and Image Fusion Laboratory	31
14	Distributed Sensors Integration Facility (DSIF)	34
15	Electronics and Glass Laboratories.	35
16	Human Test and Perception Laboratory	37
17	Humanitarian Demining Laboratory	38
18	Image Evaluation Facility	40
19	Image Intensifier Test Facility	41
20	Imaging Technology Environmental Test Facility	43
21	Industrial Hygiene & Material Hazardous Waste Storage and Processing Labs	45
22	IR Detector Semiconductor Microfactory	46
23	Laser Laboratories	48
24	Laser Test Tunnel	51
25	Mine Lanes Facility	52
26	Molecular Beam Epitaxy (MBE) Development Laboratory	54
27	Near/Short-Wave Infrared Sensor Performance Characterization Lab	55
28	Networking Facility	57
29	Optical Improvement Laboratory	59
30	Optics Laboratory	62
31	Processor Development Laboratory	64
32	Prototype IR FPA & IR Characterization Lab	65
33	Readout Integrated Circuit (ROIC) Laboratory	67
34	S&T Rooftop Testing Facility	69
35	SAP Facility	70
36	Smart Gate	71
37	Systems Engineering, Analysis & Integration Lab (SEAIL)	73
38	Unmanned Aerial Vehicle (UAV) Laboratory	86
39	Virtual Prototyping and Simulation Facility	87
40	Woodworking Shop	90
41	X-Ray Diffraction Analytical Laboratory	92
	Test Ranges	Page
42	Airborne Minefield Detection Test Range	94
43	Drop Zone Observation Range	95
44	Indoor Firing/Photometric Range	99
45	Laser Range	100
46	Range 71A (Countermine/JUXOCO)	102

7/6/2005 1930

1. Advanced Sensor Evaluation Facility (ASEF)

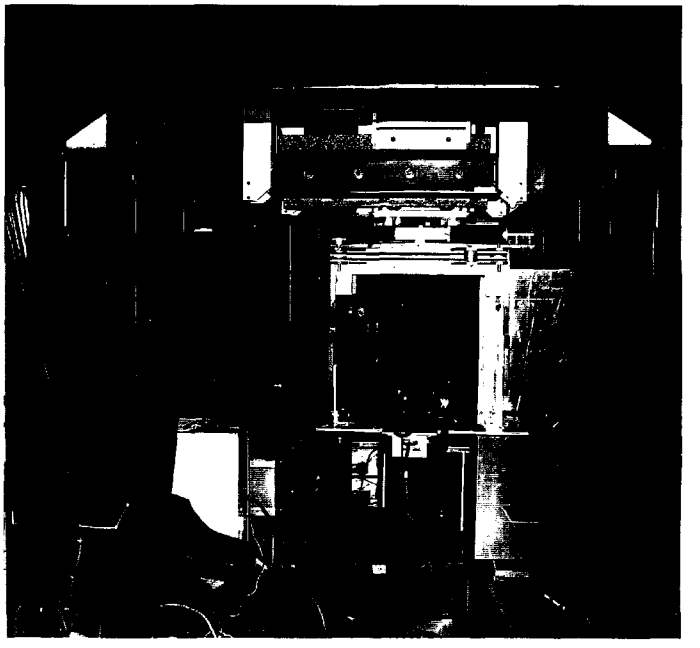
Description: The NVESD Advanced Sensor Evaluation Facility (ASEF) - With new model development comes the requirement of characterizing the sensors in such a way as to directly measure the relevant parameter used in the model. Perception testing to determine the effect of sensor artifacts on human perception and hence field performance and design quality is performed in a series of specifically designed experiments. The facility is located in the NVESD, Fort Belvoir, VA, Building 309 and occupies 2,612 square feet of space.

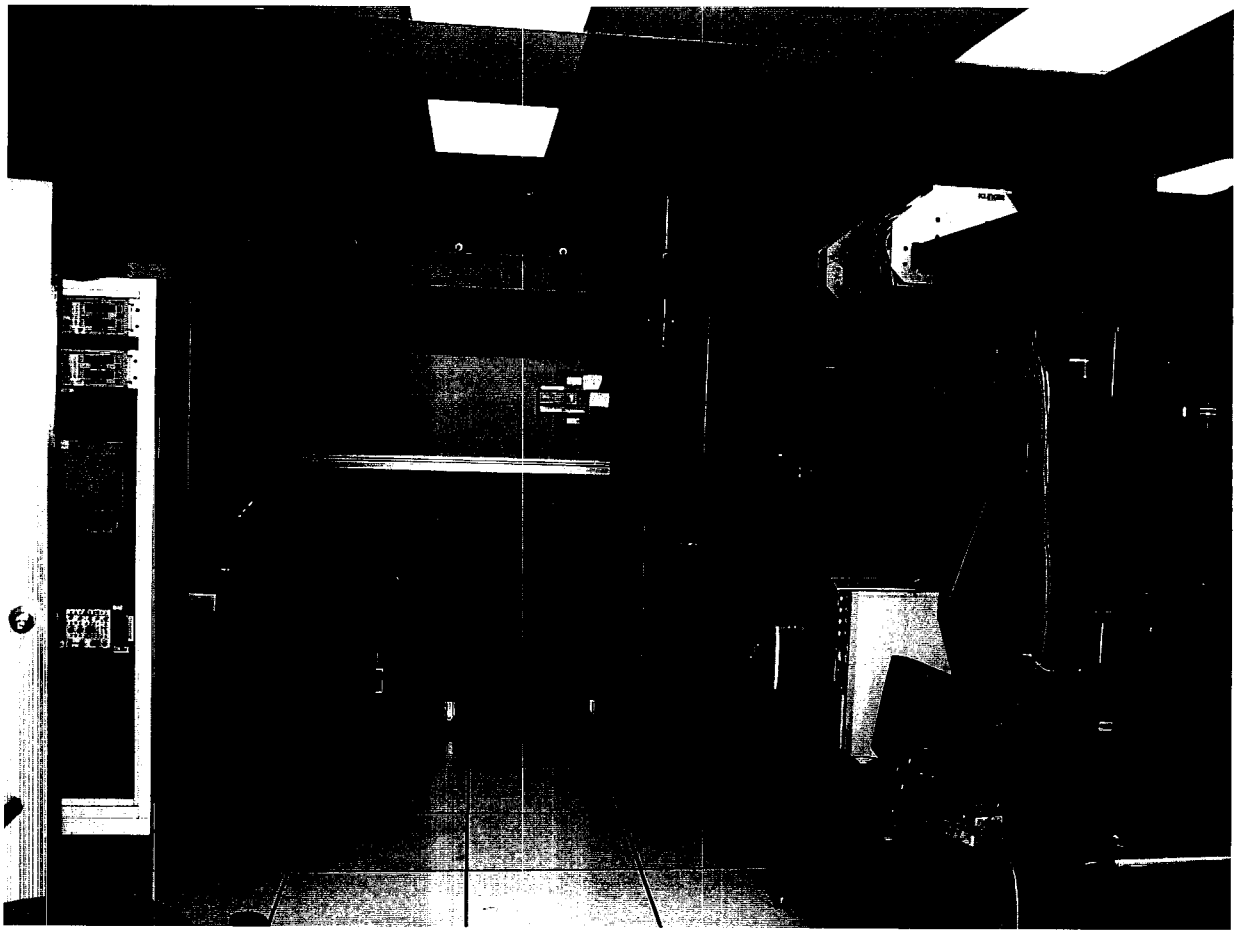
Footprint: 2,612 Square-Feet

Personnel: 4 Government

Equipment: Multiple 8' x 16' sealed hole optical benches table top with tuned damping for vibration isolation, a 1-ton capacity overhead crane, multiple small through large refractive collimators and 2 very large reflective collimator setups for multiple collimator configurations, a large mutliaxis translation/rotation stage capable of sensors in excess of 100 lb, visible through LWIR incoherent sources, emissive and reflective targets, target wheels including a large mass custom target wheel, flatplate and cavity blackbodies, digital and analog electronic signal conditioning and measurement instrumentation, and several high performance PC and electronic interfaces for real-time video and data acquisition, electronic and mechanical peripheral control, and data analysis

Special Needs: Independent environmental control; restricted and classified (SECRET level) access, including a private secret computer network and a separate unclassfied network for unclassified work; stable, high-mass, low vibration ground floor mounting for the optical bench table top with tuned damping; overhead crane for large systems and custom large-mass target wheel; sufficient storage for components/equipment/instruments not in active use; and sufficient numbers and capacity to meet electrical power requirements, including high-voltage 3-phase





2. Automated Sensor and Processor Evaluation Center (AutoSPEC) Facility

Description: The NVESD AutoSPEC Facility (AF) is a 3000 square foot, classified for SECRET open storage, facility to support the data collections and algorithm evaluations of aided target recognition systems. This facility has multiple terabyte RAID storage systems and multiple multiprocessor and high performance workstations and servers in a climate controlled area. The RAIDS and servers hold the terabytes of sensor data, ground truth, image metric databases, and algorithm analysis databases. Another area within the facility is a sensor integration lab utilized to interface advanced sensor systems to real-time data acquisition equipment. This supports the various data collections required by the various applications supported by the branch through having equipment and tools necessary to develop circuit boards and interface cables allowing NVESD to connect computer systems to various kinds of prototype sensors. The last area contains workstations for researchers to perform experiments, analysis, and evaluations of signal and image processing algorithms. The areas in this facility are tied together via a high-speed network in order to support working with terabytes of sensor data. Signal and image processing routines are developed and evaluated using clusters of workstations and servers. Evaluation software tools developed and maintained specifically for the algorithm evaluations are resident on these stations. The AF supports all aspects of signal and image processing activities from data collections through algorithm development to algorithm evaluations and maturation. The AF is located at NVESD, Fort Belvoir, VA, in Building 307 on the second floor.

Footprint: 2,651 Square-Feet

Personnel: 19 Government

Equipment:

25 Terabyte RAID 5 storage Gig-E networked to servers and compute nodes accredited for classified Secret data
4 Data/network processing servers cleared/accredited for classified Secret processing.
1 Oracle database server cleared/accredited for classified Secret processing.
25 Video extension systems to extend display/keyboard functionality for classified processing workstations from Autospec facility to personnel offices.
25 UNIX/Sun workstations, 5 - PCs cleared/accredited for classified Secret processing.
6 Sensor acquisition PCs for field data collections cleared/accredited for classified Secret processing.
2 LT02, LT01, 8mm tape drives cleared/accredited for classified processing up to Secret.
1 Color printer cleared/accredited for classified processing up to Secret.
2 4 Terabyte RAID 5 storage units for field data collections cleared/accredited for classified Secret processing.
1 B/W printer for field data collections cleared/accredited for classified processing up to Secret..
9 6' cabinets for data tape archiving/storage for classified Secret data.
44 linear feet of electrostatic electronic workbenches with 120V, 20A outlets.
30 linear feet of 7' open wire shelving units for data collection equipment.
58 linear feet of computer room workspace.

Special Needs:

- Entire facility security system/accreditation for classified processing/open storage up to Secret.
- Facility divided into 3 sections:
    1.) RAID/Server section with 12" raised no carpet floor
    2.) terminal section both with 12" raised carpeted floor
    3.) electronics section with no raised floor and no carpet

-Double doors w/ ramp from hall to raised floor in computer section
- 2 15-ton AC units with temperature and humidity control designed for computer room cooling through raised floor vents
- 350KW backup power unit for entire facility
- Parking area for 45' data collection trailer
- Outside building power outlet to plug trailer into to run off building power
- 20'x 10'storage area for shipping containers, data collection parts and cabling, etc.

3. Aviation R&D Sensors Test & Evaluation Facility

Description: The NVESD Aviation R&D Sensors Test & Evaluation Facility at the Davison Army Airfield, Fort Belvoir, VA. Army Aviation is a major application area for NVESD's technologies. NVESD is developing both pilotage and target acquisition systems for current and future Army aircraft. To accomplish this mission, NVESD maintains a unique in-house capability in the Building 3128 Hangar to integrate system technology into various Army aircraft and to test those systems in an airborne environment. Test flight operations are conducted at the Davison Army Airfield, Ft. Belvoir, VA, and Ft. A.P. Hill, VA. These facilities contain the infrastructure specializing in aviation support for integration, development, test, data collections and demonstrations of airborne assets. NVESD maintains a number of different aircraft including the DHC-6 Twin Otter, YEH-60B Blackhawk helicopter, and UH-1 Huey helicopter. Each aircraft is reconfigurable for systems integration and flight-testing of airborne system technologies.

Footprint: See Special Needs (29,700 Square-Feet Building Space Total)

Personnel: 8 Government/11 Contractor (same personnel as NVESD Unmanned Aerial Vehicle (UAV) Laboratory)

Equipment: See Special Needs

Special Needs:

- Aircraft Hangar:

The aircraft hanger has combination of open space to store aircraft and shop and storage space to support maintenance and light manufacturing. NVESD currently has 6 aircraft: 2 Twin Otters, 2 H-60 Blackhawks, and 2 H-1 Hueys. 15,500 sq. ft. of open hanger space is needed to house these aircraft. The current hanger includes another 7,500 sq. ft. of associated work space used for maintenance and manufacturing. A list of special purpose areas within the associated work space is listed below.

Sheet Metal and Manufacturing Shop
Avionics and Electronics Shop
Tool Room
Parts Room
Technical Library and Aircraft Records Room

The utilities required for the hanger include 3-phase 60 Hz at 30 Amps electrical power and multiple 220 VAC connections in the metal shops used to power large shop equipment. Also required is compressed air with multiple connections throughout hanger and work centers equired for pneumatic tools. In addition, water, heating and cooling for the associated work space, and forced heat for the open hanger area

The equipment within the hanger includes the following:

2	1-ton Shaw boxes
1	40 KVA 3-phase 208 Volt to 28 Volt DC/115 Volt power inverter
1	30 KVA 3-phase 208 Volt to 28 Volt DC/115 Volt power inverter
2	10 KVA 3-phase 208 Volt to 28 Volt DC/115 Volt power inverter
1	Diesel powered 28 Volt/10 KW DC Generator
1	Forklift

2 Warehouse Tractors/Tugs for moving Aircraft
1 Commercial Utility Cargo Vehicle (CUCV)
1 150 Gallon Compressor

The Sheet Metal and Manufacturing Shop include the following:

1 Vertical Milling Machine
1 4-Foot Sheet Metal Brake
1 2-Foot Sheet Metal Brake
1 4-Foot Hydraulic Metal Shear
1 3-Foot Metal Shear
1 Hand Shear
1 Hydraulic Press
1 Manual Press
1 Chassis Punch
1 Sheet Metal Corner Notcher Assembly
1 Band Saw
1 Drill Press
1 Grinder
1 Belt Sander
Numerous Vises and Benches

The Avionics and Electronics shop, the Avionics and Electronics shop, the tool room, the parts room, and the Technical Library and Aircraft Records room all have numerous cabinets, shelves, and benches.

- Ramp Space

The ramp space is an 88,000 sq. ft. paved area surrounding the hanger on three sides. It is used to maneuver aircraft in and out of hanger, lift off and landing of rotary wing aircraft and a staging area for fixed wing aircraft before and after takeoff. The ramp space is reinforced to accommodate aircraft up to 100,000 lbs. and is equipped with tie downs around the periphery for overnight parking.

- Aircraft Integration Shop

The Aircraft Integration Shop is a 1300 sq. ft. climate controlled building used to prepare sensor and instrumentation for flight test. It has numerous benches and storage cabinets. It also has an array of electronic test equipment, electronic parts, and electronic/wiring fabrication equipment.

- Integration Equipment and Large Part Building

The Integration Equipment and Large Part Building is an 1150 sq. ft. climate controlled building used to store high value electronic test articles as well as larger aircraft spare parts.

- Ground Support Building

The Ground Support Building is a 1600 sq. ft. non-climate controlled building used to store general equipment.

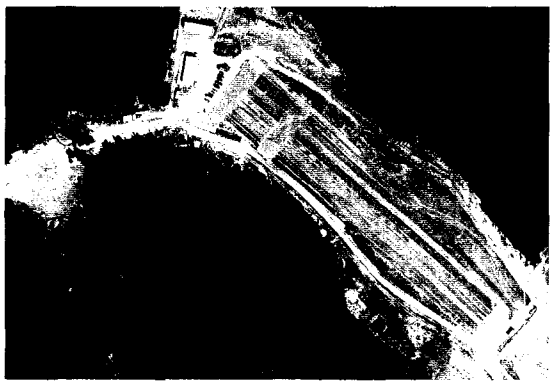
- Flight Operations Building

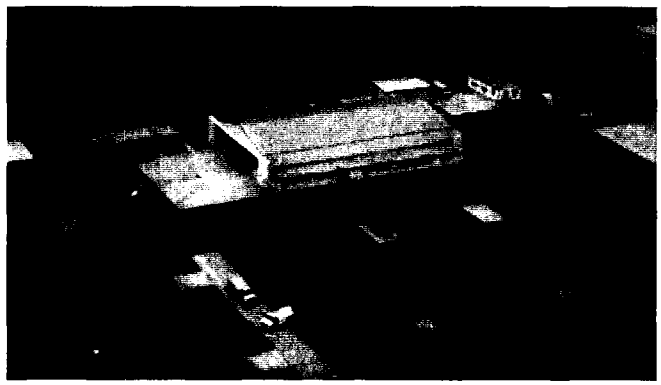
The Flight Operations Building is a 2650 sq. ft. climate controlled building used for office space and conference rooms.

- Airspace and Terrain Considerations

The NVESD Aviation R&D Sensors Test & Evaluation Facility requires access to restricted airspace over dry land on short notice with adequate maneuver space to perform sensor testing. One of the more important features of the required test area is that the land below is level and have dry soil for target placement. The required terrain needs to be a combination of wooded and cleared areas (again, the underlying ground must be dry and relatively level). Another important feature is having adequate and unencumbered maneuver airspace. Flight tracks of up to 16 km with 10 km of target area are used for data collections. In general, the flight test area is 4 km in width for safe flight operations. Access to the test area needs to be flexible because the unpredictable nature of developmental testing.

Currently, the NVESD Aviation R&D Sensors Test & Evaluation Facility performs local sensor flight testing at Fort Belvoir and Fort A.P. Hill (located 40 miles from Fort Belvoir). Fort Belvoir has the advantage of proximity, but is located within the Davison Airport Class D traffic area. A 5-mile radius around active airports is designated as Class D airspace for takeoff and landing maneuvers and is tightly controlled. Fort A.P. Hill affords NVESD a larger test area with fewer restrictions. It is within 30 minutes flying time from Davison Army Airfield, which makes it possible to perform a 1-hour flight test without refueling. Fort A.P. Hill has the required terrain features for sensor testing and has adequate maneuver space. Fort A.P. Hill has dry, flat land with open and wooded areas required for target placement. Because there is no active airfield at Fort A.P. Hill, there are no concerns with Class D airspace.





4. Building 305 High Bay Integration Facility/Night Vision Device Repair Facility

Description: The NVESD, Fort Belvoir, VA, Building 305 High Bay is an 8,200 square-foot integration facility specializing in small quantity, custom, surveillance systems and is fully equipped to construct and install prototype and surrogate items for R&D test beds. Additionally, there is an integral Night Vision Device repair facility that is capable of handling and storing sensitive and classified items.

Footprint: 8,200 Square-Feet

Personnel: 6 Government/2 Contractor

Equipment:

a. High Bay Integration Facility

DESCRIPTION	QUANTITY	CUBIC FOOT/EA	WEIGHT/LBS/EA
Doall Band Saw	1	157	2000
Powermatac Drill Press	1	37	500
Tree Milling Machine	1	187	4000
Tree Milling Machine	1	162	4000
Tree Milling Machine	1	187	4000
Oven	1	10	400
Clausing Lathe	1	81	4000
Monarch Lathe	1	82	4000
Monarch Lathe	1	82	4000
Turret Punch	1	15	400
Dake Arbor Press	1	17	300
Corner Notcher	1	12	150
Shear with Stand	1	33	200
Brake with Stand	1	28	200
Roller with Stand	1	17	200
Lathe Cabinet	3	14	300
Tool Grinder	1	93	1000
2" Belt Sander with Stand	1	19	150
6" Belt Sander	1	26	200
Wet Saw	1	80	500
Buffer on Stand	1	12	400
Glass Beader	1	61	250
Tool Grinder with Stand	1	15	150
M16 Welder with Stand	1	28	200
T16 Welder with Rod	1	27	600
Arc Welder	1	20	500
Grinder with Stand	1	14	100
Drill Sharpener with Stand	1	9	150
Air Compressor on Wheels	1	14	200
Welding Supply Cabinet	1	16	500
Oxygen/Acetylene with Bottles	1	13	300
Work Bench	4	38	150
Stencil Cutter	1	3	100
Flammable Cabinet	1	9	200

Craftsman Tool Box	1	17	1000
Kalamazoo Saw	1	42	600
Drill Cabinet	1	28	500
Milling Machine Accessory Cabinet	1	22	600
Work Bench	1	73	1000
Welding Table	1	16	100
Shadow Graph with Cabinet	1	37	300
Surface Plate and Cabinet	1	22	600
Surface Plate	1	2	300
Beam Scale	1	4	50
Tool Box	1	17	400
Brown & Sharpe Validator, Printer & Table	1	99	1000
Truing Stand	1	3	250
Rockwell Tester	1	4	100
Parts Cabinet	6	35	1000
Parts Cabinet	4	38	1000
Parts Cabinet	2	12	400
Parts Cabinet	1	6	200
Work Table	1	59	300
Work Bench #1	2	43	100
Work Bench #2	3	36	100
Work Bench #3	1	74	100
Work Bench #4	1	26	100
Lift Table	4	16	250
Tool Box	1	20	300

b. High Bay Electronics Lab

DESCRIPTION	QUANTITY	CUBIC FOOT/EA	WEIGHT/LBS/EA
Cabinet #1	1	38	500
Cabinet #2	1	33	500
Tool Box #1	1	17	500
Cabinet #3	1	53	400
Work Bench #1	1	65	600
Work Bench #2	1	62	600
Work Bench #3	1	86	600
Oscilloscope	1	12	100
Work Bench #4	1	35	500
Tool Box #2	1	12	100
Cart	1	19	75
Cabinet	1	30	400
Table	1	27	200
Arctic Gear Cabinet	1	157	600

c. Night Vision Device Repair Facility: 10 Cabinets, 5 work benches, and miscellaneous support equipment (estimated at 725 cubic foot/5500 pounds)

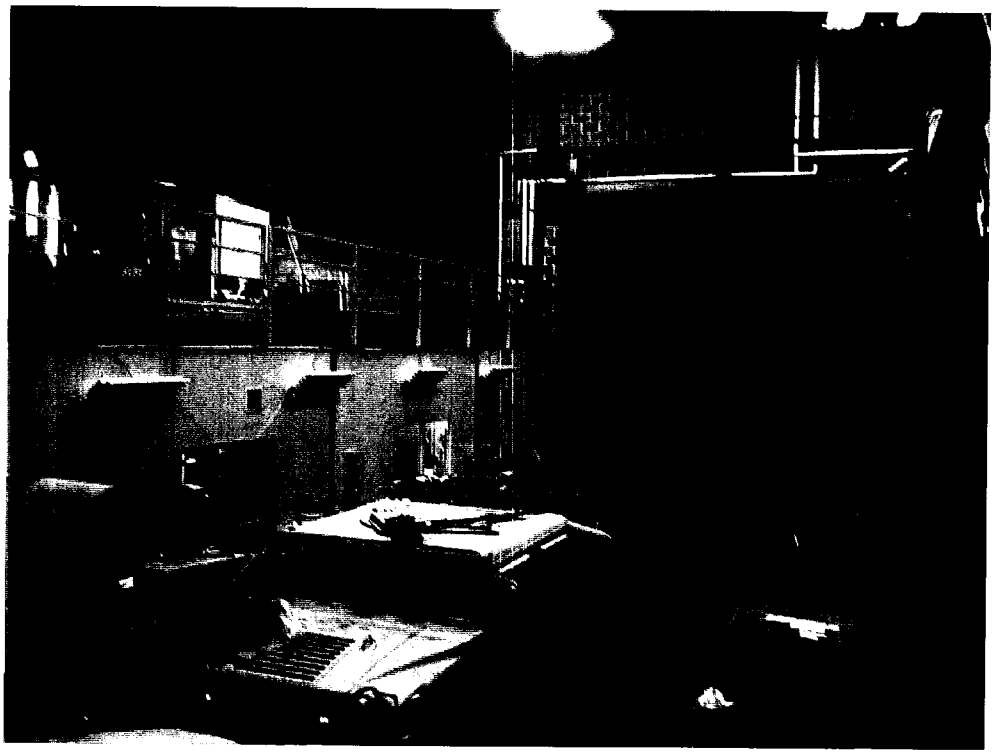
Special Needs:

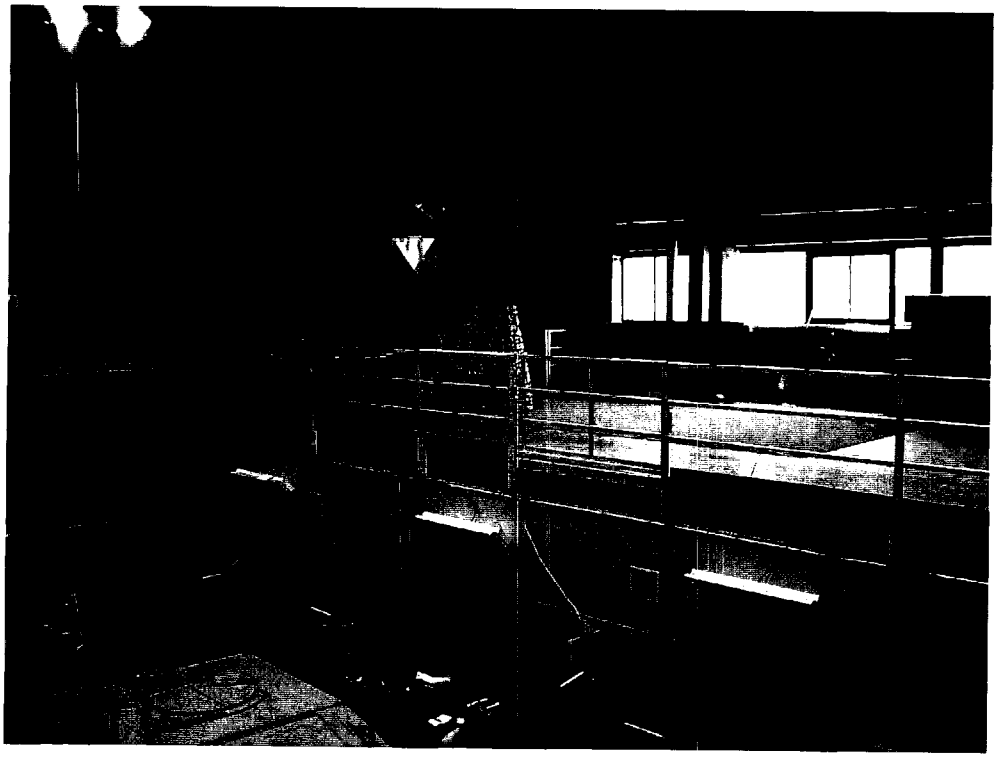
- 10-ton hoist

- Vehicle Exhaust System

- Vehicles that support these facilities include:

HMMWV	7
GSA Pick Up truck	2
Vehicle Transport Trailers	2
GSA Box Truck	1





5. Building 331 Fabrication and Integrations Facilities

Description: The NVESD, Fort Belvoir, VA, Building 331 Fabrication and Integrations Facilities are a 56,750 square-foot fabrication facility that is Pro/ENGINEER based and includes upgraded Computer Numerically Controlled (CNC) machines and new technologies including Abrasive Water Jet and Selective Laser Sintering. The Abrasive Water Jet utilizes a Garnet induced, .028 inch 40 KSI water stream to effectively cut most materials. The newest technology, Selective Laser Sintering (SLS) utilizes a 100-watt CO2 laser to fuse materials into the 3D shapes modeled in Pro/Engineer. The SLS materials are currently limited to Nylon, Glass Filled Nylon and Bronze Infiltrated 420 Stainless Steel. The Pro/ENGNEER 3D modeling CAD/CAM system is used extensively to model new concepts with enhanced visualization at component and assembly level and to directly program the CNC, Water Jet and SLS machines. Pro/ENGINEER also adds to the interactive cooperation in project development within Night Vision, other Government and Corporate activities. In addition, the NVESD Building 331 Fabrication and Integrations Facilities have a large (vehicle) and small paint booth capable of painting CARG paint, a 10' x 10' sand blast booth, a 4' x 8' power coat paint oven, and heat treating ovens.

Footprint: 56,750 Square-Feet

Personnel: 9 Government/4 Contractor

Equipment:

a. Machine Tools:

Description	Quantity	Cubic Foot/Each	Weight/lbs/Each
Hydrapower 400 Ton Brake	1	1200	57000
Cincinnati Shear	1	1040	20000
Hill Acme Ironworker	1	240	2500
Cincinnati 24" Drill Press	1	72	900
Heath Shape Cutter	2	48	500
Heath Shape Cutter	1	384	750
Tree Mill	1	294	3500
Tree Mill	1	294	3500
Cincinnati Mill	1	441	3500
Doall Band Saw	1	273	2000
Hess Lathe	1	546	17000
Fosdicke Radial Drill	1	729	5000
P&W CNC Mill	1	880	10000
Cincinnati Shaper	1	300	5000
Cleerman Drill	1	800	6500
Bridgeport Mill	1	175	1800
Cincinnati Tool Grinder	1	75	1200
Surface Grinder	1	288	3500
Blanchard Grinder	1	168	10000
Blanchard Grinder Filter	1	80	500
Landis Grinder	1	175	4500
P&W Shaper	1	336	4700
De Vlieg Boring Mill	1	512	15000
Electro Arc	1	105	1000
Tapping Machine	1	45	1000

Oven	1	54	250
Drill Sharpener	1	60	2000
Grinder	1	24	200
Belt Sander	1	59	300
Lapping Machine	1	36	800
Grinder	1	14	400
Grinder	1	24	400
Press	1	45	300
55100 Waterjet	1	1920	10000
55100 Waterjet	1	2450	13000
G&L Boring Machine	1	12250	80000
American Lathe	1	750	15000
Monarch Lathe	1	750	15000
Monarch EE Lathe	4	275	6000
Hardinge Lathe	1	120	3000
Monarch EE Lathe	3	96	3250
Milwaukee Mill	1	210	3000
Glass Beader	1	36	400
Grinder	1	15	500
Sand Blaster	1	350	2000
Surface Grinder	1	357	5000
G&L Boring Machine	1	1400	50000
Doall Band Saw	1	364	2000
Tree Lathe	1	165	3500
De Vlieg Jigmill	1	900	24250
Hardinge Lathe	1	99	2500
Oven	1	58	700
Cabinets (Electrical)	4	180	300
Peerless Saw	1	75	3000
80 Ton Press	1	125	4500
Press	1	82.5	1300
Aluminum Cut-off Saw	1	30	800
Steel Cut-off Saw	1	75	1500
Doall Saw	1	95	2500
Doall Angle Saw	1	124	3000
Monarch Lathe	4	81	3250
Moore Grinder	1	170	4500
Tree Mill	2	210	3500
CNC Tree Mill	2	294	3000
K&T Mill	1	252	4500
Doall Saw	1	78	2500
Surface Table	1	185	3000
Surface Table	1	96	4000
Comparitor	1	78	400
Hass Mill	1	972	14600
Wells Saw	1	390	2500
Porta-Cable Sander	1	98	1500
Air Dryer	1	12	200
Compressor (Shop Air)	2	64	900
Compressor (Sand Blaster)	1	99	2500
Cabinet	2	144	40

Cabinet	1	300	60
Cabinet	1	66	30
Cabinet	2	39	40
Cabinet	1	54	40
Cabinet	2	144	40
Cabinet	1	38	30
Cabinet	3	70	20
Cabinet	1	70	20
Cabinet	1	46	30
Cabinet	1	168	40
Wall Locker	10	27	16
Wall Locker	1	15	10
Wall Locker	1	108	20
Wall Locker	1	24	30
Wall Locker	1	48	20
Wall Locker	1	31	20
Wall Locker	1	48	20
Cart	30	36	50
Table	6	96	25
Metal Rack	6	840	3000
Metal Rack	1	1960	2000
Metal Rack	1	3528	2000
Metal Rack	1	960	500
Metal Rack	1	4536	4000
Metal Rack	3	336	1500

b. Machine Tools Requiring Special Concrete Foundations:

Description	Quantity	Cubic Foot/Each
G&H Boring Machine	1	110
Big Sheare	1	40
Press Brake	1	60
Nitrogen Tank	1	25

These Machine Tools Need 12" Thick Foundations

c. SLS Room:

Description	Quantity	Cubic Foot/Each	Weight/lbs/Each
Sinter Machine	1	214	2000
Sinter Machine (Side Cabinet)	1	17	200
Sinter Machine (Side Cabinet)	1	28	200
Baking Oven	1	168	2000
Glass Beader	1	12	200
Break Out Table	1	37	400
Vacum	1	24	200
Cement Mixer	1	54	1250

d. Tool Crib:

Description	Quantity	Cubic Foot/Each	Weight/lbs/Each
Cabinet	40	25	200
Cabinet	5	52	200
Cabinet	5	52	600
Cabinet	6	22	200

e. Welding Machines:

Description	Quantity	Cubic Foot/Each	Weight/lbs/Each
Miller 351	1	20	300
Miller 350 LX on Cart	1	35	300
Miller 351 on Cart	1	50	300
Airco CV 450 on Cart	1	40	300
Hobart Welder DC on Wheels	1	40	500
Airco CV 250 on Cart	1	63	400
Miller Deltaweld 302 on Cart	1	45	150
Miller Spectrum 2050 on Cart	1	12	150
Miller XMT 304 CC/CV on Cart	3	58	500
Miller 250 DX on Cart	1	36	200
Hobart 400 Amps on Wheels	1	40	500
Rod Oven	2	11	75
Portable Cutting Cart	3	33	25
Burr King Sander	1	12	150
Miller MP-65E (XR-W Wire Feeder)	1	66	325
Lincoln 250 Amps DC on Wheels	1	21	200
Hobart 300 Amps DC on Wheels	1	40	500

f. Sheet Metal:

Description	Quantity	Cubic Foot/Each	Weight/lbs/Each
Spot Welder	1	90	1000
Sander Belt	1	24	50
Sander	1	16	200
Sander Belt	1	72	200
Sander Belt	1	20	200
Break Power	1	78	800
Break Power	1	168	1200
Shear Small	1	368	1500
Shear Large	1	546	3000
Hand Break	1	63	1000
Table	1	82	200
Saw	1	16	300
Band Saw	1	169	900
Table	1	92	200
Press Break	1	630	20000
Drill Press	1	54	300
Band Saw	1	185	900

Hand Break	1	36	200
Dip Tank	7	25	100
Notcher	1	33	500
Strippit Punch	1	470	10000
Punch Break	1	56	600
Hand Break	1	139	1500
Strippit Punch	1	334	8000
Roller Small	1	21	200
Roller Medium	1	59	400
Roller Power	1	120	1000
Roller Power Large	1	160	1500

g. Heat Treat and Painting:

Description	Quantity	Cubic Foot/Each	Weight/lbs/Each
Oven	1	695	14700
Oven	1	695	14700
Control	1	75	700
Control	1	38	700
Furnace	1	33	1200
Furnace	1	18	500
Furnace	1	45	1200
Quinching Tank	1	200	1500
Quinching Tank	1	200	1500
Control	1	22	500
Control	1	23	500
Control	1	37	500
Paint Booth	1	11264	15000
Paint Booth	1	1365	3500
Oven Powder Coat	1	576	1000
Sand Blasting Booth	1	1188	3000
Sand Blasting Booth Filter	1	6	200
Sand Blasting Tank	1	72	500
Sand Blasting Hopper	1	90	500

h. General Shop Equipment:

Description	Quantity	Cubic Foot/Each	Weight/lbs/Each
Workbench with Drawers	30	75	200
Layout Table	5	150	1000
Welding Table	5	300	2000
Miscellaneous Metal Stock			100000
Miscellaneous Hardware, Welding Supplies, Spare Parts, Brake Dies, Machine Shop Tooling, Hand Power Tools			50000
Overhead Crane 15 Ton Capacity	1		
Overhead Crane 2 Ton Capacity	5		

Overhead Crane 1 Ton Capacity	2		
Oil Rack	2	400	300
Tool Box Craftsman	7	30	100
Tool Box Kennedy	17	30	80
Trash Can	19	18	100
Fork Truck Electric 4000 Capacity	1	256	12620
Fork Truck Diesel 4000 Capacity	1	300	4500

Special Needs:

- Large parking area both paved and unpaved around this facility, approximately 3 acres.

- Extensive special requirements for this facility, including:

1 - 15-ton High Bay P & H
1 - New hoist frame, 1 ton C&M
1 - Air hoist 1-Ton
1 - Yale/Chisholm Moore 2 ton
3 - Wright 2-ton
1 - 1-ton electric chain hoist with push trolley
1 - Crane - 2 ton - high speed (Stahl)
1 - Hoist frame, 1 ton

6. Building 380 Sensitive Compartmented Information Facility (SCIF)

Description: Building 380 Sensitive Compartmented Information Facility (SCIF) is a DIA approved and accredited facility built in accordance with DCIDS 6/3 providing NVESD with the ability to conduct research/data processing of classified and codeword material in support of sensor development for the tactical and national Intelligence community. The Community supported by this facility includes all Department of Defense and Government agencies involved with NVESD sensor development and research. The facility additionally supports tenant organizations and two Program Management offices within the compound to include support to the Rapid Equipment Force Office, Improvised Explosive Detection Office, Joint Precision Strike Office, Counter Mine and backup capability to the Joint Personnel Recovery Agency and HQ AMC. The facility provides the ability to process classified and codeword material, communicate via two separate secure systems (SPRINET and JWICS), and conduct briefings, conferences and training at the SCI level. The facility provides controlled document storage/ accountability and processing. The facility is manned 10 hours a day five days a week but it can be used 24 hours a day seven days a week.

Footprint: 1,200 Square-Feet

Personnel: 3 Government/2 Contractor

Equipment:

NOTE: JWICS and SIPRNET require separate LANs

SCI ACCREDITED
1 – Server required because of location by GISA/Army JWICS office
3 – JWICS Workstations with computers and monitors
1 – SUN JWICS Workstation with monitor
1 – Color Printer
1 – B/W Printer
1 – Communications/Crypto Interface system
7 – JWICS LAN Drops
1 – T1 Communications Circuit
1- Dial Up back up circuit

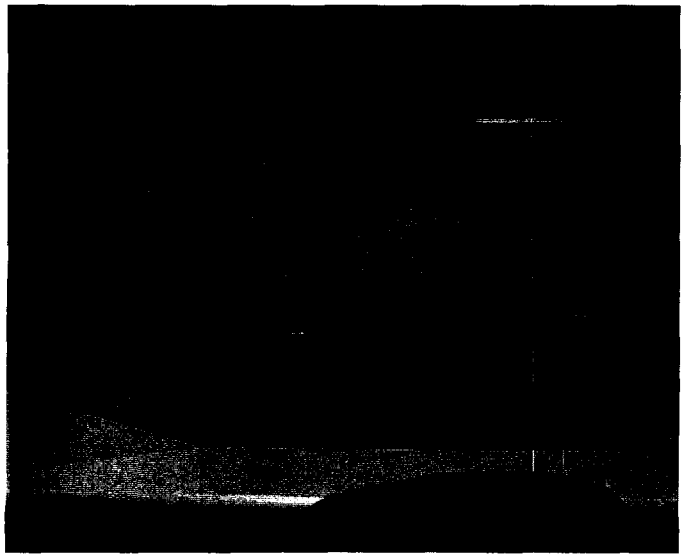
Collateral Accredited – SIPRNET
1 – Server with Communications/Crypto Interface system
3 – SIPRNET Workstations with computers and monitors
1 – Color Printer
1 – B/W Printer
6 – LAN Drops
1 – T1 Communications Circuit
1 – Backup communications circuit or path

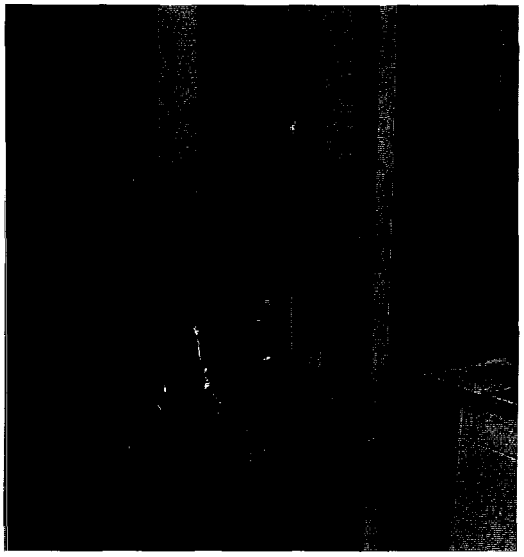
Support/Office Equipment
1 – STU-III Secret/TS collateral capability
1 – STU-III TS/SCI capability
1 – Computer projector
1 – Screen
1 – Overhead Projector
1 – Computer PC for briefing accredited at the Secret level

1 – TV monitor with VHS and DVD unit
1 – Stand alone data processing computer with external drive arrays
1 – 2 drawer COMSEC Safe
2 – 5 drawer Safes
2 – Shredders accredited for SCI destruction
1 – Shredder for crypto
2 – Workstations for processing material and storage of office supplies
Conference Tables and chairs to support up to 25 to 30 people

Special Needs:

- Facility built in accordance with DCIDS 6/3 as part of a controlled access building or as a separate building.
- DIA Inspected/Accredited during and after construction.
- Power: 240 volts AC, 3 phase, 4 wire (conditioned) (separate distribution panel if part of another building)
- External UPS to support facility in the event of commercial power loss
- Separate HVAC system
- Alarm System – Intrusion Detection – JSSIDS (to be replaced by ISSIDS) connected with 24/7 Rapid Response Guard Force.
- Servicing SSO for processing/receiving SCI clearance and DCS courier packages
- Cover Music system
- White Noise generator for access doors and emergency exit
- COMSEC/CRYPTO Account and Support
- TS/SCI cleared Computer Technical support
- Threat Assessment Completed For Area





7. Countermine Acoustics Laboratory

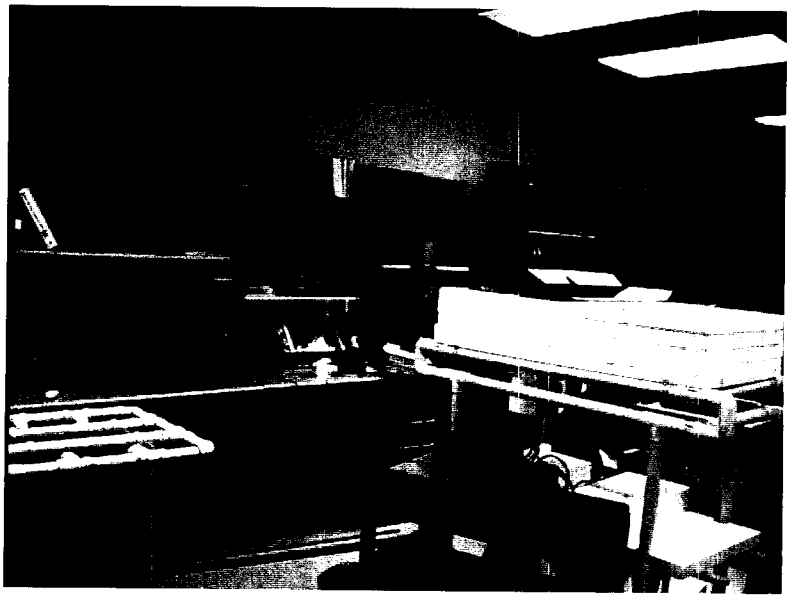
Description: The NVESD Countermine Acoustics Laboratory is a new NVESD laboratory that supports the development of sensor technologies specifically for acoustic mine detection applications. Located in the NVESD Fort Belvoir, VA, Building 357, rooms 122 and 134, the lab occupies 1,360 square-feet of space. Acoustic mine detection systems exploit the structural resonances of landmines to discern the location of a buried mine from an off-target measurement. In general, there are two components in an acoustic mine detection system: sources used to excite the landmine structural resonances and sensors used to measure the vibration response of the soil. The research group is pursuing more efficient acoustic sources and the development of sensitive, stable measurement tools. Current research projects in the acoustics laboratory include the development of an ultrasonic displacement sensor, an investigation of ultrasonic parametric arrays as an alternative acoustic source, and a study of wave propagation in soils with the objective of optimally exciting landmine structural resonances. The acoustics laboratory is also developing an acoustic confirmation sensor, which will be capable of scanning a 1-m2 area for landmines in twenty seconds or less. The confirmation sensor will be installed on a mobile platform and will include mounting hardware for the evaluation of different sensor suites (i.e. laser Doppler vibrometers, or geophones). The acoustics group currently possesses the following laboratory equipment: vector signal analyzer, spectrum analyzer, laser Doppler vibrometers, modal shakers, modal hammer, modal accelerometers, miniature accelerometers, parametric arrays, pre-amplifiers, power amplifiers, function generators, programmable filters, weighted signal summer, programmable attenuator, microphones (i.e. free field, pressure, omni-directional, and ultrasonic), data acquisition cards, audio speakers, and oscilloscopes.

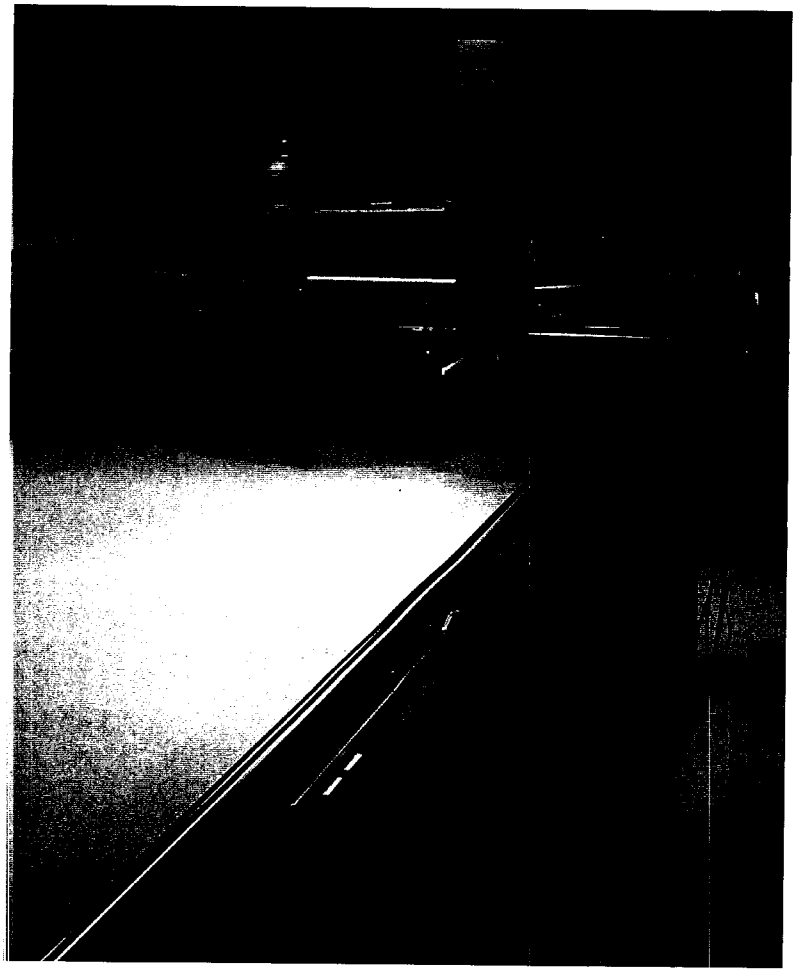
Footprint: 1,360 Square-Feet

Personnel: 4 Government

Equipment: Laboratory equipment includes: vector signal analyzer, spectrum analyzer, laser Doppler vibrometers, modal shakers, modal hammer, modal accelerometers, miniature accelerometers, parametric arrays, pre-amplifiers, power amplifiers, function generators, programmable filters, weighted signal summer, programmable attenuator, microphones (i.e. free field, pressure, omni-directional, and ultrasonic), data acquisition cards, audio speakers, and oscilloscopes.

Special Needs: Requires static-free flooring. The facility HVAC requirements are the same as for office space





8. Countermine Chemical Sensor Laboratory

Description: The NVESD Countermine Chemical Sensor Laboratory is a new 223 square-foot facility located in the NVESD Fort Belvoir, VA, Building 357, room 301, that supports the development of chemical sensor development. The major focus will be on the detection of tactically buried land mines and unexploded ordnance (UXO). Other applications for chemical sensing technologies will also be explored. Space has been allocated for the trace chemical analysis laboratory and a gas chromatograph has been acquired for the detection and analysis of the trace quantities of explosives and their environmental degradation products that are leaked from land mines into surrounding air, ground water and soil. We will also acquire other analytical instruments suitable for the detection of trace quantities of land mine-related chemicals in vegetation. The laboratory will be utilized for collaborative efforts with other organizations in the development of biological reporters for land mine detection and to evaluate commercially available chemical sensors for land mine detection purposes.

Footprint: 223 Square-Feet

Personnel: 4 Government

Equipment: Gas chromatograph/micro-Electron Capture Detector instrument, gas chromatograph/Mass Spectrometer instrument, two contractor-delivered explosives detection sensors, two ovens, two freezers and one refrigerator, compressed gas cylinders, and miscellaneous other lab equipment (e.g. analytical balances, centrifuge, hotplate/stirrer, pH meter, etc.)

Special Needs: Requires static-free flooring. The facility has a significant HVAC requirement. The laboratory requires a separate storage area for chemicals that meets all safety requirements. The laboratory requires storage of compressed gas cylinders in a separate facility. Ideally there would be house de-ionized water and compressed air.

9. Countermine Prototype Systems Laboratory

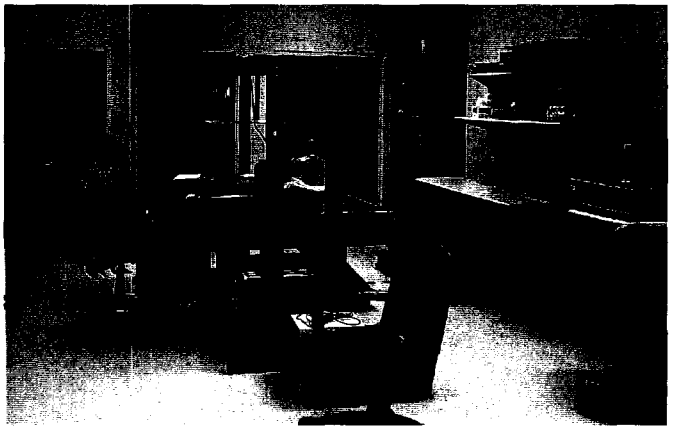
Description: The NVESD S&T Division Countermine Prototype Systems Laboratory located in Building 357, Fort Belvoir, VA, is a NVESD S&T Laboratory to evaluate tele-operated or remotely controlled vehicle-based mine/IED detection and neutralization technologies. These technologies are evaluated for their effectiveness as remotely-controlled data collection systems for operation at countermine field sites prior to field data collections. The laboratory is used by NVESD personnel to integrate and test different components onto the different systems that are being developed. The lab consists of a large work area where the various sensors or platforms can be worked on. The lab also has tables and lab benches to work on finer parts.

Footprint: 540 Square-Feet

Personnel: 4 Government

Equipment: Laboratory equipment includes tele-operated platforms integrated with landmine/IED detection and neutralization sensors and techniques. Also test and measurement instrumentation and various tools to assemble or disassemble components are part of this laboratory.

Special Needs: Requires static-free flooring. The facility HVAC requirements are the same as for office space



10. Countermine Radar and Electromagnetic Induction (EMI) Lab

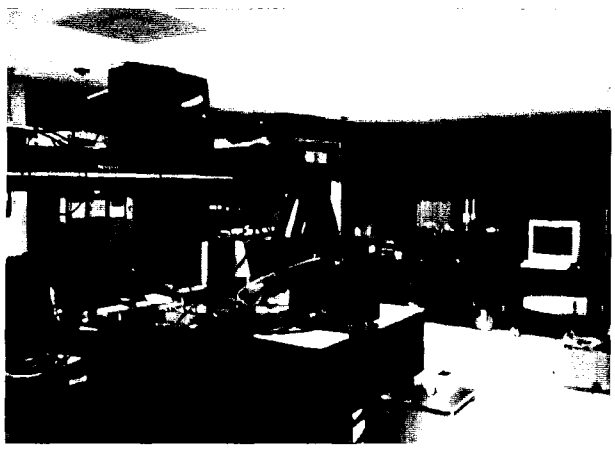
Description: The NVESD Countermine Radar and Electromagnetic Induction (EMI) Lab provides for state-of-the-art in-house research of radar and electromagnetic induction sensors. Located in the NVESD Fort Belvoir, VA, Building 357, rooms 124 and 127, the 764 square-foot lab is equipped with the tools and testing platforms necessary to evaluate commercially available and research-grade antennas and coils as well as investigate innovative new detection techniques. EMI research focuses on optimizing coil configurations, transmitter waveforms, and algorithms for detection and discrimination of mines, unexploded ordnance (UXO), and improvised explosive devices (IED). Radar research focuses on optimization of ground penetrating radar antennas with respect to signal gain, system resolution, antenna footprint size, and system. Instrumentation includes a vector network analyzer, spectrum analyzer, and two computer workstations. The lab is equipped with versatile testing platforms for minimal electromagnetic interference. The facility has a large sandbox equipped with a computer-controlled 3-axis plotter for accurately controlled data collections.

Footprint: 764 Square-Feet

Personnel: 7 Government

Equipment: Laboratory equipment includes test and measurement instrumentation for radar and metal detector data collections, work benches, and electronics equipments, two non-metallic test platforms, and associated measurement instrumentation. . The current laboratory also houses a large sandbox and XYZ positioner for highly controlled mine detection experiments in a soil medium. The dimensions of the soil box are 6 feet by 8 feet by 4 feet deep. The sandbox and XYZ positioner allow accurate mounting and positioning of landmine detection systems for precise laboratory measurements. The positioning and measuring system is computer controlled using custom written software. The non-metallic platforms allow sensors that are sensitive to metal to be calibrated and designed without metallic clutter interference.

Special Needs: Requires static-free flooring. The facility HVAC requirements are the same as for office space



11. Countermine Systems Laboratory (CMSL)

Description: The NVESD Countermine Systems Laboratory (CMSL) fills a Countermine Division need for standardizing and maintaining characterizations of sensors deployed in its detection systems, as well as the characterization of the sensor signal and data acquired during testing.

Footprint: 5,200 Square-Feet

This new 5,200 square-foot facility, on the first floor of the NVESD, Fort Belvoir, VA, Countermine Division, Building 392, is comprised of four work areas as described below:

a. Nuclear Quadrupole Resonance (NQR) Laboratory

Description: The mission of the NQR laboratory is to advance the state of the art of NQR technology applied to landmine detection in collaboration with the Naval Research Laboratory (NRL), GE Infrastructure Security (formerly Quantum Magnetics), the United Kingdom's Defense Science and Technology Laboratory (DSTL), King's College-London, and other academic institutions. NVESD's NQR lab has the capabilities (a) to conduct advanced NQR physics experiments (e.g., multi-frequency and composite pulses); (b) to investigate the NQR properties of a substance; (c) to enable components of an advanced lab NQR sensor to be built and evaluated; and (d) to enable comparative evaluations of different NQR sensor designs.

Footprint: 400 Square-Feet

Personnel: 2 Government

Equipment: NQR spectrometer, RF power amplifier, network/spectrum/impedance analyzer, waveform generator, DC power supplies, RF shielding boxes (large and small), custom electronic components, oscilloscope lab benches, explosive simulants (non-hazardous), multimeters, miscellaneous electronics pieceparts, electronics rack, soldering equipment, electrical wire, electronics tool kit, lab highchairs, and miscellaneous electronics boxes, parts and materials

220 volt-AC power source with a special three-prong female outlet plus normal 110-volt-AC power and normal air conditioning for an office

b. Airborne Sensor Laboratory

Description: The mission of the Airborne Sensor laboratory is to advance the state of the art of Airborne sensor and data processing technology applied to airborne mine, minefield, IED and obstacle detection. Sensor Lab Component includes lasers, LED's and cameras that are tested, integrated and prepped for field experiments. A Signal Processing Component serves as a simulator for airborne ground station and change detection data processing, analyst and human in the loop experiments.

Footprint: 2,000 Square-Feet

Personnel: 8 Government

Equipment: Signal Processing Component (1400 square feet with storage): 4 ground stations and a change detection work station with high through put (3 Dual Xeon with 3Ghz IDE and 1 dual Xeon with 3Ghz SCSI processing node, RAID storage, Giga switch, large monitor), 4 high though put data processing/analyst work stations with 3 Ghz processors and large monitors; Sensor Lab Component(1200

square feet with storage):sensors(lasers)/cameras (SWIR, MWIR, LWIR, visible), pulse generators, signal generators, spectrum analyzer, power supplies, spectrometer, monochrometer, multimeters, data logger, lab computers, printers, miscellaneous electronics piece parts, custom electronic components, soldering equipment, electrical wire, electronics tool kit, and miscellaneous electronics boxes, parts and materials), Lab benches, lab highchairs

Special Needs: Special needs: Special power and safety requirements for laser operation, sound suppression for ground stations, electrical power, air conditioning and data ports to support the above ground stations and processors.

c. Countermine Data Processing Laboratory

Description: The mission of the CM Data Processing Laboratory (CMDPL) is to advance the state-of-the-art of sensor data processing technologies applied to landmine detection. This facility also includes a continually updated library of existing mine detector sensor data from a variety of sensor types. In addition to Government signal processing and algorithm development specialists, this facility hosts summer hires, summer faculty, co-op students, and IPA positions. It serves as an on-site focal point for our in-house signal processing activities as well as our academic and contracted support. NVESD's CMDPL lab has the capabilities (a) to receive and process sensor data from various vendors and platforms; (b) has specialized tools for data processing, modeling and various data analyses; (c) has high speed access to DoD HPC resources; and (d) to enable comparative evaluations of different and competing sensor data processing techniques.

Footprint: 1,400 Square-Feet

Personnel: 2 Government/6 Other

Equipment: Computer processing laboratory with special purpose desk side computers. Two printers and a centralized parallel processor for large scale data storage and numerical computations are also required.

Special Needs: Normal 110-volt-AC power and normal air conditioning for an office

d. Geospatial Data Processing Laboratory

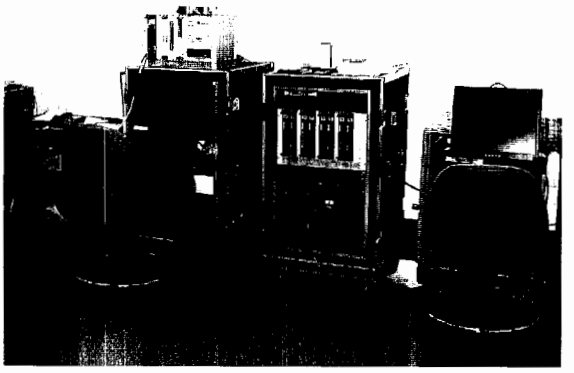
Description: The mission of the data processing laboratory is to advance the state-of-the-art of specialized geospatial intelligence processing in support of the selected Countermine mission areas (currently at secret level, but need TS/SCI level facility). This lab collaborates with the national intelligence community and selected military agencies. NVESD's geospatial data processing lab has research capabilities (a) to operate on standard NGA image or data products; (b) order and receive through appropriate channels imagery or other data products; (c) store and forward processed results with collaborator; and (d) to enable comparative evaluations of different image or data processing designs and systems.

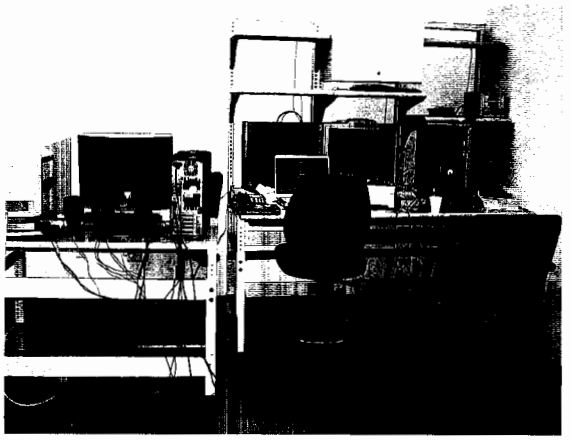
Footprint 800 Square-Feet

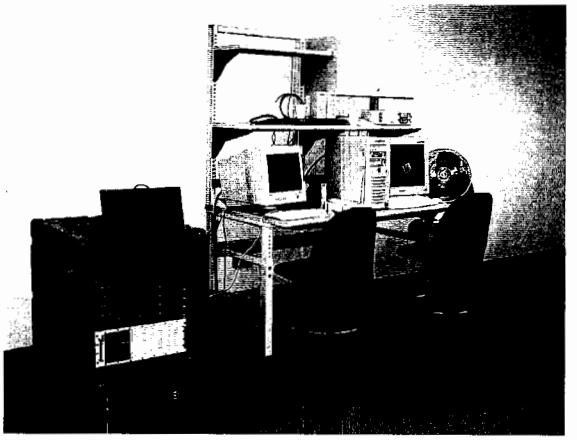
Personnel: 2 Government/4 Contractor

Equipment: The facility requires compartmented office space with a conference area for meetings. The Conference area needs accommodate a table with chairs for 15 people. ADPE in addition to desk side computers are two printers and a centralized parallel processor for large scale numerical computations. Keyed STU/STE phones and NIPR and SIRPNET network services are required.

Special Needs: Normal 110-volt-AC power and normal air conditioning for 5 desks in five offices. Facility security and intrusion detection systems are required.







12. Detector Fabrication Cleanroom Facility

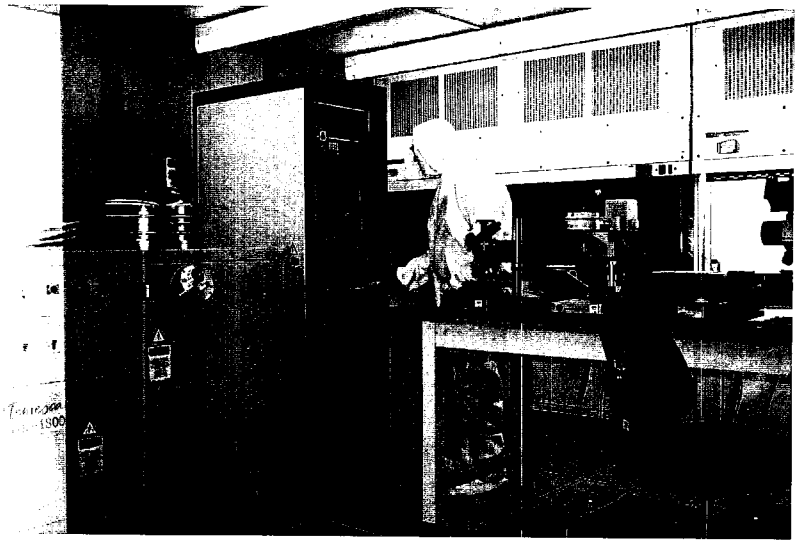
Description: The NVESD Cleanroom is utilized to fabricate both cooled and uncooled infrared detectors. The Cleanroom is at the forefront of Third Generation Focal Plane Array (FPA) development, participating with the FPA industry through Cooperative Research and Development Agreements (CRDAs) to develop semi-conductor processing techniques for multi-color detector structures. The facility has fostered breakthrough technology for etching high aspect ratio trenches in HgCdTe. The potential of amorphous silicon as an uncooled detector material for advanced applications is also being explored in the NVESD clean room facility. Amorphous silicon detector test structures are fabricated with the goals of high thermal coefficient of resistance (TCR) and low resistance to open the path to uncooled focal plane arrays for high relative motion applications such as UAVs. This facility houses both an ISO class 5 cleanroom (per ISO 14644-1) and a 'white' room. The NVESD Detector Fabrication Laboratory is one of only two II-VI cleanroom facilities within DoD. Photolithographic and metalization capabilities allow detector array patterning, reticulation, and contact metalization of microfactory grown samples. The 'white' room will provide packaging and discrete device testing facilities. The Cleanroom occupies 2,000 square feet of space in the NVESD Fort Belvoir, VA, Building 357, room 242.

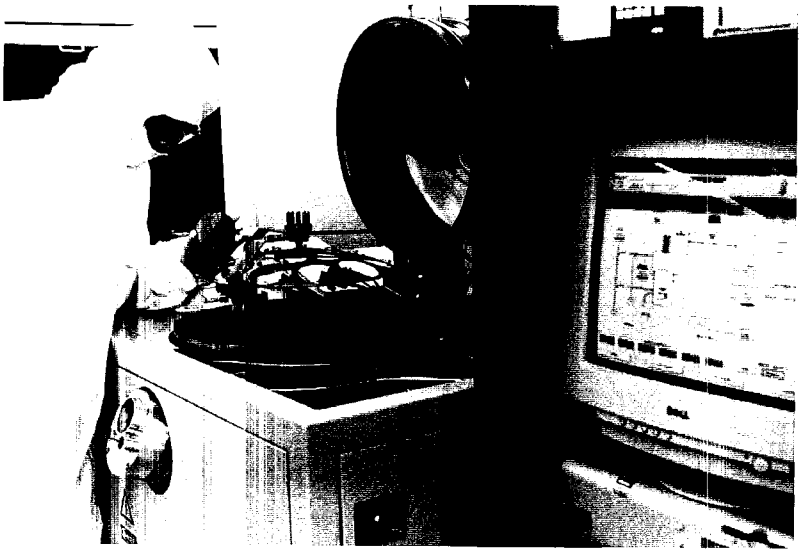
Footprint: 2,000 Square-Feet

Personnel: 8 Government/1 Contractor

Equipment: 4 vacuum systems (including 1 thermal evaporation chamber containing a full assortment of metal sources, 2 electron beam evaporation sources roughing and cryo pumps; 1 thermal evaporation chamber containing dielectric source capability, plasma ignition capability, and roughing and cryo pumps; 1 electron beam evaporation chamber containing 2 electron beam evaporation sources, a full assortment of metal sources, and roughing and cryo pumps; and 1 indium deposition chamber containing indium deposition sources and roughing and cryo pumps); 1 spectroscopic ellipsometer; 2 photolithographic mask alignment systems; 2 chemical fume hoods; 2 laminar flow hoods; 1 photoresist spinning bay; 2 high-power optical microscopes; 2 low power optical microscopes; 1 scanning electron microscope; 2 refrigeration units; 1 thermal treatment oven; 2 wire bonders; 1 wafer dicing saw; 2 surface profilometry systems; 1 optical interferometer; 1 diode probe station; 1 focal plane array hybridizing system; and 7 instrument computer control systems

Special Needs: 1000 sq ft class 100 clean room with particle, temperature, and humidity control; 1500 sq ft class 10000 clean room with particle, temperature, and humidity control; acid and solvent hood exhaust and scrubbing systems; uninterruptable power supply with capacity 250kW; house vacuum system; high-resistivity (18M□) DI water filtering, polishing and distribution system; and purified nitrogen gas distribution system





13. Display and Image Fusion Laboratory

Description: The NVESD Display and Image Fusion Laboratory provides National Institute of Standards and Technology (NIST) traceable test and analysis of direct view displays, miniature displays, and near-to-eye displays that includes monocular/binocular head mounted displays as well as weapon sights, viewfinders, and night vision goggles. The test capabilities include: luminance, luminance uniformity, gamma, contrast/modulation transfer function, color gamut, cosmetics, geometric distortion, field of view, exit-pupil, eye relief, focus/focus range, binocular alignment/stability and temporal response. The lab facilities also provide thermal and humidity environmental life testing for all the aforementioned displays as well as other vision system components. The image fusion laboratory collects temporally and spatially correlated visible, near IR and long wave IR sensor imagery. This data is processed internally and by industry and academia to evaluate fusion algorithms and metrics. The laboratory occupies 1,500 square-feet of space in the NVESD Fort Belvoir, VA, Building 357, Room 268.

Footprint: 1,500 Square-Feet

Personnel: 4 Government

a. Soldier Vision System Evaluation Laboratory:

Equipment:

- Video Projection System: IR rear video projector, visible rear video projector, screen, speakers, and a computer

- Near-to-Eye Display Test Station: Optical bench, bench overhang rack, stand-alone tower computer, motion control stages and drives, sensors and array cameras, pattern generator, spectroradiometer, IR blackbody, collimated IR blackbody, and a visible light source

- ANVIS-HUD Test Set: Equipment rack for test set, equipment rack for A/V, computer, power supply, and an ANVIS-HUD interface

Special Needs: 45' minimum room length (14' rear projection distance + 20' viewing distance + projector + control area), adjacent and light secure control room to prevent light contamination of test area, 220 V 400 Hz Power for ANVIS-HUD Test Set, uninterruptable power supply, compressed air for optical bench for isolation, room temperature control is necessary for maintaining standard room conditions, and light tight and light isolated laboratory space

b. Large Area Display Test Station:

Equipment: Optical bench, stand-alone tower computer, power supply, pattern generator, motion control stages and drives, photometer, spectrometer/colorimeter, CCD camera, light source replicating sun, light source, and telephoto lenses

Special Needs: Light tight and light isolated laboratory space, room temperature control is necessary for maintaining standard room conditions, and an Uninterruptable power supply

c. Microdisplay Test Station:

Equipment: Optical bench, bench overhang rack, stand-alone tower computer, pattern generator, motion control stages and drives, photometer, spectrometer/colorimeter, and a camera

Special Needs: Light tight and light isolated laboratory space, compressed air for optical bench for isolation, room temperature control is necessary for maintaining standard room conditions, and an uninterruptable power supply

d. Calibration Station:

Equipment: Optical table, bench overhang rack, stand-alone desktop computer, sandard light source, Theodolite, spectral light source (pencil lamp), spectral light source (high power), and a black body source and controller

Special Needs: Light tight and light isolated laboratory space, compressed air for optical bench for isolation, room temperature control is necessary for maintaining standard room conditions, and an uninterruptable power supply

e. Image Fusion Lab:

Equipment: 6-channel video capture system, field-portable dual-sensor image capture system, digital video editing console, high-resolution capture system for digital video sensors, head-tracked vision system prototypes, and a SADA II Scan Converter prototype

Special Needs: Light tight and light isolated laboratory space, room temperature control is necessary for maintaining standard room conditions, and an uninterruptable power supply

f. Classified Data Collection & Processing Station:

Equipment: Computer, motion control system, and a spectroradiometer

Special Needs: Room certified for classified data, light tight and light isolated laboratory space, room temperature control is necessary for maintaining standard room conditions, and an uninterruptable power supply

g. Three-Dimensional Printer Station:

Equipment: 3D Printer, computer, cleaning station, and an infiltration station

Special Needs: Uninterruptable power supply, ventilation hood, separate room from other labs to avoid contamination of those rooms with power, and room temperature control is necessary for maintaining standard room conditions

14. Distributed Sensors Integration Facility (DSIF)

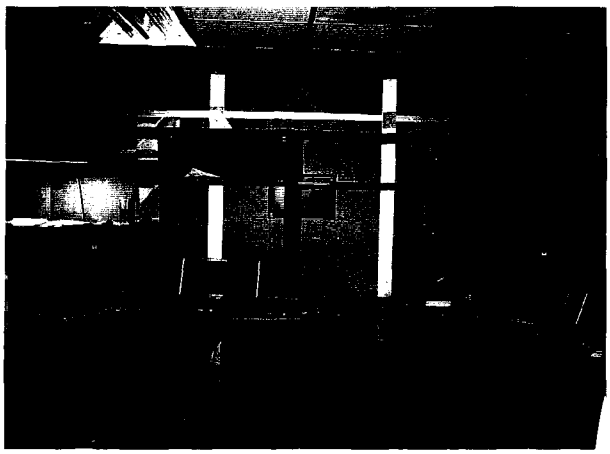
Description: The NVESD Distributed Sensors Integration Facility (DSIF), Building 371, is a new NVESD, Fort Belvoir, VA, facility which supports the integration and demonstration of small, low cost, targeting and ID sensors with day/night capability that are networked together with software tools. The sensor systems will be integrated in the DSIF for deployment aboard unmanned platforms i.e. unattended ground sensors (UGS), unmanned ground vehicles (UGV), and small-unmanned aerial vehicles (s-UAV) to provide situation awareness for the ground commander to fill in the gaps from overhead ISR assets. The sensors that will be integrated and networked in the DSIF provide a night vision capability for Own the Night, self forming/self healing, anti-jamming, low probability of interception/low probability of detection smart radios for secure network communications, and software tools for sensor line of sight vision and communications calculations for the commander's planning and decision making capability. All of these contribute to giving the Future Force units survivability that is critical for the future Army's lighter vehicle platforms.

Footprint: 1,000 Square-Feet

Personnel: 3 Government/6 Contractor

Equipment: 14 high-end, vehicle mounted and lab computer systems, commercial and high performance GPS equipment, high performance test equipment (signal analyzer, network analyzer, and two oscilliscopes), computer network devices (routers, switches, hubs, KVMs, and
Military and R&D wireless systems), multiple computer processor Operating Systems (Linux (Debian, Redhat, v9, Fedora), Microsoft Windows, Mac OS/9), cable and electronic prototyping equipment, soldering irons, crimping tools, and mechanics tools

Special Needs: Cooling for computer equipment, GPS re-transmitting capability indoors, electronic circuit-board and cable making benches, vehicle power, 3 phase 120 VAC (1Kw), 28 VDC (2.8kw), and iInternal computer networking cable raceways/connections



15. Electronics and Glass Laboratories

Description: The NVESD Electronics and Glass Laboratories ares located in Building 357 at Fort Belvoir, VA. The labs provide support to the NVESD Microfactory Laboratory and the wider infrared focal plane array community in a variety of functions including: infrared detector performance measurements; extensive characterization of fundamental transport properties of semiconductor material; high temperature processing of semiconductor material (quartz encapsulation and annealing). The NVESD Electronics Laboratory performs electronic transport measurements on HgCdTe and related infrared materials grown in the Microfactory and elsewhere. These measurements include high-field (9T) Hall effect measurements, and photoconductive carrier lifetime measurements. The Electronics Laboratory also evaluates the performance of infrared detectors. Additionally, the Electronics Lab provides a wide variety of support, designing, constructing, testing, troubleshooting and repairing of the Microfactory's electronic equipment. The Glass Lab has the unique facilities and expertise to produce sealed quartz annealing tubes for high temperature processing of HgCdTe and related semiconductor materials.

Footprint: 1,000 Square-Feet

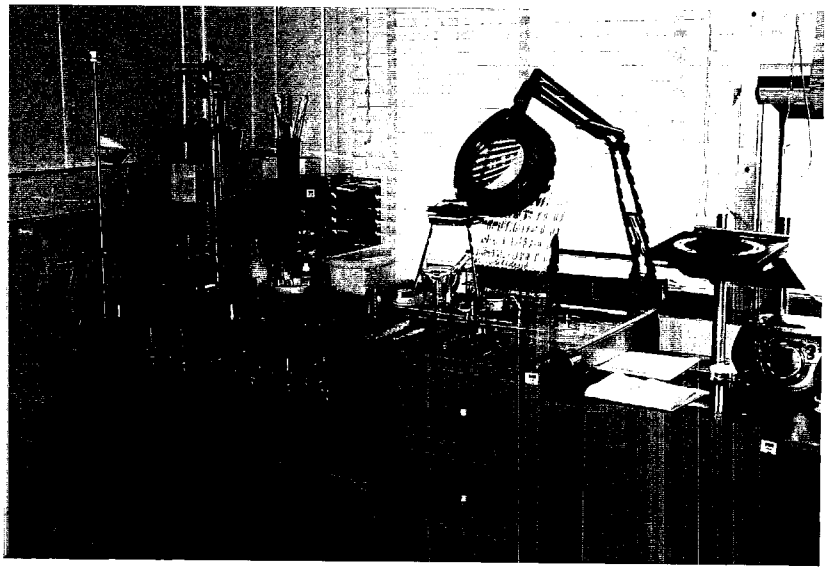
Personnel: 3 Government

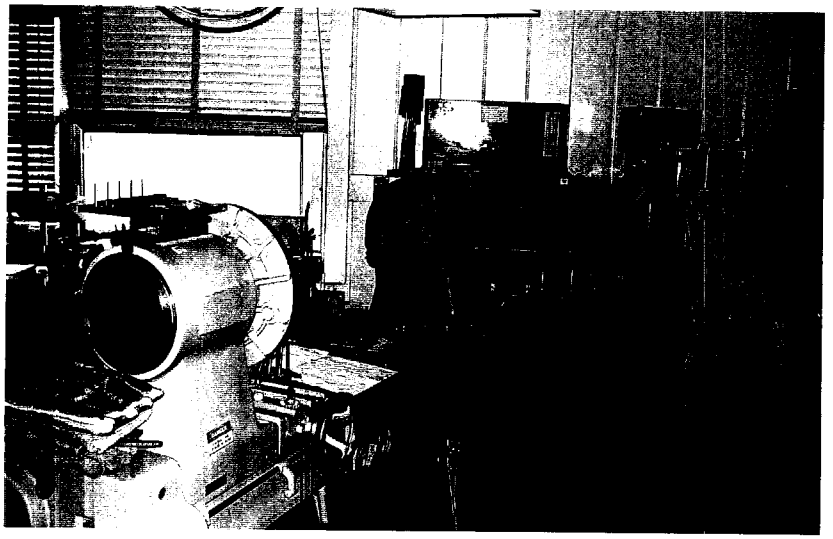
Equipment:

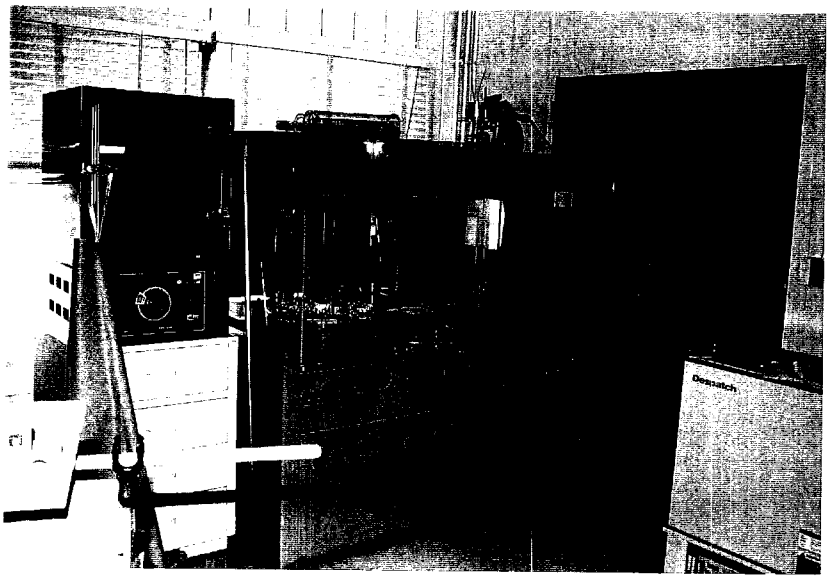
- Electronics Lab: Fume hood; microscope; soldering equipment; MMR Hall Van Der Pauw system; Anneal oven and related control electronics; portable electronics rack; electronic work bench; dewar for cryogenic operation and testing of infrared devices; temperature controllers; oscilloscope; function generator; optical table; Zeiss Nomarski microscope; liquid nitrogen dewar and transport lines; data acquisition computer; standard laboratory voltage sources; vacuum oven; noise spectrometer; heating chuck; Keithley (four 236 I/V SMUs; trigger, capacitance/voltage setup, capacitance/time, and low noise switch); LakeShore 330 tmperature controller; LakeShore Hall effect setup—9 T superconducting magnet and associated electronics; UPS; and 4 Personal Computers

- Glass Lab: Cryopump; turbomolecular- pumping station; glass and torch work bench; small glass lathe; large glass lathe; lab sink; deionized water source; cutting wheel; Anneal oven; drying oven; and a drill press

Special Needs: 100 sq. ft. dark room; fume hood; ceiling hood for glass and torch work bench; ceiling hood for Large and Small glass lathe; faboratory sink; gas cabinet for hydrogen, oxygen and propane gas tanks for glass torches; 208 Volts AC, 2 phase receptacles; 208 Volts AC, 3 phase receptacles; readily available supply of liquid nitrogen; access to liquid helium; and a high purity nitrogen gas supply



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16. Human Test and Perception Laboratory

Description: The NVESD Human Test and Perception Laboratory, Fort Belvoir, VA, purpose is to contribute to scientific knowledge about the human visual system, behavior, and performance as it relates to the perception of imagery from electro-optical sensors. The perception approach is experimental, utilizing real thermal imagery, military subjects, and state-of-the-art computer systems. All perception studies relate directly to the development of better thermal systems and the optimization of system performance in effort to reduce fratricide. The lab presently consists of ten (10) state-of-the-art workstations, each housing a 550-megahertz computer system equipped with a 23-inch color monitor and a high-resolution 10-bit display that encompasses the full range of an operational system. The lab also consists of two of a very limited number of ISCAN eye-tracking systems. These systems are used to better understand human eye-movements, such as the effects of thermal clutter during search and identification of a thermal scene. These experiments are performed in effort to collect human performance data and ultimately to validate the system models. The models mathematically describe a sensor's capability and predict sensor performance. The models are used: in TRADOC war-games to determine sensor, platform and system cost-effectiveness; to support electro-optical system development and procurement, including competitive sourcing and contractor compliance in building the sensors; and, to project future sensor capability.

Footprint: 760 Square-Feet

Personnel: 2 Government/1 Military/4 Contractor

Equipment: The lab presently consists of ten (10) state-of-the-art workstations, each housing a computer system equipped with high resolution color monitors and a high-resolution 10-bit Barcoe displays that encompass the full range of an operational system. Two (2) ISCAN eye-tracking systems that are used to better understand human eye-movements, such as the effects of thermal clutter during search and identification of a thermal scene. 2 Multi-purpose high lumen projectors for displaying 3-D, 1 silver automatic screen. 12 Port Workgroup Hub, Powerware 6-KVA UPS, 11 High Resolution LCD-PC Monitors.

Special Needs:

The Perception Facility and Psychophysics Lab need their own environmental control, including a separate room for the eye-tracking system, and a separate unclassified network for unclassified work.

Electrical Requirements: 110 and 220 electrical outlets, and air conditioning

Power and environmental requirements:

- Independent environmental control
- Restricted but not classified access
- Sufficient storage for components/equipment/instruments not in active use
- Stable, filtered electrical power to support the research instrumentation

17. Humanitarian Demining Laboratory

Description: The Humanitarian (HD) Laboratory is required to support DoD Humanitarian Demining Program. The lab focuses on in-house prototype development from concept to fielding. The HD Lab capabilities include design, fabrication, modeling, integration and testing of demining equipment. The lab specializes in electronic, hydraulic and system control. The lab has state of the art surface mount electronic printed circuit board capabilities that include board testing and software development. The HD Lab personnel have developed a Windows based standardized remote control system that can be easily integrated onto most any vehicle. The lab is located in Building 331 at Fort Belvoir, VA

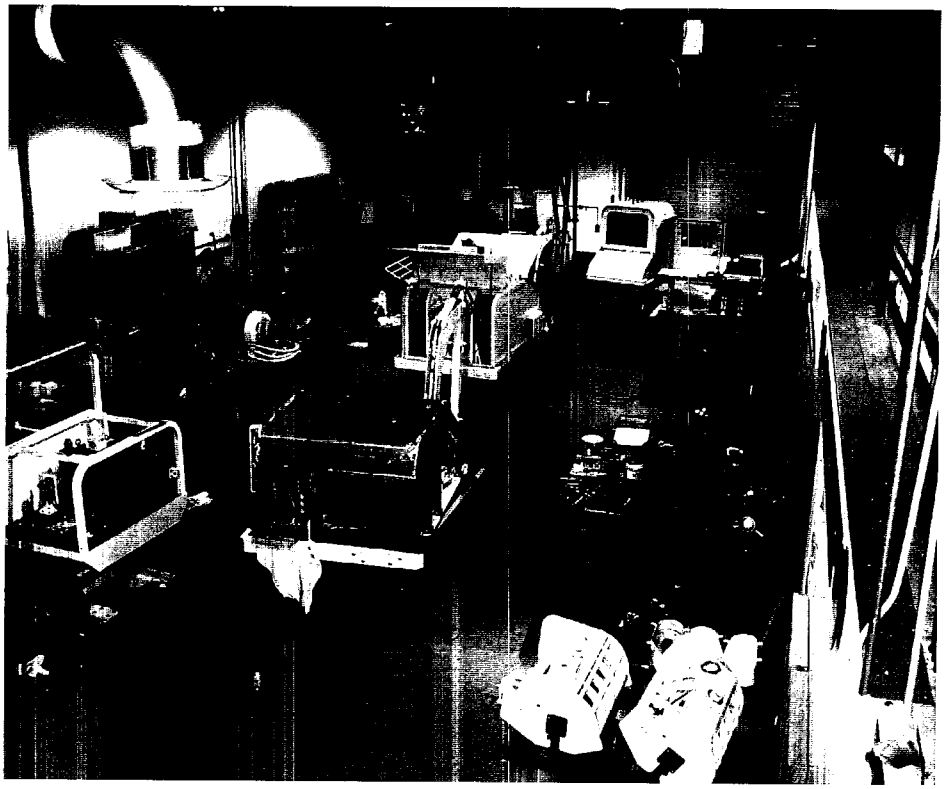
Footprint: 10,000 Square-Feet

Personnel: 6 Government/6 Contractor

Equipment: 15 Ton Overhead Crane, Welding (all types), Machine Shop, Sheet Metal, and the following:

Description	Quantity	Cubic Foot/Each	Weight/lbs/Each
Test Station	3	400	3000
Work Benches	10	75	300
Cabinet (hardware)	11	70	3000
Lab Equipment			10000
Tools			5000
Mil Vans 20"	8	1300	5000
Welders Diesel	3		700
HD Vehicles and Implements:			
Wheeled Excavator A904	1		30000
Track Excavator A904	1		30000
Track Dozer 742	2		50000
Track Dozer 712	1		40000
Skid Steers armored	3		8000
HD Excavator – remote controlled	2		8000
Dozer D7	1		50000
Dantra	1		20000
Remote Operated Vehicles	2		8000
Survivable De-Mining Tractor	4		20000
De-Mining Excavator	1		70000
Improved Backhoe	1		24000
Tempest	4		8000
De-Mining Implements Large	7	816	14000
De-Mining Implements medium	15	80	3000
MAXX	1		10000
MAXX Plus	1		10000

Special Needs: Concrete floor (8" minimum), 16' wide x 14' tall overhead door, engine exhaust evacuation system, air conditioning.



18. Image Evaluation Facility

Description: The NVESD Image Evaluation Facility is located in Building 309 at Fort Belvoir, VA, and is used to perform advanced laboratory research in the following areas:

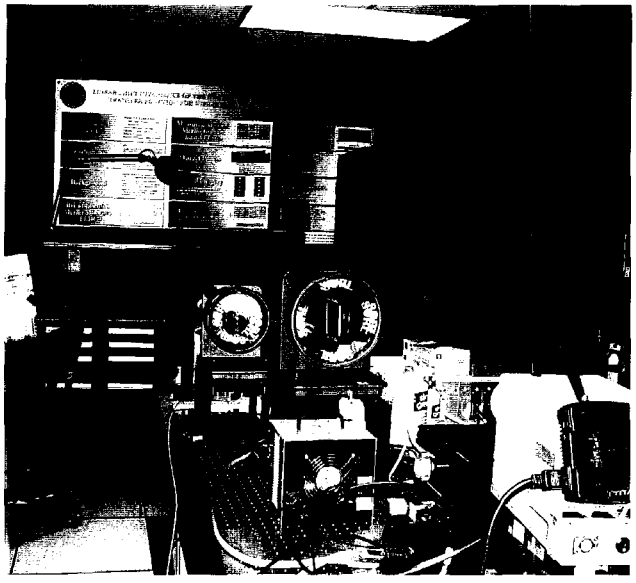
- Develop new measurement methodologies and metrics associated with existing, new, and emerging EO/IR systems, such as 3rd Gen, hyper-spectral, super resolution, passive/active millimeter wave/Terahertz, and active imaging
- Characterize EO/IR physics at the system and/or component level for the purposes of supporting sensor performance model research
- Development of critical custom measurements beyond the current capabilities/capacity of the Advanced Sensor Evaluation Facility (ASEF).

Footprint: 2,612 Square Feet

Personnel: 2 Government/1 Contractor

Equipment: 8' x 16' sealed hole optical bench table top with tuned damping for vibration isolation; state-of-the-art imaging sensors (research grade MW & LW hyperspectral, uncooled LW microbolometers, and CCD TV); multiple small through large reflective mirrors (1st surface flat and curved high reflectors) for multiple collimator configurations; visible through LWIR coherent and incoherent sources; emissive and reflective targets; target wheels; flatplate and cavity blackbodies; visible through LWIR refractive lenses, windows, and beamsplitters; high precision motorized positioning stages and mounts (linear, rotational, and 6-axis); extensive metric and SAE optical bench mounting hardware for sensors and components; digital and analog electronic signal conditioning and measurement instrumentation; high performance PC and electronic interfaces for real-time video and data acquisition; and electronic and mechanical peripheral control and data analysis

Special Needs: Independent environmental control; restricted but not classified access; stable, high-mass, low vibration ground floor mounting for the optical bench table top with tuned damping; sufficient storage for components/equipment/instruments not in active use; and stable, filtered electrical power to support the research instrumentation



19. Image Intensifier Test Facility

Description: The NVESD Image Intensifier Test Facility has served Government and industry since the inception of the Night Vision Laboratory by establishing and maintaining the standards for testing critical performance parameters in these direct view night vision-imaging systems. System and subcomponent test capabilities include brightness gain, signal-to-noise, equivalent brightness input, modulation transfer function, limiting resolution, uniformity, spectral sensitivity, halo, visual quality, reliability, bright source protection, microchannel plate electron gain, resolution vs. light level, phosphor efficiency, and veiling glare. Imaging sensor test capabilities extend from the visible band to 2 microns enabling the characterization of noise and system performance in video-based sensors such as silicon and InGaAs. The facility is located in the NVESD Fort Belvoir, VA, Building 305, rooms 228, 232, 237, 238, 239, 240, 241, and 242 occupying 1,343 square feet of space.

Footprint: 1,343 Square-Feet

Personnel: 4 Government

Equipment:

- Modulation Transfer Function (MTF): Analyzer head, support equipment rack, and two stand-alone desktop computers

- Optronics Radiometric Measurement System: Single grating monochromator, double grating monochromator, light source, 24" integrating sphere, and a stand-alone desktop computer

- Signal-to-Noise Measurement System: Light source, analyzer head, stand-alone desktop computer, and a support equipment rack

- Veiling Glare Measurement System: 60" integrating sphere, analyzer head, and a support equipment rack

- Radiant Sensitivity Test System: Light source with special purpose filters and associated support equipment

- Gain/Saturation/EBI/WL Sensitivity Measurement System: Light source, photometer, laptop computer, and a support equipment rack

- Visual Quality Test System: Light source, binocular viewing assembly, support equipment rack, and a low light still camera

- Low Light Level Resolution Test System: Automated light source, target assembly, variety of system support-stand devices, and a remote control

- Limiting Resolution Test System: Light source projector and a binocular microscope

- Halo Test System: Light source projector and a traveling microscope

- Phosphor Decay/Image Lag Measurement System: Light source, high-speed photo diode assembly, control unit, and a stand-alone desktop computer

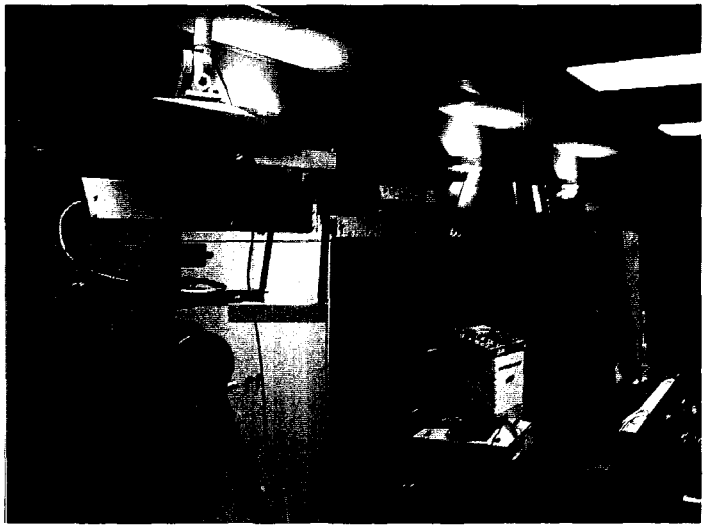
- Reliability Test System: Light source/tube fixture assembly and control console

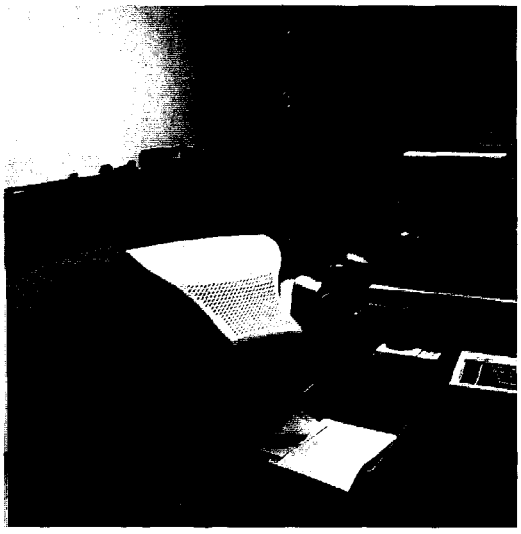
- Gain Recovery Test System: Dual light source, high-speed pick-up assembly, storage oscilloscope, and a control unit

- Video Imager Signal-to-Noise Measurement System: Variable light source and a image grabbing stand-alone computer

- Bright Source Protection Measurement System: High light level source, photometer, and a low-light still camera

Special Needs: Vibration isolation from the floor is required for all tests, room temperature control is necessary for maintaining standard room conditions, and separate test rooms that are light-isolated & light tight





20. Imaging Technology Environment Test Facility

Description: The NVESD Imaging Technology Environment Test Facility located in Building 305 is used to perform operational evaluation of systems and components of military specification thermal conditions to aid in the development of technologies and to ensure the capability of designed components and systems.

Footprint: 500 Square-Feet

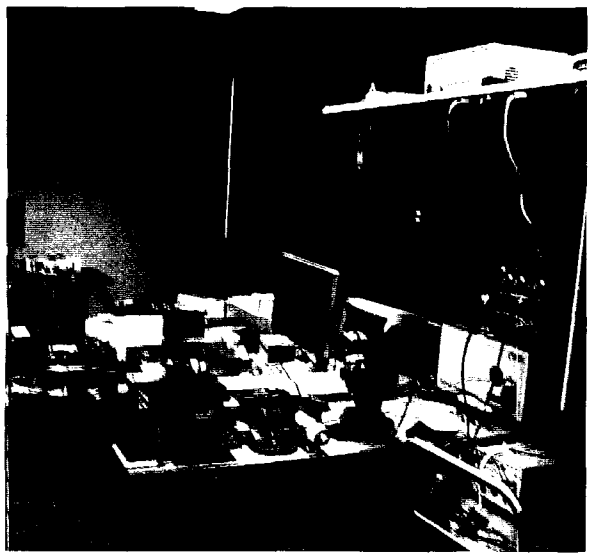
Personnel: 2 Government

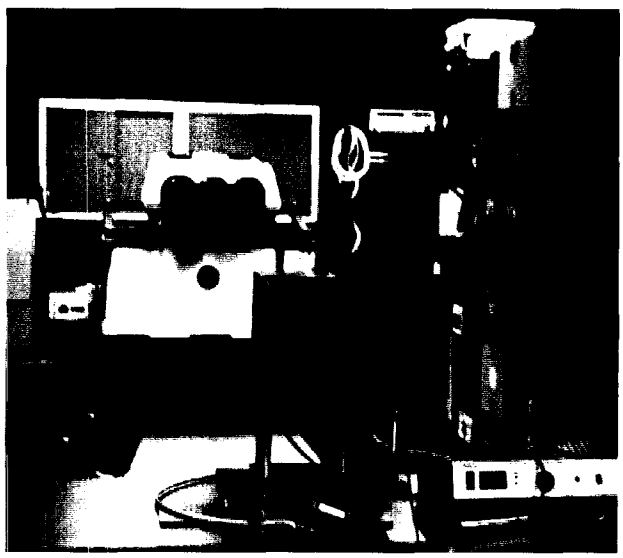
Equipment:

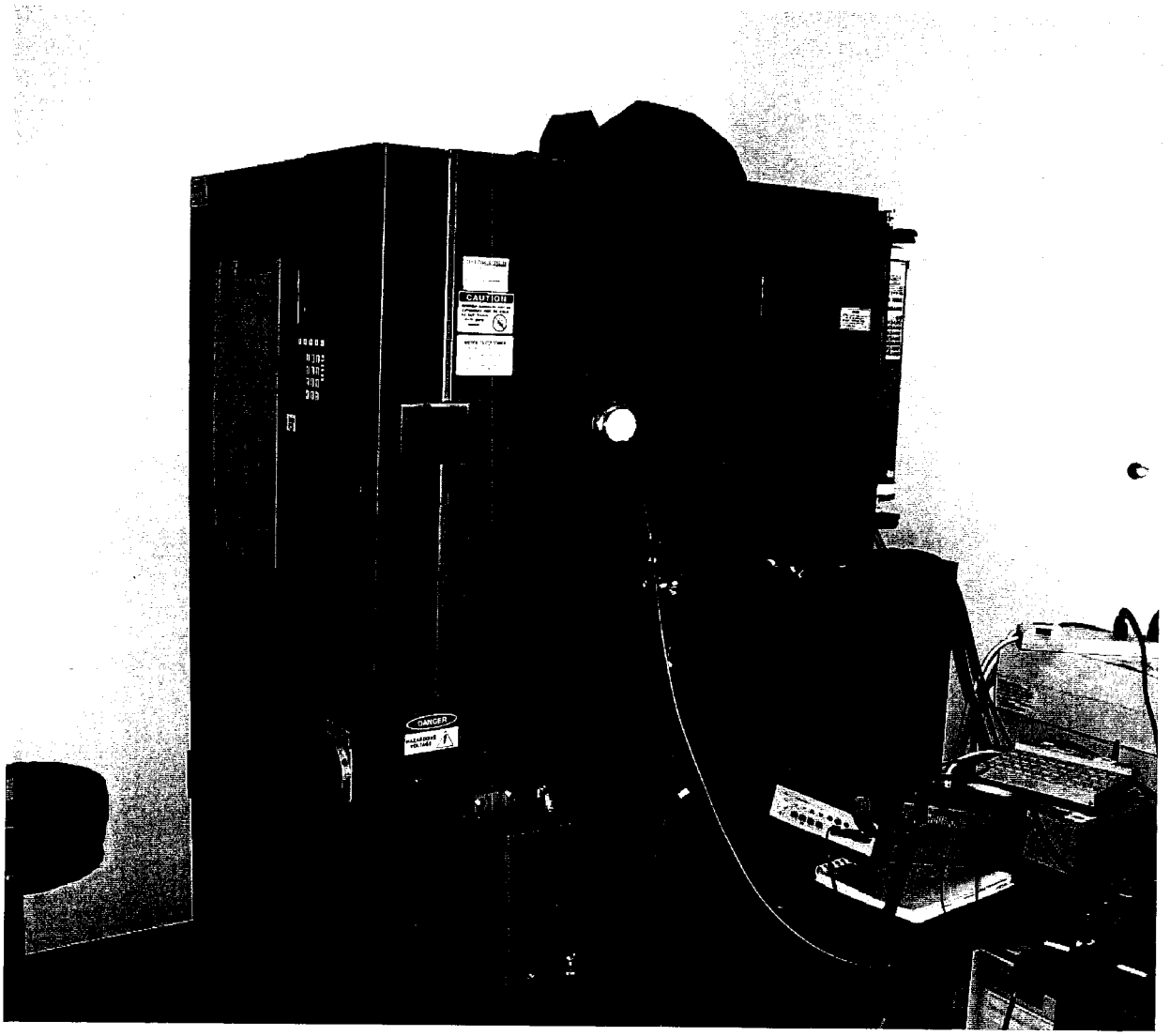
- Environmental Test Station: Stand-alone desktop PC, Thermotron SM8-7800 Environmental chamber, and a support equipment rack

- Ambient Lifetime Test Station: Stand-alone desktop PC, optical bench with bench-top light-secure enclosure, support equipment rack, and an uninterruptible power supply

Special Needs: 240V 3-phase minimum 25A power service, distilled water supply - minimum 0.5 liter/hour, vent to outside for Nitrogen purge system exhaust, high-capacity HVAC to maintain 25°C room ambient with thermal chamber in full operation, steady HVAC to maintain constant temperature for ambient life station, floor capable of supporting 1400 lb thermal chamber over 3' x 3' footprint, and light secure rooms for low light measurements



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21. Industrial Hygiene & Material Hazardous Waste Storage and Processing Laboratories

The NVESD Industrial Hygiene & Material Hazardous Waste Storage and Processing Laboratories are housed in NVESD Building 331, Fort Belvoir, VA. The Industrial Hygiene Lab (300 Square-Feet) is used for processing and analyzing air quality measurements, noise survey data, and lead, asbestos, mercury and mold samples taken from the Fort Belvoir, VA, Building 300 Area Compound. Prior to sampling, sampling media is chemically treated to ensure analyses are accurate. This treatment needs to be done in a clean and controlled environment to meet EPA standards. Once samples are taken in building locations they are processed and or analyzed in the Industrial Hygiene Lab. Samples in the lab are also put in proper containers by the NVESD industrial hygienist for monitoring of historical data in building locations. Samples once properly storied in the lab can be sent out for higher level analyses. The Hazardous Material Hazardous Waste Storage and Processing Lab (180 Square-Feet) is a staging area for in-process of hazardous materials which requires barcoding for chemical tracking and out-processing for hazardous waste. All chemicals require documentation, MSDS, labeling and weighing. The Safety Office is responsible for in-house safety programs to include Chemical Hygiene and Hazardous Waste Management, Inspection and Hazard Abatement, Non-Ionizing Radiation, Ionizing Radiation, Respiratory Protection and HAZCOM.

Footprint: 480 Square-Feet

Personnel: 3 Contractor

Equipment:

- Heavy duty light meter
- Sound Level Meter – meter, filter and calibrator
- Air Quality Monitor – meter, sensors, pump
- DryCal flowmeter – pump kit and meter
- Mercury Vapor Analyzer
- Noise Logging Dosimeter and software
- Permissible Noise Dosimeter and sound calibrator
- Variety ½ face and full face respirators
- 55-gallon drum transport

Special Needs:

- Power: Single-phase 200 Amp
- Sampling Media – carbon dioxide, carbon monoxide, carbon monoxide detector tubes, hydrocarbons, LP gas detector tubes, oxygen tubes, sulfur dioxide detector tubes, PH Paper
- Respirator cartridges
- Refrigerator to store media
- Require water source in both areas for clean up and eye wash stations
- Flammable, base, poisons and corrosive cabinets
- Continuous ventilation to disperse any type of fume from chemicals.
- Containers for spill control
- Carts for transport

22. IR Detector Semiconductor Microfactory

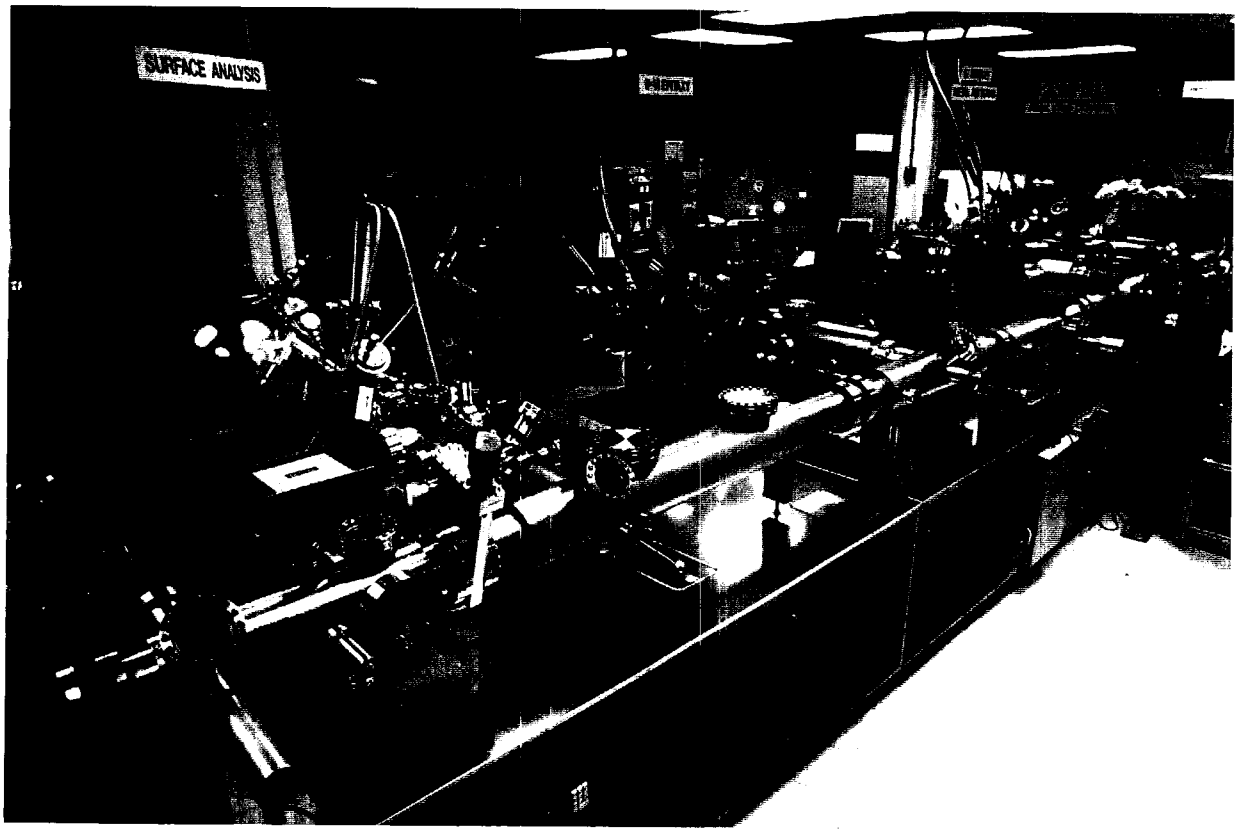
Description: The NVESD IR Detector Semiconductor Microfactory has introduced a revolutionary approach to the rapid prototyping of semiconductor materials for future infrared sensor systems. This processing line utilizes vapor phase processes carried out in ultra-high vacuum cluster equipment that prevent contamination and damage of the microchips as often occurs on conventional manufacturing lines. This vapor approach to sensor fabrication allows for the "spraying" down of layers of atoms, one layer at a time. The Microfactory features the ability to carry out all growth and fabrication steps required in prototyping new and improved infrared sensor material for the army. This facility includes capabilities for pre-growth thermal and ion cleaning of the substrate before the infrared detecting semiconductor layers are deposited. Capabilities also exist with the microfactory for epitaxial growth, metallization, etching, and surface passivation all the while maintaining the wafer in the protective environment of a high vacuum system. New materials and processes developed in the Microfactory are transitioned to US industry for use in fabricating advanced infrared focal plane arrays for DoD. The facility has unearthed and fostered breakthrough technology in molecular beam epitaxy on silicon. The Microfactory is one of only two II-VI epitaxial materials' facilities within DoD. It is the only facility in the world where film deposition, film characterization, and device processing are integrated under a common vacuum envelope. The microfactory was conceived as a national resource meant to engage university, industrial, and government scientists in the pursuit of the next generation of infrared sensors. This vision has been realized. Over the course of the ten years that the instrument has been in operation, several laboratory consortia have been established. Under the aegis of Small Business Innovative Research programs, engineers and scientists from the small business community continue to develop and deliver to NVESD apparatus that enhances the capabilities of the microfactory. Engineers from the large focal plane manufacturing laboratories are also our partners, spending weeks at the microfactory co-developing new technologies. An exit criterion for all microfactory activities is that device designs and processing equipment and processes that are developed here in the microfactory are adopted by US industry. We can point to a number of successes in this area. The Microfactory occupies 3200 square feet of space in the NVESD Fort Belvoir, VA, Building 357, room 263, with ancillary lab support space in rooms 255, 258, 259, 260, 261, 262A, 262B, 265, and 267.

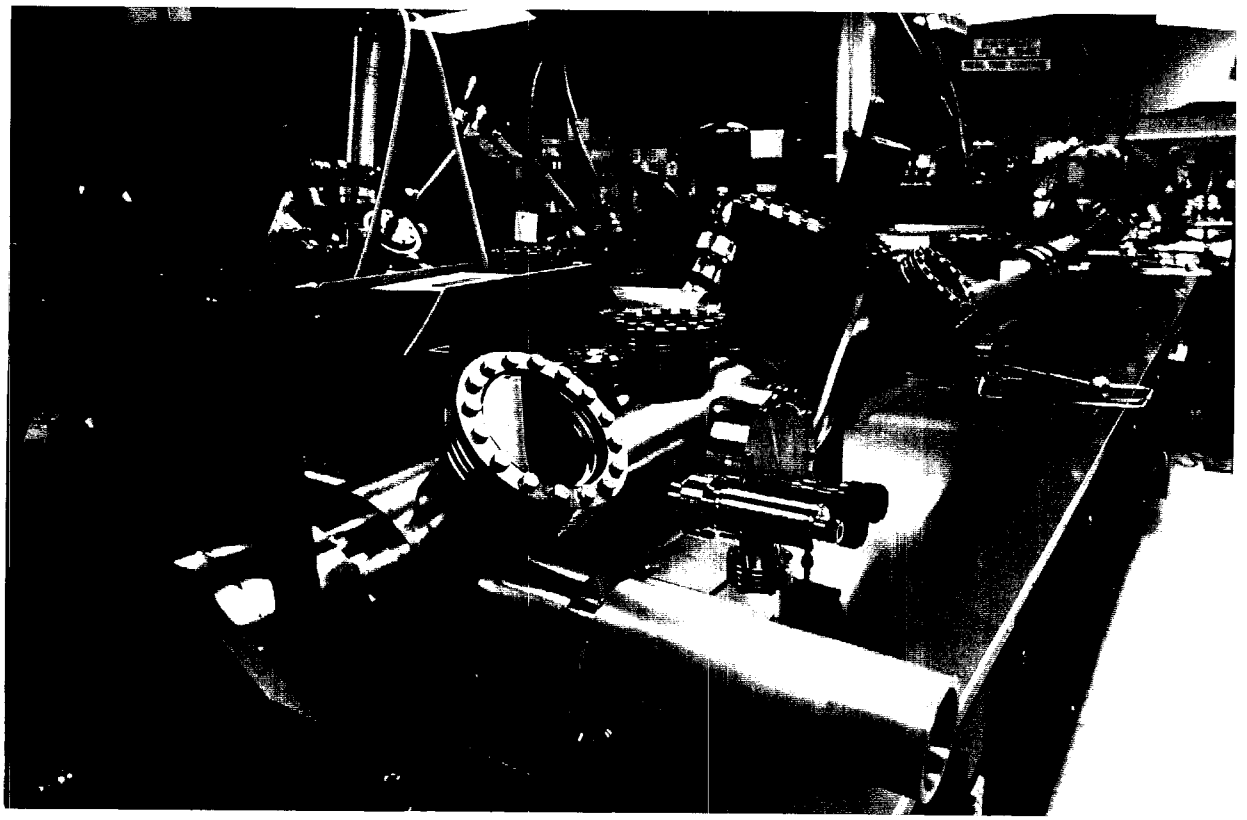
Footprint: 3,200 Square-Feet

Personnel: 8 Government/2 Contractors

Equipment: 7 vacuum systems; 3 molecular beam epitaxy deposition chambers containing; a full assortment of custom effusion cells; 2 electron beam evaporation sources; 1 surface analysis chamber containing computer controlled ultra-high vacuum x-ray; photoelectron, scanning Auger microscopic, and ion scattering spectroscopy (XPS, SAM & ISS respectively) with full data reduction; 2 plasma etching chambers; electron cyclotron resonance chamber; inductively coupled plasma chamber; 1 chemical vapor deposition chamber; 1 industrial excimer laser; 3 spectroscopic ellipsometers; 1 fourier transform infrared spectrometer; 2 chemical fume hoods; 3 laminar flow hoods; 1 liquid nitrogen distribution center; 5 data acquisition and instrument control computer systems; 1 toxic gas handling and distribution center; 2 water stills; 1 technical presentation center with projectors, computers, and projection screens

Special Needs: 2000 sq ft class 1000 clean room with particle, temperature, and humidity control; Processing-gas scrubbing and abatement system; continuous Liquid Nitrogen distribution to 4 separate vacuum chambers and fill station; uinterruptable power supply with capacity 250kW; air compressor and distribution system; and water chiller and distribution system


SURFACE ANALYSIS



23. Laser Laboratories

Description: Seven laboratories (average size 20 ft x30 ft) totaling 5239 square-feet of space in the NVESD Fort Belvoir, VA, Building 357 are dedicated to the development of compact, lightweight, low cost solid state lasers and laser-radars (LADAR) for Army applications. The facilities include many optical benches with instrumentation for the development of novel diode pumped solid state lasers, laser materials research, prototype development and evaluation, and laser diode characterization. Specialized equipment includes spectrometers, power meters, energy meters, high-speed oscilloscopes, optical multi-channel analyzers, precision computer controlled positioning equipment, and custom laser assembly equipment. A clean room is available for critical laser assembly tasks. The labs are located in rooms 135, 136, 137, 141, 141C, 100, 101, 146, 147, 148, 165, and 166.

Footprint: 5,239 Square-Feet

a. Laser Lab 1:

Description: Laboratory for assembly of solid state lasers and fabrication and testing of fiberoptic components, including a dust-free assembly area for solid state lasers.

Personnel: 2 Government

Equipment: Built-in storage cabinets, countertops and assembly benches; two 4x8' optical tables with pneumatic vibration isolation legs and overhead shelf; high-current laser diode drivers; power meters and fast optical detectors; NIR camera and monitor; SWIR camera and monitor; and two Tektronix digital oscilloscopes

Special Needs: Air conditioning, power strip along the walls, and ceiling drop-down power outlets

b. Laser Lab 2:

Description: Laboratory for testing of solid state lasers

Personnel: 2 Government

Equipment: Built-in storage cabinets, countertops and assembly benches; two 4x8' optical tables with pneumatic vibration isolation legs and overhead shelf; high-current laser diode drivers; power meters and fast optical detectors; NIR camera and monitor; SWIR camera and monitor; and two Tektronix digital oscilloscopes

Special Needs: Air conditioning, power strip along the walls, and ceiling drop-down power outlets

c. Laser Lab 3:

Description: Laboratory for assembly and testing of LIDAR systems

Personnel: 4 Government

Equipment: Oriel optical spectrum analyzer; built-in storage cabinets, countertops and assembly benches; two 4x10' optical tables with pneumatic vibration isolation legs and overhead shelf; NIR camera and monitor; and two high-current laser diode drivers

Special Needs: Air conditioning, power strip along the walls, and ceiling drop-down power outlets

d. Laser Lab 4:

Description: Prototyping area including electronics fabrication and machining

Personnel: 8 Government

Equipment: Milling machine, band-saw, lathe, drill press, two soldering stations including hot air system, PC board milling machine system, six DC power supplies, 3 Tektronix oscilloscopes, and built-in storage cabinets and electronic assembly work-benches with power strips

Special Needs: Air conditioning, power strip along the walls and ceiling drop-down power outlets, and high load carrying cement floor

e. Laser Lab 5:

Description: Laboratory for assembly and testing of lasers for laser designators

Personnel: 5 Government

Equipment: Optical spectrum analyzer; three 4x10' optical tables with pneumatic vibration isolation legs and overhead shelf; NIR camera and monitor; five high-current laser diode drivers; built-in storage cabinets, countertops and assembly benches: beam near field and far field analysis equipment; three water chillers; and pulsed and CW power meters

Special Needs: Air conditioning, power strip along the walls and ceiling drop-down power outlets, and 40 foot long room for measuring far field beam profiles

f. Laser Lab 6:

Description: Laboratory for assembly and testing of lasers for laser rangefinders

Personnel: 3 Government

Equipment: Optical spectrum analyzer; two 4x8' optical tables with pneumatic vibration isolation legs and overhead shelf; two NIR cameras and monitors; SWIR camera and monitor for beam characterization;
Three Tektronix oscilloscopes; high-current laser diode drivers; built-in storage cabinets, countertops and assembly benches; beam near field and far field analysis equipment; two water chillers; pulsed and CW power meters; and clean assembly area with 12x12 foot laminar flow bench with wet bench and vented chemical storage cabinet.

Special Needs: Air conditioning, power strip along the walls and ceiling drop-down power outlets, and 220 v electrical outlets

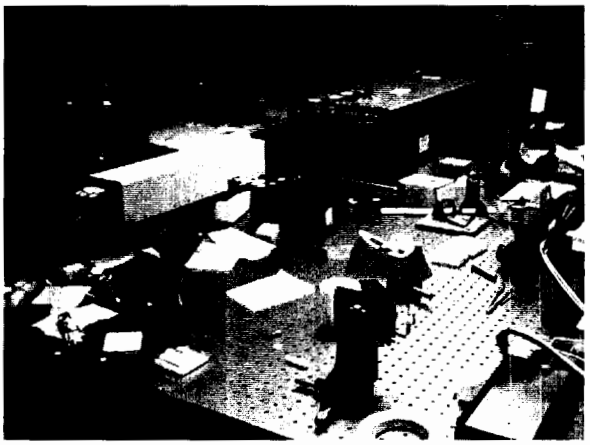
g. Laser Optics Lab:

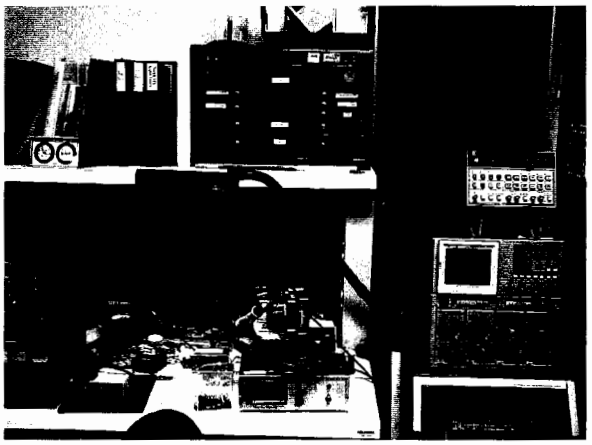
Description: Laboratory for assembly and testing of microchip lasers

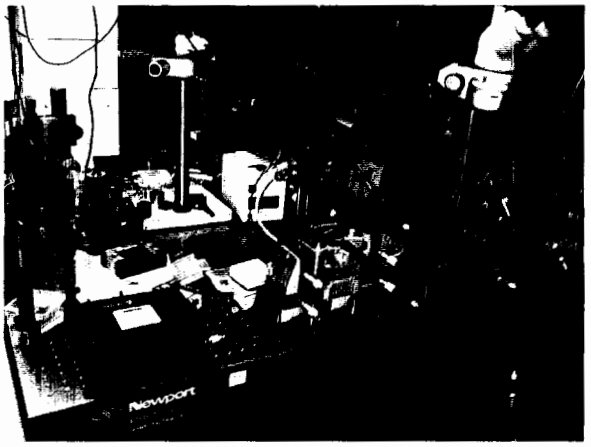
Personnel: 2 Government

Equipment: Optical spectrum analyzer; short pulse measurement system; two 4x8' optical tables with pneumatic vibration isolation legs and overhead shelf; two NIR cameras and monitors; and SWIR cameras and monitors

Special Needs: Air conditioning, power strip along the walls, and ceiling drop-own power outlets







24. Laser Test Tunnel

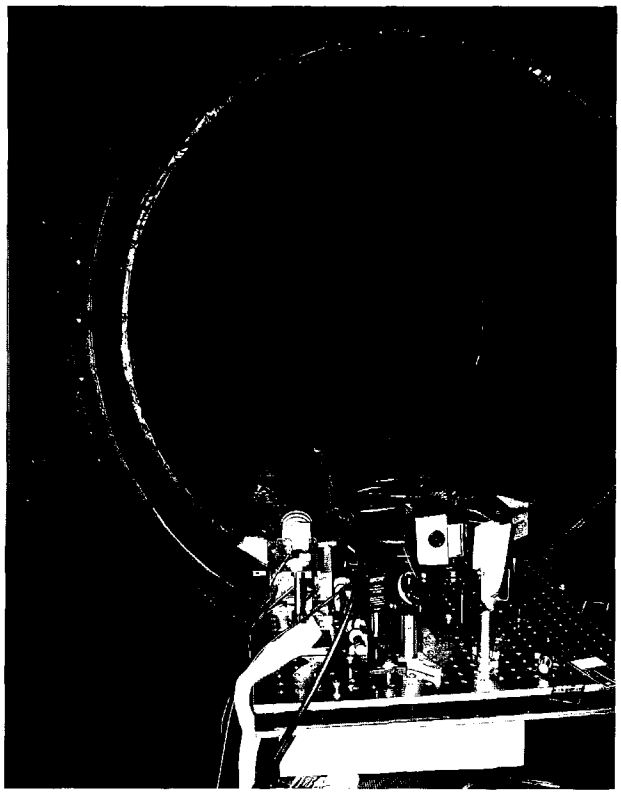
Description: The NVESD Laser Test Tunnel located in the NVESD Fort Belvoir, VA, Building 357 is a long (55 m) enclosed space in which lasers and remote sensing systems can be tested as well as performing alignment and measurement of laser rangefinders and LADAR equipment. The enclosed nature of the tunnel allows high power laser systems to be operated safely with a minimum of precautions. The proximity to laboratory facilities, parts, and test equipment makes it extremely valuable for troubleshooting systems which operate over a longer range than can be provided in the lab.

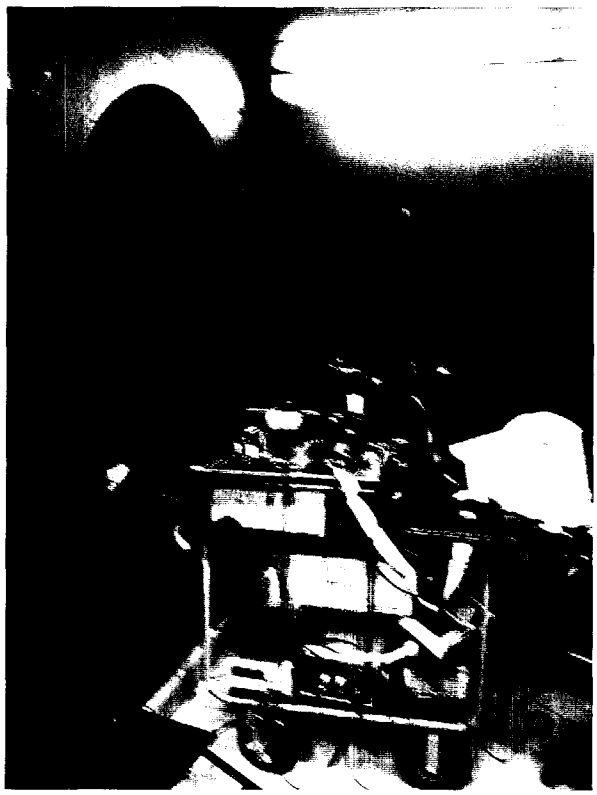
Footprint: 2,000 Square-Feet

Personnel: Up to 50 different Government and other users in a year

Equipment: Motorized sled to transport targets and equipment down the tunnel, extra power outlets, speakerphone communication between rooms at ends of tunnel, control of lights for both rooms in both rooms

Special Needs: 50+ m long tunnel, at least 2 m in diameter, painted black on the inside with air conditioning. At each end of the tunnel should be larger equipment setup rooms with extra power outlets, and easy access for equipment (extra wide doors, no steps, etc.).





25. Mine Lanes Facility

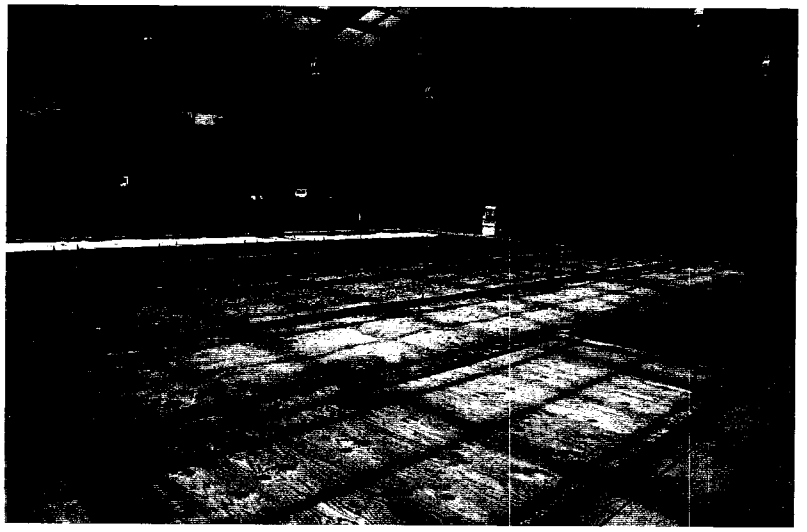
Description: The NVESD Mine Lanes Facility, Building 353, at Fort Belvoir was built in 1959 to support Countermine testing. It is one of the few indoor mine lane facilities in the world. During 2003, the facility underwent extensive renovation to add a greenhouse portion with moisture controlled lanes. The facility occupies approximately 14,000 square-feet of space. The indoor structure contains six mine lanes, each approximately 8-feet wide by 4-feet deep by 100-feet long. These lanes contain six different soil types: fine white sand, bank run gravel, crusher run gravel, loam (or silt), Virginia red clay, and, the McIntyre mixture (20% magnetite / 80% sand mixture). The lanes are separated by nonmetallic barriers to prevent the mixing of soils between adjacent lanes and prevention of false alarms that metallic barriers would produce. In addition there are two outdoor lanes, one on each side of the building. The two outdoor lanes are both crusher run gravel, also known as Virginia Department of Transportation (VDOT) 21A. Various buried mine targets can be emplaced in this clutter-controlled environment. An overhead trolley system is used for mounting the various mine detection systems and sensors under test. The trolleys are fully automated and equipped with 3-axis motion control. Data acquisition / data logging is also fully automated. This facility enables testing of commercial off the shelf (COTS) technologies without the expense of ruggedizing or weatherproofing prototype equipment. The new greenhouse structure was added to the facility to provide a countermine testing capability for targets buried in moisture-controlled lanes, and for solar loading studies. The greenhouse lanes are 8 feet wide by 6 feet deep by 60 feet long. The soil types are identical to those in the indoor facility. A built in sprinkler system delivers precise amounts of water to each lane. In-ground detectors are being installed to precisely measure moisture content in the lanes. The roof of the greenhouse is motorized, and can be rolled back to allow natural sunlight to illuminate the soils. This will enable testing of long wave infrared sensors. The greenhouse contains a single, overhead trolley system (similar to an industrial warehouse crane) that is be used for mounting of the mine detection systems and sensors under test. A control room overlooking the lanes is complete with recording and monitoring devices and contains controls to operate the trolleys. Data ports provide full connectivity to the NVESD network and to the World Wide Web. The facility has traditionally been used for hand-held mine detector evaluation, primarily electromagnetic induction sensors and more recently to test ground penetrating radar sensors.

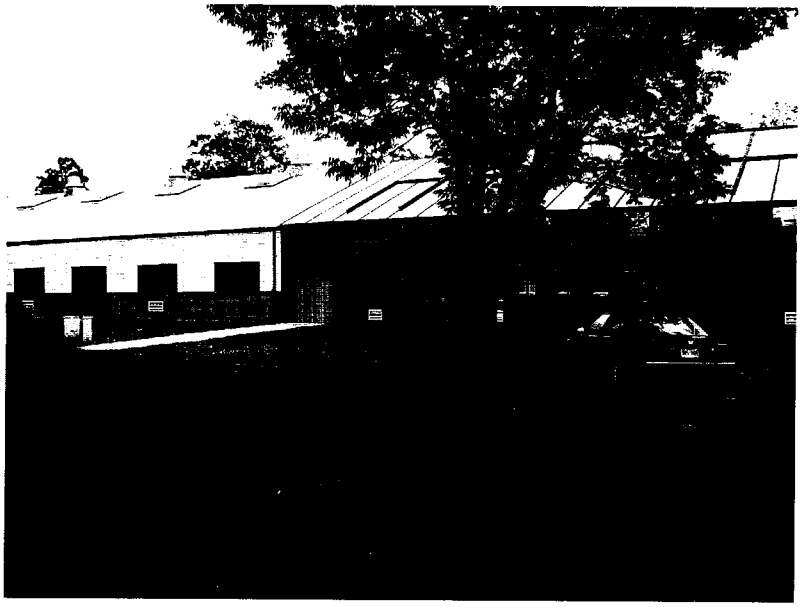
Footprint: 14,000 Square-Feet

Personnel: 5 Government

Equipment: XYZ-Axis Controlled Gantry System, Soil Moisture Equipment, Lab Control Room, Metal Detection Electrical Induction Equipment, and LWIR Cameras and Electronics

Special Needs: Significant HVAC requirement/magnetic-free construction





26. Molecular Beam Epitaxy (MBE) Development Laboratory

Description: The NVESD MBE Development Laboratory is located in Building 357 at Fort Belvoir, VA. This newly installed (CY05) state-of-the-art molecular beam epitaxy chamber is designed for deposition of the highest quality HgCdTe. Equipment is used for the creation of state-of-the-art infrared photovoltaic diode structures on CdZnTe and Si substrates. Exploration of new materials and device structures are made possible by the equipment's very high film quality and precise composition, doping, and thickness control. The MBE Development Lab will support NVESD Microfactory Laboratory by developing and implementing innovative growth procedures for insertion into Microfactory processes.

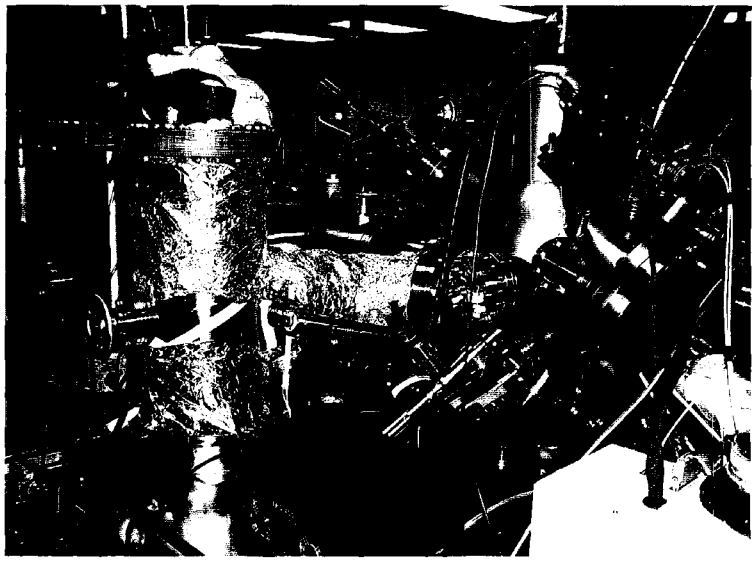
Footprint: 1,000 Square-Feet

Personnel: 3 Government/1 Contractor

Equipment: Riber Compact 21 Research MBE chamber, consisting of 1 gGrowth chamber for 3" wafers, 1 growth chamber pumping system, 1 liquid nitrogen cooling trap for Hg condensation, 1 wafer handling system, 1 wafer heating/rotation assembly, 1 buffer/loading system, 1 buffer/load lock pumping system, 1 chamber bakeout system, 8 source shutter assemblies, 1 EpiMax computer control unit, 5 double zone effusion cells, 1 as cracker cell, 1 valved Hg source and controller, 12 regulated 40V/40A DC power supplies, 3 ultra high vacuum ion gauge heads and readout electronics, 1 high-voltage electron gun and phosphor screen for RHEED measurement, 1 J.A. Woolam M-2000 Spectroscopic Ellipsometer, 1 residual gas analyzer system, and 2 personal computers

Special Needs:

Floor resistance:	500kg/m^2
Lab temperature:	20° C ± 5°
Lab Humidity:	< 65%
Electrical Power:	3 phase, 230VAC, 60A/phase, uninterupted
Lab Water:	5 L/min per chamber
Compressed air:	105 psi
Dry Nitrogen:	15 psi
Liquid Nitrogen (-196° C):	18 L/hr



27. Near/Short-Wave Infrared Sensor Performance Characterization Lab

Description: The NVESD Near/Short-Wave Infrared Sensor Performance Characterization Lab is a low light level device evaluation laboratory. The laboratory has been designed to assess passive solid state FPAs, CMOS devices, hybrid tube devices, test structures as well as complete camera systems that operate in the visible, near infrared (NIR) and short wave infrared (SWIR) spectral regions. The lab is equipped with both broadband and narrowband evaluation systems including calibrated 2856K blackbody sources capable of producing light levels from 10^{-6} to 10^{-1} Footcandles (or $\approx 10^{-12}$ to 10^{-7} W/cm^2). These light levels are ideal for replicating the spectral irradiance of the night sky from overcast to full moon conditions. Measurements performed in the laboratory consist of responsivity, noise floor, signal-to-noise, defects and 3-dimensional noise. These parameters are evaluated as a function of light level, wavelength, gain, temperature and/or integration time. The facility is located in the NVESD Fort Belvoir, VA, Building 357, rooms 236 and 237, and occupies 1,096 square-feet of space.

Footprint: 1,096 Square-Feet

Personnel: 2 Government/1 Contractor

Equipment:

1 Optical Bench , 8'x 4'
1 Low Light Case for Optical Bench (includes top shelving)
2 lab carts, 2' x 3'
3 Work Desks, 6'x 2.5'
2 ESD Protected Work Benches w/upper shelves, 5'x 2.5'
1 Desk/Storage Drawers, 6'x 2.5'
3 storage cabinets, 6' tall x 3' wide x 1.5' deep
1 Tektronix Oscilloscope Mainframe
1 SBFPA Thermal Imager
1 Loral Imaging System
1 Amber Engineering Camera System
1 Pulse Instruments Mainframe
1 Pulse Instruments Data Generator
6 Sensors Unlimited SWIR Cameras
1 Leybold Vacuum Pump System
1 Litton IR Camera
3 Stand Alone Lab Computers
1 Integrated Design Digital Camera
1 Dage MTI Monitor
1 Texas Instruments Helmet Mounted Thermal Imager
1 Tektronix Digital Oscilloscope
1 Raytheon Sight Prototype
1 Keithley Digital Multimeter
2 Thermo Oriel Spectrometer Systems
1 Azimuth Inc. Light Source
1 SEIR Dewar

Special Needs:

a. Electrical Power Requirements:

- 110 V AC, at least 4 x 30 Ampere and 7 x 20 Ampere lines required (lines should be mounted overhead for safety reasons and for easier access)

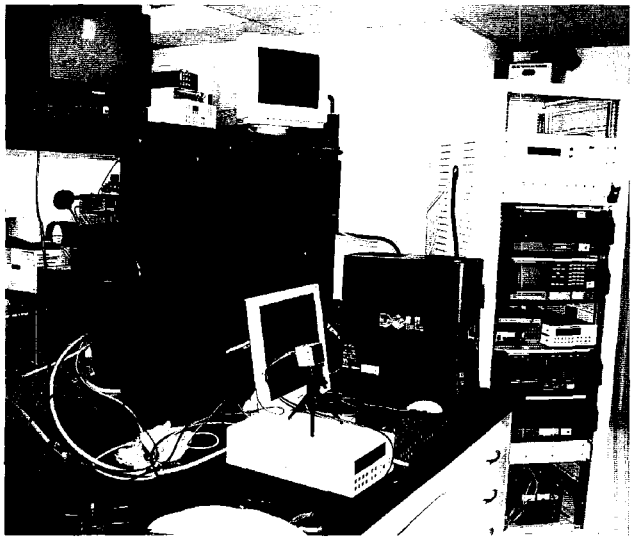
- 3 UPS Units rated at 5 kVA each for laboratory to keep equipment operational for proper powerdown in the event of power failure

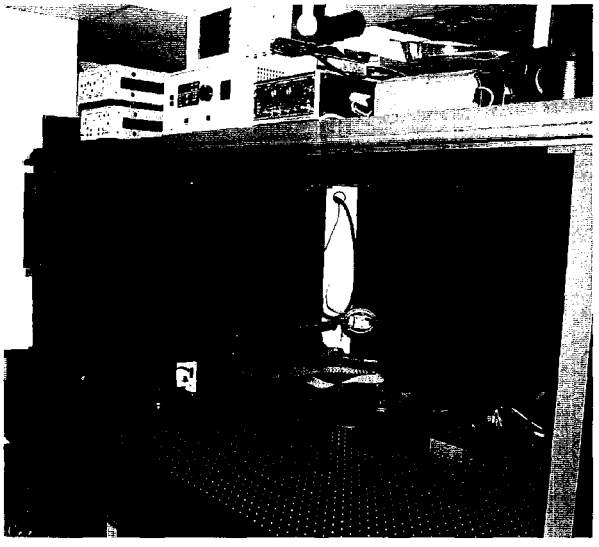
b. Miscellaneous:

- Stable AC capable of maintaining a lab environment at +22 C +/- 1 C, 50% RH Required

- Dry and liquid nitrogen lines for environmental tests, and cooling of focal plane arrays

- Compressed air lines for cleaning of optics





28. Networking Facility

Description: The NVESD Networking Facility, Building 361 Facility, Fort Belvoir, VA, is an 11,500 square-foot computer facility that houses the NVESD NIPRNET server farm including the file servers for the NVESD imagery, project space, E-mail servers, Print Servers, and, backup servers. The file servers contain over 4 Terabytes of digital terrain imagery that was collected with various NVESD sensors and some digital terrains. UNIX application servers located in Building 361 and Building 309 use the imagery for the Modeling and Simulation (M&S) experiments. The project space servers allow the NVESD engineers to write and store their M&S and Automated Target Recognition (ATR) algorithms. E-mail servers support over 1600 mailboxes and provide NVESD with a highly reliable means to communicate electronically. The servers also provide the capability to link all of the internal databases used by operations functions such as program budget. Building 361 contains a computer based training room that supports 18 students. A storage area and a PC setup/repair area provide complete setup and repair of all Automated Data Processing (ADP) equipment for NVESD. Office space includes the Help Desk area, the PC Technician area, UNIX & NT systems administrations, and the database programming team. The server room has complete fire suppression, Air Conditioning, and electrical backup capabilities providing 24-hour by 7- days-a-week service and support.

Footprint: 11,500 Square-Feet

Personnel: 15 Government/24 Contractor

Equipment:

Production Servers:
(18) Windows Servers
(1) UNIX Servers

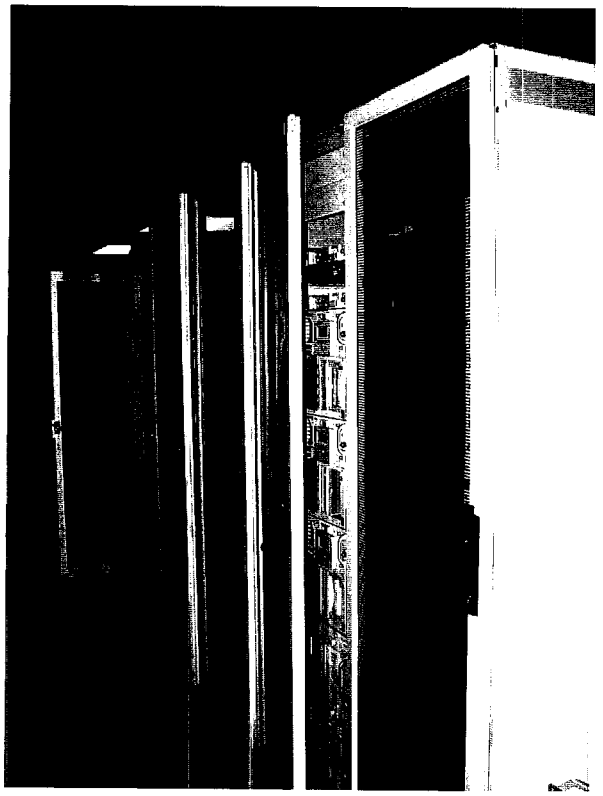
Defense Research Engineering Network (DREN) Servers:
(33) Windows Servers
(20) UNIX Servers

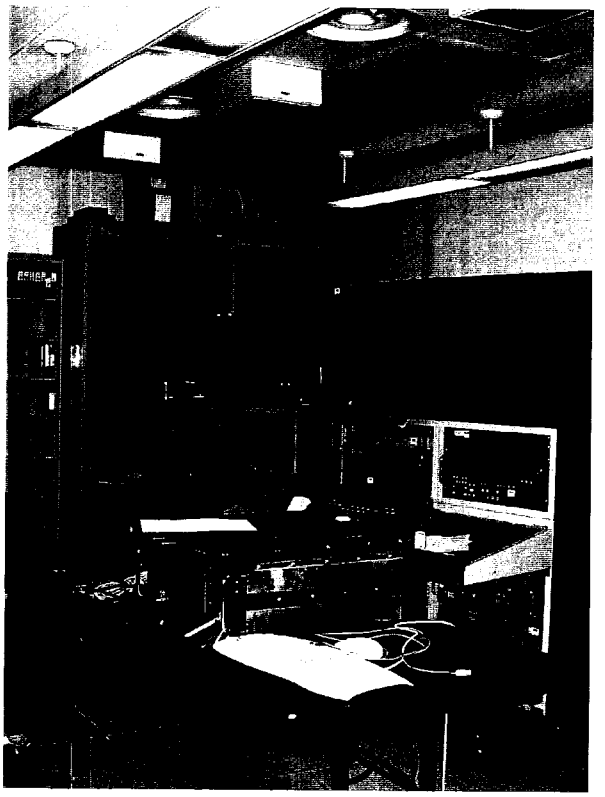
Engineering Development Network Servers:
(11) Windows Servers
(7) UNIX Servers

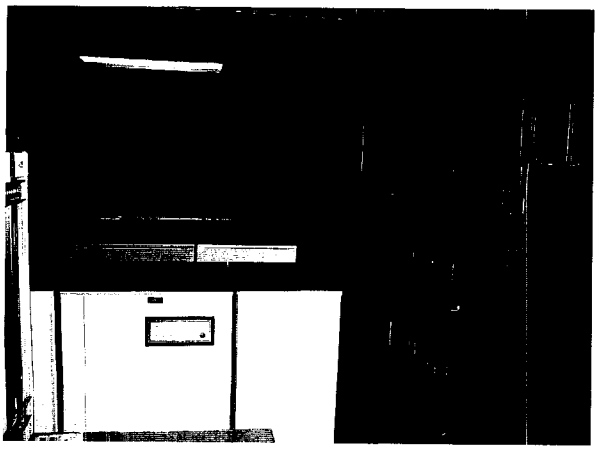
Hitachi Storage Area Network (SANS) – 27 TB
Spectro Logic Spectra T950 LTO-2, 200 Tb Tape Backup Library
ALT P3000 DLT 7000, 18 Tb Tape Backup Library
CISCO PIX Firewall
CISCO 6500 Catalyst Switch

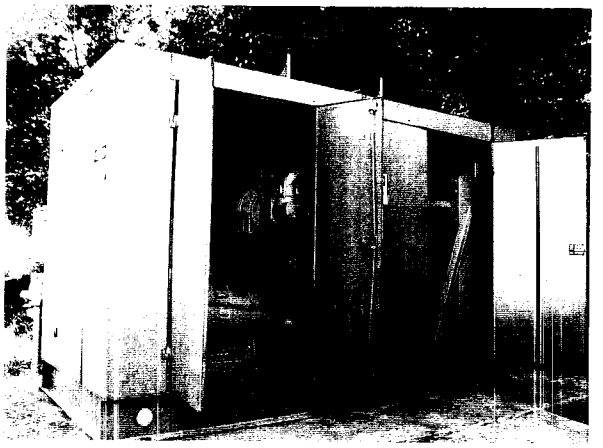
Special Needs:

205KVA Natural Gas Backup Generator
(4) 20KW Backup UPS
(2) Redundant 20 Ton Liebert Air Conditioners
Fire Suppression, water with dry above the server room ceiling
Raised Server room floor with forced A/C from below









29. Optical Improvement Laboratory

Description: The NVESD Optical Improvement Laboratory measures night vision devices and cameras to determine their vulnerability to hostile detection, jamming and destruction. It also performs the research, design, fabrication, and testing of protection improvements to these devices and cameras. Testing involves the use of lasers of varying power levels (eye safe and not eye safe) of varying wavelengths. The testing also involves the use of numerous night vision devices and camera systems that cover the spectrum range from visible through the long wave infrared band. The lab occupies 2,000 square feet of space in the NVESD Fort Belvoir, VA, Building 305.

Footprint: 2,000 Square-Feet

Personnel: 2 Government

Equipment:

- Electronics assembly and work area:

40 ft long x 30" deep workbench area for general-purpose assembly and electro-mechanical work. This area is made up of 10' long bays, each bay having 10 electrical outlets and one overhead shelf. All work surfaces should be anti-static and grounded.

13 ft long x 5 ft wide work island for large-scale assembly and test. Each side should have at least 15 electrical outlets. Island top should be anti-static and grounded.

2 Optical Bench, 5' x 10' with air-bearing legs.

2 19" x 6' instrument rack for test and measurement equipment, including the following:

- HP 4140B pA meter/DC Voltage Source
- HP 3456A Digital Voltmeter
- HP 35660A Dynamic Signal Analyzer
- HP 4145A Semiconductor Analyzer

3 standalone PC workstations for laboratory equipment control, data collection, and analysis. Workstations are networked along with printers in a local area network which is NOT part of main NVESD network.

8 48" metal cabinets (4 shelf) for storage of equipment and project supplies

4 large multiple-drawer storage cabinets for electrical and optical components

2 large antistatic workbenches for electronics fabrication and repair, modifications, and assembly. Each workbench should contain at least 10 electrical outlets, and storage for electronic and mechanical tools and components. Each workbench should be equipped with electronics vise, soldering and de-soldering stations, fume extractor, halogen work light, and a binocular microscope for surface-mount electronics work and inspection.

- General equipment:

- The entire electronics assembly and work area should be surrounded by a ground bus equipped with banana plugs.

- Compressed air line with multiple taps
- Compressed Dry nitrogen line
- Utility sink
- Eye-wash station

1 Spectral Responsivity Characterization Station (Thermo Corp Fourier Infrared Spectrometer w/control PC)
1 Environmental Chamber (12" by 16" by 30") with a large environmental chiller and an environmental controller
2 Large Extended Source Blackbodies with associated control and power electronics.
1 Large Extended Source Cryo-Blackbody with associated chiller and control/power electronics
1 High Temperature Cavity Blackbody with control electronics box
1 Dewar Pumpout Station (Vacuum Pump)
1 Digital Camera Data Collection Station (IO Industries Video Savant)
2 SE-IR Prototype IRFPA Characterization Stations
2 Prototype IRFPA Data Acquisition Units (Hi Techniques WIN600 and IQ300, 1 of each)
1 3-bay instrument rack, which contains the following:
1 PI-11008 Pattern Generator (clocks FPAs)
1 PI-2000 Pattern Generator
1 PI-5800 Pattern Generator
1 PI-4003 Power Mainframe for Precision Low-Noise Bias Lines
1 PI-4001 Bias/Clock Control Electronics Box
2 PI-4002 Bias/Clock Generator Boxes
2 large format cooled IRFPA cameras with support electronics and portable PCs
3 large antistatic workbenches for FPA mounting, optics mounting, wiring, etc. Workbenches also contain storage space for optical and opto-mechanical components
4 large storage cabinets for electrical and optical components – At least one additional cabinet required
3 large heavy duty tripods with additional mechanical fixturing for field test capability of cameras
1 large workbench for mechanical fabrication and assembly. Workbench should be equipped with vise and storage for tools and equipment.
Each worker will need a work area/desk with at least 20 ft of 30" deep work area, 20 linear ft of book shelving, and 10 electrical outlets. At least 10 ft of the work area should have an anti-static surface.

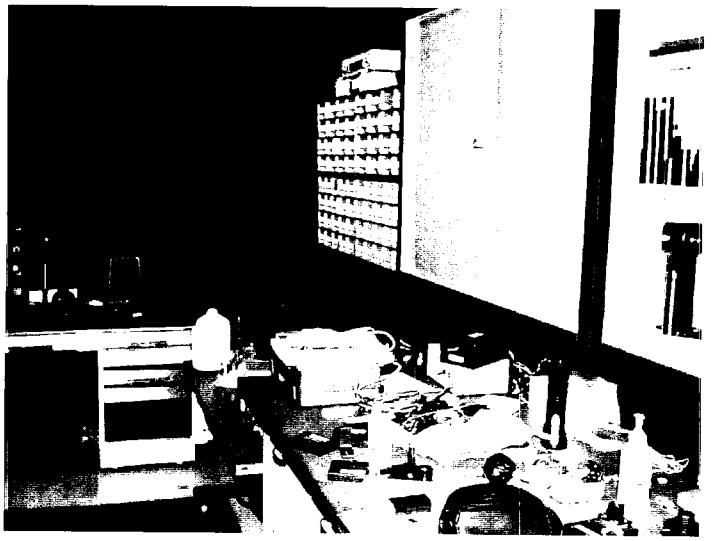
Special Needs:

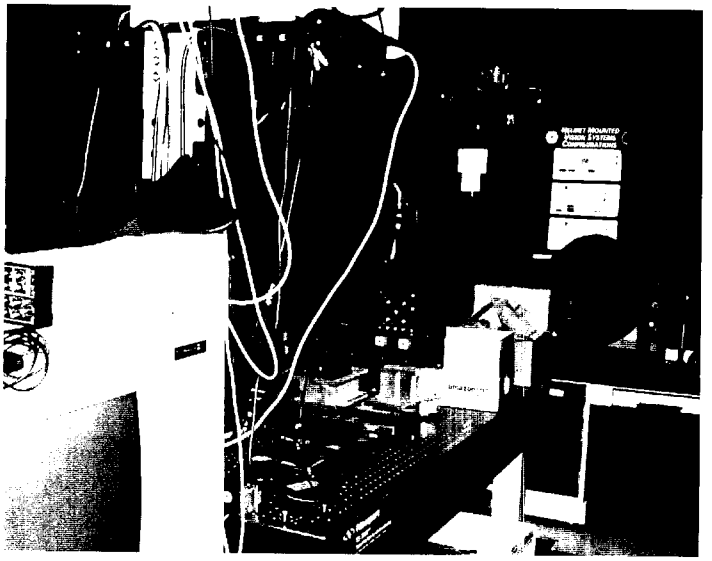
- Electrical Power Requirements:

110V AC, 200 Amps total, 15A and 20A circuits.

5 UPS Units rated at 5 kVA for laboratory to keep equipment operational for proper powerdown in the event of power failure

- Air Conditioning: Stable A/C capable of maintaining lab environment at +22C +/- 1C, 50% RH required





30. Optics Laboratory

Description: The NVESD Optics Laboratory has been a cornerstone of Night Vision since the 1960's, providing impartial optical testing and analysis for a wide application of systems from the visible to the long-wave infrared (LWIR). Recently the lab has been upgraded with the purchase of a state of the art video based Modulation Transfer Function (MTF) test system for visible, near infrared (NIR), and LWIR, with future upgrades to include the mid-wave IR (MWIR). This recent improvement expands on the lab's other capabilities, which include measuring veiling glare, stray light, afocal magnification, distortion, field of view, focal length, and spectral transmission of filters. In the very near future, additional capabilities will be added including the measurement of optical system spectral transmission and a variety of measurement tests for eyepieces. The lab is located in the NVESD Fort Belvoir, VA, Building 305, room 120, and occupying 2,500 square feet of space.

Footprint: 2,500 Square-Feet

Personnel: 3 Government

Equipment:

- Modulation Transfer Function (MTF) Test System - Optics: 3-axis motion controlled image analyzer, phase lock amplifier, stand-alone desktop computer, light source power supply, visible light source, infrared source, 8-axis motioncontroller, motor power supply, uninterruptible power supply, CCD camera - VIS/NIR, Vidicon camera, thermal camera, photomultiplier tube, InSb detector, HgCdTe detector, turning mirror, 2500mm EFL collimating mirror, target wheel, Image analyzer rotation stage, image analyzer remote control, motorized scan aperture, and a high-voltage power supply

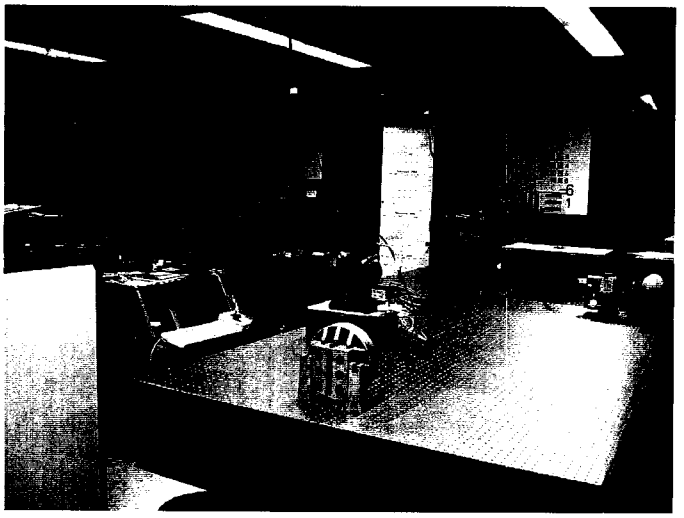
- Optronics Spectroradiometer - Optics: 2 double grating monochromators, light source, collimator, stand-alone desktop computer, light source power supply, integrating sphere - gold plated, integrating sphere – visible, silicon detector, and a HgCdTe detector

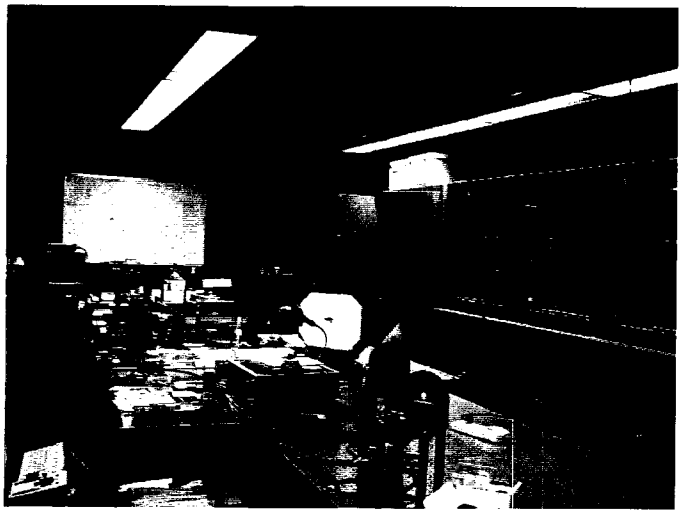
- Veiling Glare Test Station: Photometer - PR 1980A Prichard, motorized rotation stage, motor controller, stand alone computer, light source, and a light source power supply

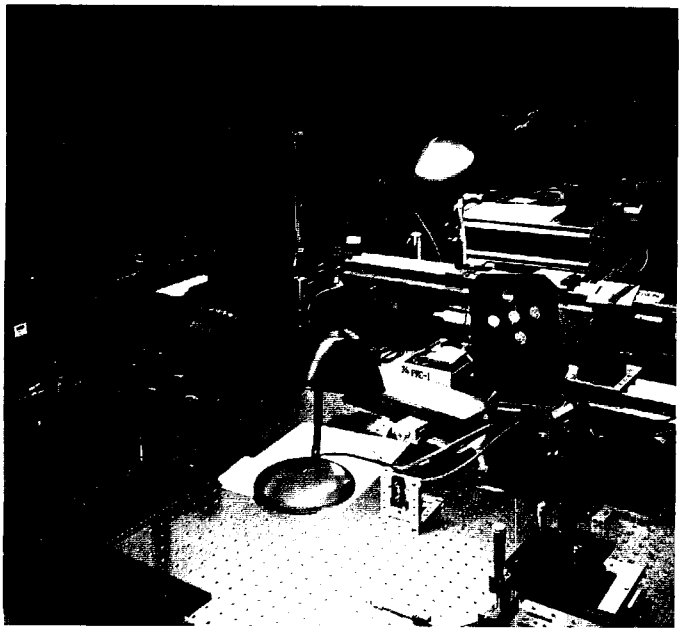
- Stray Light Test Station: Light source, light Source power supply, 25-inch diameter integrating sphere, photomultiplier tube, three-axis motion controller, high-voltage power supply, and a electrometer

- Nikon Auto Collimator
- 12' x 4' Optical Table
- 5' x 6' Optical Table
- Two 8' x 5' Optical Tables
- Sixteen Optical Table Isolators

Special Needs: Vibration isolation of the floor is required for all tests, room temperature control is necessary for maintaining standard room conditions, light isolated and light tight rooms, compressed air source to "float" optical tables, and black curtains/curtain support from ceiling







31. Processor Development Laboratory

Description: The Processor Development Laboratory (PDL) is a 1,000 square foot electronics integration facility located in Building 307 at Fort Belvoir, VA. This multipurpose facility is utilized for all aspects of processor development from design to test and evaluation. Tradeoffs between various processor architectures, inter-processor communication protocols, and types of processing are done. A processor subsystem can be modeled to verify functionality and to ensure it meets requirements. The PDL has the capability to access various software tools and libraries of component models, being developed through internet connections to the rest of the world. Real-time embedded processor components are integrated into complete functional units within this facility. Several processor testbeds that adhere to commercial standards such as VME are available. The testbeds can be programmed with various types of algorithms and sensor types for target detection applications and can be utilized in processor evaluations and demonstrations.

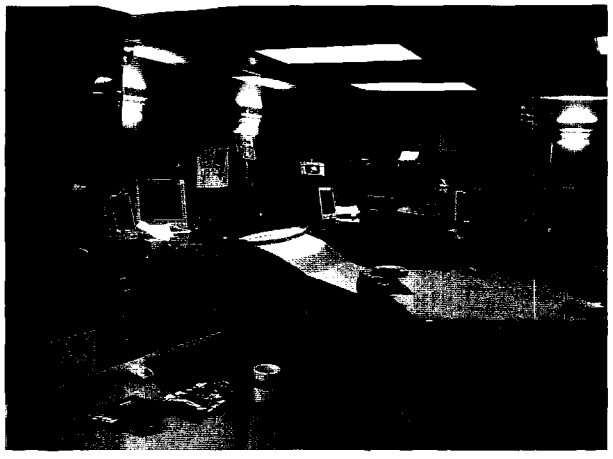
Footprint: 1,000 Square-Feet

Employees: 5 Government

Equipment:

5 – UNIX/Sun workstations
3 – PCs in board formats for use with embedded processor systems
4' x 10' optical bench
10 – 6' equipment cabinets
40 linear feet of electrostatic electronic workbenches with 120V, 20A outlets
30 linear feet of computer room workspace

Special Needs
Raised floor throughout lab
Double doors w/ ramp from hall to raised floor
2 – 5ton AC units with temperature and humidity control designed for computer room cooling through raised floor vents
2 – L6-30R connectors with 240V, 30A circuits
150KW backup power unit for entire lab



32. Prototype Infrared (IR) Focal Plane Array and IR Camera Characterization Laboratory

Description: The Prototype IR Focal Plane Array and IR Camera Characterization Laboratory is used for performance parameter characterization of advanced prototype cooled and uncooled mid-wave IR (MWIR) and long-wave IR (LWIR) staring focal plane arrays (FPAs) and MWIR and LWIR staring FPA-based prototype camera sensors. In the past, scanning FPAs such as the Standard Advanced Dewar Assembly (SADA-II) have also been characterized in this laboratory. The following focal plane parameters are characterized in this laboratory: Broadband Responsivity, Temporal and Spatial Noise, 3D Noise, Temporal and Spatial Noise Equivalent Temperature Difference (NETD), Detectivity (D*), Calibaratibility (also known as Post Correction Non-Uniformity), 1/f Noise, Dynamic Range, and Relative Spectral Responsivity. Prototype camera sensors are also evaluated for the same list of parameters, and additionally also for the parameter Image Blur and Thermal Time Constant Assessment (for sensors that are based upon uncooled FPAs only). The lab occupies 2,000 square feet of space in the NVESD Fort Belvoir, VA, Building 357, rooms 268, 270, 275A, and 296.

Footprint: 2,000 Square-Feet

Personnel: 5 Government

Equipment:

4 Optical Benches (1st 6' x 9', 2nd 4' x 10', 3rd 5' x 10', 4th 5' x 10')
2 Overhead Shelves for Optical Benches, 10' long by 2' wide, equipped with electrical power outputs
1 Image Smear Characterization Station (6' motorized stage with supporting PC and drive electronics)
1 Spectral Responsivity Characterization Station (Thermo Corp Fourier Infrared Spectrometer w/control PC)
1 Environmental Chamber (12" by 16" by 30") with a large environmental chiller and an environmental controller
2 Large Extended Source Blackbodies with associated control and power electronics.
1 Large Extended Source Cryo-Blackbody with associated chiller and control/power electronics
1 High Temperature Cavity Blackbody with control electronics box
1 Dewar Pumpout Station (Vacuum Pump)
1 Digital Camera Data Collection Station (IO Industries Video Savant)
2 SE-IR Prototype IRFPA Characterization Stations
2 Prototype IRFPA Data Acquisition Units (Hi Techniques WIN600 and IQ300, 1 of each)
1 3-bay instrument rack, which contains the following:
1 PI-11008 Pattern Generator (clocks FPAs)
1 PI-2000 Pattern Generator
1 PI-5800 Pattern Generator
1 PI-4003 Power Mainframe for Precision Low-Noise Bias Lines
1 PI-4001 Bias/Clock Control Electronics Box
2 PI-4002 Bias/Clock Generator Boxes
4 standalone PC workstations for laboratory equipment control, and data collection and analysis (Workstations are networked along with several equipment controlling PCs into local area network which is NOT part of main NVESD network)
22 Indigo Omega Cameras with associated equipment in storage cabinet
2 large format cooled IRFPA cameras with support electronics and portable PCs
3 large antistatic workbenches for FPA mounting, optics mounting, wiring, etc. (workbenches also contain storage space for optical and opto-mechanical components)

4 large storage cabinets for electrical and optical components (at least one additional cabinet required)
3 large heavy duty tripods with additional mechanical fixturing for field test capability of cameras
1 large 5 drawer safe for classified materials

Special Needs:

a. Electrical Power Requirements:

- 110V AC, at least 9 (nine) 30 Ampere and 7 (seven) 20 Ampere lines required. Lines should be mounted overhead for safety reasons and for easier access, as well as a cluster of 4 x NEMA L5-30 Plugs capable of 125 V and 30 Amps each in order to power an environmental chamber

- 6 UPS Units rated at 5 kVA for laboratory to keep equipment operational for proper powerdown in the event of power failure

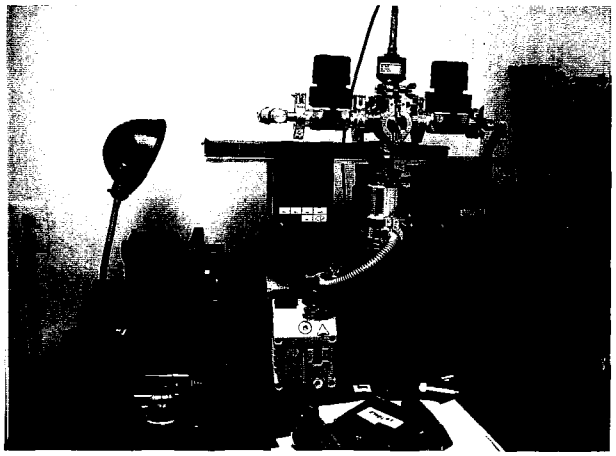
b. Air Conditioning:

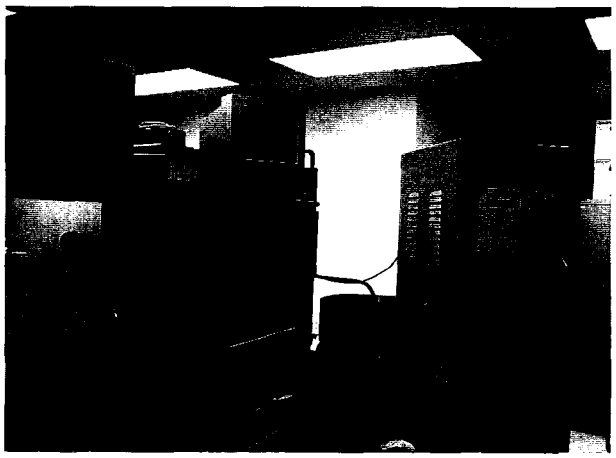
- Stable A/C capable of maintaining lab environment at +22C +/- 1C, 50% RH required

c. Other Requirements:

- 2 Dry Nitrogen Gas Hookups (House Air preferred, cylinder hookups if necessary).

- Availability of Liquid Nitrogen for Cooled IRFPA Evaluation required





33. Readout Integrated Circuit (ROIC) Laboratory

Description: The NVESD Readout Integrated Circuit (ROIC) Laboratory measures night vision devices and cameras paying particular attention to the system issues associated with the ROIC such as nonlinearity and nonuniformity. It also performs the research, design, fabrication, and testing advanced ROICs for these devices and cameras. Testing involves the use of light sources of varying wavelengths from the UV, visible, NIR, SWIR, MWIR and LWIR. The testing also involves the use of numerous night vision devices and camera systems that cover the spectrum range from UV through the long wave infrared band. The lab occupies 2,000 square feet of space in the NVESD Fort Belvoir, VA, Building 357.

Footprint: 2,000 Square-Feet

Personnel: 2 Government/1 Contractor

Equipment:

-Electronics assembly and work area:

40 ft long x 30" deep workbench area for general-purpose assembly and electro-mechanical work. This area is made up of 10' long bays, each bay having 10 electrical outlets and one overhead shelf. All work surfaces should be anti-static and grounded.

13 ft long x 5 ft wide work island for large-scale assembly and test. Each side should have at least 15 electrical outlets. Island top should be anti-static and grounded.

1 Optical Bench, 5' x 10' with air-bearing legs.

1 19" x 6' instrument rack for test and measurement equipment, including the following:

- HP 4140B pA meter/DC Voltage Source
- HP 3456A Digital Voltmeter
- HP 35660A Dynamic Signal Analyzer
- HP 4145A Semiconductor Analyzer

4 standalone PC workstations for laboratory equipment control, data collection, and analysis. Workstations are networked along with printers in a local area network which is NOT part of main NVESD network.

8 48" metal cabinets (4 shelf) for storage of equipment and project supplies

4 large multiple-drawer storage cabinets for electrical and optical components

2 large antistatic workbenches for electronics fabrication and repair, modifications, and assembly. Each workbench should contain at least 10 electrical outlets, and storage for electronic and mechanical tools and components. Each workbench should be equipped with electronics vise, soldering and de-soldering stations, fume extractor, halogen work light, and a binocular microscope for surface-mount electronics work and inspection.

General equipment:

- The entire electronics assembly and work area should be surrounded by a ground bus equipped with banana plugs.
- Compressed air line with multiple taps
- Compressed Dry nitrogen line
- Utility sink
- Eye-wash station

- Mechanical workshop:
  - Arbor press
  - Milling machine/drill press (at least 1" diameter chuck and 24" x 24" x 24" working volume
  - Small high-speed drill press
  - Grinding/sanding wheel
  - Fume hood for painting and chemical use.

1 large workbench for mechanical fabrication and assembly. Workbench should be equipped with vise and storage for tools and equipment.

Each worker will need a work area/desk with at least 20 ft of 30" deep work area, 20 linear ft of book shelving, and 10 electrical outlets. At least 10 ft of the work area should have an anti-static surface.

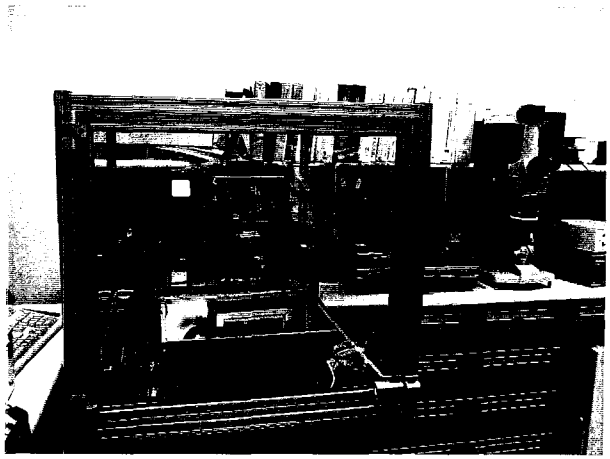
Special Needs:

- Electrical Power Requirements:

110V AC, 200 Amps total, 15A and 20A circuits.

5 UPS Units rated at 5 kVA for laboratory to keep equipment operational for proper powerdown in the event of power failure

- Air Conditioning: Stable A/C capable of maintaining lab environment at +22C +/- 1C, 50% RH required



34. S&T Rooftop Test Facility

Description: The NVESD S&T Rooftop Test Facility is a unique laser and infrared camera testing facility serving government and industry. This facility is located on the top of the NVESD Fort Belvoir, VA, Building 357 giving 240-degree coverage from windows that open looking over the Potomac River basin. It allows lasers and sensor to see out to a distant of 10 kilometers without being blocked by buildings or vegetation. This provides scientist and engineers with a facility that can provide initial data on camera and laser performance. Additionally, another unique feature is the platform on the far side of the S&T Rooftop Test Facility where sensors can be set up to look down onto a grass and wooded area for collection data from targets such as mines and vehicles.

Footprint: 900 Square-Feet

Personnel: Up to 50 different Government and other users in a year

Equipment: Varies by test event

Special Needs:

- At least 30 ft x 30 ft floor space
- At least three stories up with unobstructed views to ranges of two kilometers
- Windowed from waist level to ceiling on at least three sides. Windows on tracks will all slide to one side and can be easily removed if necessary
- Access to outdoor, stabilized platform at least 30 ft x 30 ft with capability to handle heavy equipment
- Easily accessed via heavy equipment freight elevator
- Power requirements: 110 v outlets every 3 ft plus at least two 220 v outlets

35. SAP Facility

Description: The NVESD SAP Facility support SAP Programs.

Footprint: 3,440 Square-Feet

Personnel: 10 Government/8 Contractor

Equipment: On the order of 15 computer work stations, two (4 ft x 12 ft) optical benches, and test trailers

Special Needs: 2,000 Square-Foot vault with a Modeling & Analysis lab, security office, two rooms for daily work , and a conference room for program discussions; 1 600 Square-Foot lab for Perception Studies; 1 240 Square-Foot lab with 2 work stations; 1 600 Square-Foot laser lab, and access to a 5 km laser range. All labs need to have A/C for the computers and all labs and the vault need to be constructed to meet the security guidelines for SAP's – particularly alarms (JCIDS), noise reduction for walls and ceilings, etc…

36. Smart Gate

Description: The DoD Smart Gate (SG) at NVESD, Fort Belvoir, VA, is an autonomous entry gate test bed built by SPPD in support of the Product Manager for Force Protection Systems. The goal of the SG Project is to reduce the number of guards required to check vehicles and personnel IDs, improve the flow of vehicles through access checkpoints, and verify access authorization of vehicles and personnel. Employees enrolled with SG access the 300 Area Compound through the Truck Gate located near Building 335 using Common Access Card, NVESD proximity badge, and RFID vehicle tag sensors. Other technologies currently under test include swing-arm gates, magnetic disturbance proximity sensors, inductive loop sensors, photo-electric light curtains, and "on-the-move" biometrics devices. Future technologies planned for SG testing are multiple passenger detection sensors and hyper-spectral driver/passenger imaging. Eventually, a final version of the SG will be located at all US Army Post entry points. The SG Project Test Bed Lane is located in the Fort Belvoir, VA, CERDEC/NVESD Visitor Center parking lot and the SG Offices are in building 335.

Footprint: 12,900 Square-Feet (2,713 Square-Feet Office Space)

Personnel: 3 Government/1 Contractor

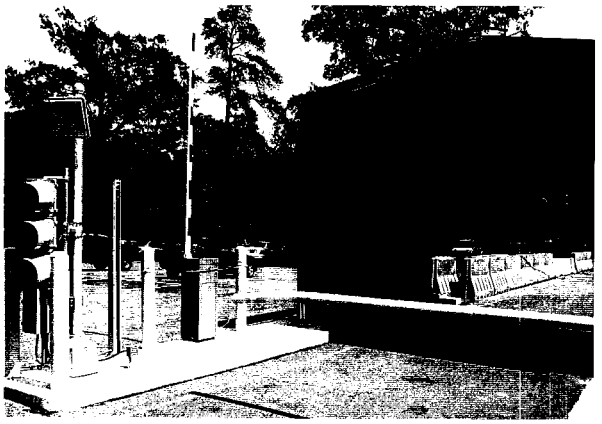
Equipment:

4 Computers (SG Lane Control)
2 Computers (Biometrics)
2 Computers (Surveillance System)
2 Computers (SG Operations)
1 48"x60"x16" NEMA enclosure with: 4 opto22 switches, 4 A&E loop controllers (2 loops per controller for 8 loops), Test switch bank for all Magnetic Ground Loops, Light Curtain, and Swing Arm Gates.
2 24"x20"x10" NEMA enclosures for RFID Readers, Traffic Lights, Light Curtain Electronics and Alarms.
1 60"x24"x12" ID Tower housing 2 Driver's Face Cameras, 2 Barcode Scanners, and 1 HID Proximity Card Reader
8 SG Lane Video Cameras (various views including 2 in ID Tower)
2 AXIS DVR Servers (1 each controls 4 Video Cameras)
8 Magnetic Ground Loops (cut into asphalt and sealed)
3 Traffic Lights
2 RFID Readers
2 Swing Arm Gates
1 Light Curtain
1 Variable Message Board (VMS)
1 EG&G PICS server box
Wiring harnesses for SG electronics
1 Remote Reality Surveillance System with: 1 270 degree Panoramic Camera, 1 PTZ Camera, 1 Target 1 Detection and Tracking Computer, and 1 Control Computer

Special Needs:

- Electric Power
- Phone Service with 7 telephones
- Asphalt paved lane in Visitor Control parking area
- Concrete-based, Sheet-Metal Canopy Structure

- Independent LAN for SG Operations
- LAN connections (Network hub)
- 10' x 10' Modular Guard Shack
- 2,613 Square-Feet office space



37. System Engineering, Analysis, and Integration Laboratory (SEAIL)

The NVESD System Engineering, Analysis, and Integration Laboratory (SEAIL) is an Integrated Systems Laboratory complex dedicated to the development and improvement of ground based Night Vision Electro-Optic and Electronic systems providing the capability for the rapid characterization and analysis of applied technologies. Located in the NVESD, Fort Belvoir, VA, Building 305, the laboratory currently occupies 6210 square-feet of space on the second and third floors and anticipates growth to 11,444 square feet over the next five years. The functions of the SEAIL facility include (1) integration of laser based technologies, visible imaging and CMOS CCD I2 imaging with Forward Looking Infrared (FLIR) imaging technologies, near IR, Short Wave IR (SWIR), 1-2um solid state and 1.54um imaging; (2) Motion stabilized uncooled FLIR stereo vision and non-stabilized absorption band illumination combined with stereo vision for UGV obstacle detection; (3) Evaluation of militarized uncooled large and small format cameras; (4) Rapid test, evaluation, and analysis of the system and system of systems capabilities while in the development stages and/or during system integration; (5) Engineering capabilities of system design, rapid and experimental prototyping, integration and testing including the latest capabilities in CAD engineering workstation rapid prototyping; (6) Algorithm analysis and advanced digital signal processing. In this area the SEAIL will provided input and support to the established standard NVESD Algorithm Evaluation capability within the M&S Division;(7) Latest engineering capabilities in high density FPGA, PLD and surface mount technologies along with electronic circuit design, timing synthesis and printed circuit board design; (8) In laboratory field test preparation, system configuration/ reconfiguration, repair, maintenance, and support; (9) Evaluation of cooled Infrared Focal Plane Arrays (FPAs), Detector Dewars, and Integrated Dewar/Cooler Assemblies (IDCAs). The SEAIL directly supports the NVESD Advanced Sensor Evaluation Facility (ASEF) in providing the bases for selection of systems and configurations for precision characterization in the ASEF to support advanced performance model development. SEAIL provides preliminary preparation, configuration selection, test, and requirements development to enable the companion capabilities of the NVESD Observation and Laser Ranges at Ft A.P.Hill, VA, to be brought efficiently to bear in the broadest array of technical and operational field test exercises. In order to effectively and efficiently carry out the stated mission and objectives the SEAIL Complex is organized into twelve (12) functional modules providing access to engineers and technicians from all four Ground Combat System Division Branches as well as customer entities. The functional Modules of the SEAIL are:

a. NVESD SEAIL Field Preparation Lab Soldier Sensors and Robotics. This includes all soldier carried NVESD equipments as well as all small robotic platforms and their sensors. In this module systems are processed and prepped for field tests and upon completion of the tests re-processed, cleaned and checked for basic performance. Systems are sent on to other modules of the SEAIL or returned to test as necessary.

b. NVESD SEAIL Field Preparation Laboratory Manned Vehicle Sensors. This includes all NVESD systems mounted on Tanks, Scout Reconnaissance Vehicles, APCs and similar vehicles. These NVEO systems are generally heavier and bulkier requiring special lift capability for safety. These two field preparation laboratories occupies 937 sq ft in building 305 rooms 340 and 356B respectively

c. The NVESD SEAIL Cryogenic-Cooler Laboratory with its Automated Cooler Test Facility (ACTF). This subsystem/module laboratory provides the capability to test and evaluate current and future cryogenic-coolers for use in military infrared imaging sensors and space application hardware as well. The 675 square-foot laboratory is located in the NVESD Fort Belvoir, VA, Building 305, rooms 234/235. The lab is designed and maintained to support qualification tests prior to production, as well as tests of prototype military cryo-coolers. The lab is divided into a manual test facility and a computer controlled test facility, the ACTF. The function of the manual test facility is to test the basic performance of the cryo-cooler through a wide range of ambient temperatures and varying operating conditions. Critical

performance parameters of cool-down time, cooling capacity, and input power are automatically recorded. The function of the computer controlled test facility is to perform long-term performance tests such as reliability, and high and low temperature tests. The typical reliability requirement for linear drive coolers is 10,000-hours Mean Time to Failure (MTTF); the reliability requirement for the 1.5-watt cooler is 6,000 hours Mean Time to Failure (MTTF). The reliability test will continue until all the units under test meet/exceed the requirement, or the coolers fail. The computer controlled chamber and coolers are automatically cycled through varying ambient temperatures and operating conditions. Other tests performed in the cryogenic-cooler laboratory are Helium leak rate, audible noise, vibration output, high temperature, low temperature, and shock.

d. The NVESD SEAIL Detector Imaging/Radiometric Laboratory. This also is a subsystem/module laboratory which provides the capability to test and evaluate the performance of 2nd generation Focal Plane Arrays, and Integrated Dewar Cooler Assemblies(IDCAs) including the Standard Advanced Dewar Assembly (SADA) a 2nd Generation Forward Looking Infrared (FLIR) critical component for use in military infrared imaging sensors. This laboratory is divided into an imaging facility, FPA radiometric performance test facility, and an environmental test facility. The performance test facility tests key Dewar/Focal Plane/Command and Control Electronics performance parameters. Key baseline performance parameters tested include Detectivity, Responsivity, 1/f Noise, RMS noise, Input Power, Post Correction Uniformity, DC Offset, and Defective Scan Lines.. The imaging test facility provides the capability to test MRT, Signal Intensity Transfer Function, Noise Versus Background, Noise Versus Time, and 3-dimensional Noise, Other tests include Cross-talk Analysis, Scan and Cross-scan Modulation Transfer Function Characteristics. The Environmental test facility supports automated reliability testing, Temperature Shock, and High and Low Temperature Tests. Finally this laboratory also contains a state of the art electronics design and fabrication capability that enables the fabrication of custom test equipment, including the drive and timing electronics necessary to operate FPAs, Dewars, and IDCA assemblies received for testing. The imaging test facility is capable of supporting 3rd Generation FPAs, and the radiometric test facility is currently being reviewed, and plans executed to enable joint support of both 2nd and 3rd Generation devices.

e. NVESD SEAIL Electronics Laboratory. This is the primary Laboratory for electronic design, analysis, repair, and experimentation of the whole range of Night Vision Electro-Optic (NVEO) systems electronics) including the latest engineering capabilities in high density FPGA, PLD and surface mount technologies along with electronic circuit design, timing synthesis and printed circuit board design; It occupies 535 sq ft in the building 305 SEAIL complex.

f. NVESD SEAIL Systems Lab. This module provides long optical path length analysis capability integrated with a unique environmental capability at the terminus of the optical path. This module of the SEAIL provides the ability to test complete sensors and sensor systems. It contains a large environmental test chamber capable of accepting complete sensor systems. Moreover this chamber has a large optical window that allows sensors in the chamber to image targets placed in the collimator on the extended optical bench. This permits full system performance evaluation over the complete range of ambient temperatures. The chamber is planned to be upgraded to include solar loading testing. This will further enable system testing over the full range of the diurnal cycle. This lab is optically coupled to the SEAIL Laser Lab to substantially increase the optical path length and extend the flexibility of the lab. It occupies 602 sq ft in room 337 of building 305.

g. NVESD SEAIL Laser Lab. This is the primary SEAIL Laser Laboratory which is optically coupled as needed to the SEAIL Systems lab. This approximately 283 sq ft laboratory in Building 305 is equipped with several laser cavities (ER:GLASS, and Nd:YAG), InGaAs camera to see near IR laser wavelengths, and benches (including laminar flow bench) for non contamination laser builds. A research quality floating table (matching those in the Systems Lab) with access door to the main SEAIL lab enables a long

focal length path directly into the thermal chamber for laser evaluation and cavity design over a specified temperature requirement. This produces up to 30 times more sensitivity in studying beam stability as a function of temperature. Current capability in this laser laboratory includes measuring operating wavelength to +/- .01nm accuracy, laser output power (visible to IR), laser pulse width (single to very high repetition rate), beam quality (near and far field), boresight alignment and retention, and cavity characteristic over temperature.(stable and unstable resonator).

h. NVESD SEAIL System Control Lab. This is the primary networking control module for SEAIL LAB operations and is located as a direct adjunct to the NVESD SEAIL Systems Lab Module where it occupies 196 sq ft.

i. NVESD SEAIL Digital Signal Processing Lab Module. The GCSD is developing the advanced imaging sensor systems for the next generation of combat vehicles and un-attended ground sensors. Integral to these sensors is the need for rapid aided or automated detection of threat objects within a large field of regard in a ground-to-ground application. NVESD GCSD is working the Systems of Systems aspects of 2nd and 3rd generation sensors for use on the next generation of vehicles. These sensors must have the capability to rapidly scan large fields of regard in single or multiple spectral bands, process imagery for aided or automated detection, report potential target cues to the local system operator and provide output to the tactical internet. GCSD has develop the capability and facilities necessary to conduct image processing necessary to support the integration of the 2nd and 3rd Gen sensors for future combat vehicles. The DSP Systems Integration Lab (integral part of the SEAIL) was brought on line to support the experimentation and real time implementation for systems applications such as Local Area Processing (LAP), Non Uniformity Correction (NUC) of 3rd Gen FPAs, Image Fusion, and Wide Area Search (WAS) capable AiTD / AiTR, etc. Initial operations are conducted on un-classified data and algorithms. The GCSD SEAIL DSP Lab is a standalone classified accredited network within Room 336 (Vault) and will support end-to-end systems and AiTD/AiTR development and integration. Algorithms will be developed / evaluated on non-real time simulation and then implemented on real time hardware to include multi-processor boards, DSP devices, and/or Field Programmable Gate Arrays (FPGA) and in system Programmable Logic Devices (isPLD). The real time hardware implementation will then be evaluated on sensors in the SEAIL system evaluation facility. The scope of the ATR/Signal Processing support engineering includes the support of ATR Investigations/Studies by the following:

Analysis / Investigation of multi-spectral imagery metrics
Imagery Analysis for design of experiments
Ground truthing / imaging truthing support
Image quality characterization
Code and test algorithms in off-line non-real time environment
Image collection / Sensor Interface support
Rapid test fix test to drive performance

The NVESD SEAIL Digital Signal Processing Lab is located in Bldg 305 Room 336 (Vault), which is a secure facility.

j. NVESD SEAIL Observatory. This balcony area of the 3rd floor building 305 provides relatively unrestricted observation capability to test and demonstrate long range NVEO systems. This occupies 110 sq ft and provides observation ranges of 1-4 kilometers along and across the Pohick Bay arm of the Potomac River. Current planning is to convert this to a year round all weather observation and system demonstration deck.

k. NVESD SEAIL Overflow. This area provides readily accessible staging and stowage of systems and equipment to minimize clutter in active lab space, as well as expediting the movement of systems in/out of the SEAIL

l. NVESD SEAIL Mechanical Room. This space includes the refrigeration/heating systems for the main environmental chamber in the SEAIL Systems Lab module as well as the SEAIL central electrical power conditioning and regulation plant. Additional environmental modules as well as the dedicated six (6) ton capacity HVAC plant are in the interstitial spaces between the 2nd and 4th floor to minimize obstruction of prime lab space.

Footprint: 6,210 Square-Feet

Personnel: 53 Government/2 Contractor

Equipment:

a. SEAIL Systems Lab:

Item Description	Quantity
10"x6" Platform W/ All Post (X4)	1
12" F.L. large diameter WFOV collimating optics 3-5u	1
12" F.L. large diameter WFOV collimating optics 8-12u	1
120" F.L. segmented NFOV collimating mirror	1
21" Hitachi CRT monitor	3
21" Samsung CRT monitor	3
240" F.L. large diameter NFOV collimating mirror	1
38-Pin Adapter Cable for Agilent Logic Analyzer	1
50-1200 DegC w/2" Aperture w/ GPIP	2
60" F.L. large diameter WFOV collimating mirror	1
Active probe for spectrum analyzer	1
Agilent 0-35V, 0-60A power supply w/ meters & GPIB	2
Agilent 6.5 digit Digital Multimeter (DMM) w/ GPIB interface	2
Agilent Spectrum Analyzer	1
APC Server rack cabinet	2
Custom Athlon 2200XP Workstation for data collection, processing and analysis	4
Custom Athlon 2800XP Workstation for data collection, processing and analysis	9
Custom powder coated steel table assembly for holding breadboard in chamber	2
Custom steel linkage assembly for coupling chamber to Newport optical bench	1
Datasilo 9 drive JBOD RAID Box	2
Digital/Analog Frame	1
Dual CPU Athlon MP 2U server w/ U320 SCSI	4
Environmental chamber , Walk-in, -65 C to +80 C	1
Extech Hygro-Thermometer w/PC Interface & Certification	3
Extended Thermal Source (X2)	1
Frame Grabber	1
Goniometric translation stage	1
High Resolution Monitor w/50Mhz Aperture	3
High Resolution rotational stage	1
HP Logic Analysis system	1
HP5500dtn Color LaserJet Printer	1

HTI Bkit 2nd Gen Plate FLIR	1
HTI Bkit Components (Multiple components: Scan Control CCA, POL CCA, SGCEU, SGBICU, Imager, DC Bench Assembly, Afocal, TRU)	1
Infiniium 500Mhz w/option W50	2
IR Neutral density (4sets of 9)	4
Laser Top Optical 4' X 8' X 12'	1
Long-Travel Linear translation stage	4
Martin Marietta Quantum Well FLIR	1
Miscellaneous lab network support hardware and cabling	1
Multichannel logic analyzer	1
National Instruments GPIB Enet/100 interface box	13
National Instruments Labview7 software for Linux	1
Newport Optical Test Benches	5
Newport Pneumatic Type Legs for chamber, set of 3	1
Newport translation stage 1-3 Axis controller	3
NI-488.2 Software for GPIB communications	2
PC-hosted Logic analyzer software	1
Precision 1/8 wave flat 76mm X 108mm	3
Precision Differential	1
RG Series Optical breadboard	2
Right Angle bracket for translation stage mounting	2
RMI 12"x12" beam splitter	3
Samsung 17" Syncmaster Flatpanel display	1
Samsung 21" Syncmaster Flatpanel display	1
SBIR 4" Diff. BB System w/ target wheel & custom cables	3
SBIR Target set for Model 12 target wheel	75
SBIR Target Wheel & Controller w/custom cables	2
Sun Ultra10 workstation w/ HDTV monitor	1
SUT Power Supplies	1
System With Cables & GPIB Port	1
Toolbox and tools	1
Zinc Selenide (ZnSe) windows w/ custom mounting cell	1

b. SEAIL System Control Lab

Item Description	Quantity
APC Server rack cabinet	1
Custom Athlon 2800XP Workstation	2
AMD64 workstation	2
Samsung 21" CRT Monitor	3
Samsung 19" LCD Flatscreen display	2
Dual Athlon MP 2U server w/ U320 & U160 SCSI	2
Dual AMD Opteron 2U server w/ U320	2
Fluke Scopemeter	1
Lab equipment storage cabinets	2
NTP100 GPS Time server	1
Miscellaneous network support items and cabling	1
Storcase 14bay 4.2TB U320 SCSI JBOD RAID Box	2
Storcase 9bay 324GB U320 SCSI JBOD RAID Box	3

c. SEAIL Electronics Lab:

Item Description	Quantity
Agilent 4 Channel 1Ghz digital oscilloscope	2
Agilent Function Generator	3
Agilent 6.5 digit Digital Multimeter (DMM) w/ GPIB interface	4
Agilent Technologies N5746A power supplies	4
AMD64 Workstation	5
Cadence Orcad PCBoard design software suite	2
Electronics and mechanical components	1
FPGA design software suite	2
HP5500dtn Color LaserJet Printer	1
IR Systems 2" Cavity Source	1
Multichannel logic analyzer	1
NI Labview software development suite	2
PACE SMC Soldering station	2
MATLAB software suite	2
ProEngineering software suite	1
Reliability Prediction software suite	2
Samsung 19" LCD Flatscreen display	3
SBIR 10" Thermal Reference Source	1
SBIR Portable collimator w/ 4" BB, TW, and targets	1
Spectrum Analyzer	1
Toolbox and tools	1
Head Track Sensor Suite (HTSS), fixtures and electronics	1

d. SEAIL Laser Lab:

Item Description	Quantity
20" concave high reflective mirror	1
4channel 1GHz Digital Oscilloscope	2
830nm and 1550nm laser detector heads	4
Agilent Power supply	1
Auto collimator	1
Beam Analyzer	1
Beam Attenuator	1
Beam Cube	1
CCD camera	1
Computer workstations	1
Continuous tune laser source (near IR and IR)	1
Controllable laser chiller	1
For Optical Bench	1
For Optical Bench	1
Full spectrum beam analyzer	1
InGaAs Camera	1
Laminar Flow bench for dust free work space	2
Laser diode controller	1
Laser spectrometer	1
Laser Star CPU detector head controller	1
Nanoposition flexure system with readout	1

Newport Optical Test Benches	2
NOVA Laser power meter display	1
Portable laser power meter w/case	1
Stepper controller	1
Tunable IR Laser 530-2100nm	1
Ultra-fast tune laser source	1

e. SEAIL DSP Lab:

Item Description	Quantity
17 slot tape library w/ dual LTO3 drives	2
40TB active with 40TB live mirror w/ file servers	1
96node cluster	1
AMD64 workstation	6
APC Server rack cabinet	1
APC SU3000 SmartUPS, network ready	2
APC SU5000 UPS w/ transformer, network ready	4
Athlon 2800XP w/ 2GB DDR workstation	5
Dual CPU Athlon 2800MP 2U server w/ U320 SCSI	2
Cybernetics Dual LTO3 tape drives	1
Hitachi 21" CRT Monitor	1
Miscellaneous network support items	1
Plasmon LTO2 Tape Drive for data backups	1
Samsung 19" LCD Flatscreen display	9
Samsung 21" CRT Monitor	3
Storcase 14bay U320 SCSI JBOD 2TB RAID Box	2
Storcase 9bay U320 SCSI JBOD 684GB RAID Box	1
Sun Blade workstation	3

f. SEAIL Detector Imaging/Radiometric Lab:

Item Description	Quantity
14" Computer Monitor	1
17" Nanao computer monitor	1
Fold mirror and mounts	5
3Com Dual Speed Ethernet Hub	1
6"x6" square -40deg to 150C, controller, GBIB I/F	2
68-Channel State/Timing plug in option card for 16702A Logic Analyzer	1
Agilent 4 Channel 500Mhz digital oscilloscope	1
Agilent Technologies N5746A power supplies	9
APC Server rack cabinet	2
APC SU3000 SmartUPS, network	7
APC SU5000 SmartUPS w/ transformer, network	5
Belkin KVM switch box	4
Bitflow R/64 CL Frame Grab computer systems	2
Custom Athlon 2200XP Workstation for data collection, processing and analysis	5
Custom Athlon 2800XP Workstation for data collection, processing and analysis	5
Custom Telic imager	3
Dage MTI HR-2000 high resolution video display w/ 50MHz video aperture	4

DAVID Radiometric test station for SADA I and SADA II	1
DIOP MTF Optical Test station	1
Dual CPU Athlon MP 2U server w/ U160 SCSI	1
Dual CPU Athlon MP 2U server w/ U320 & U160 SCSI	4
Environmental Chamber Refrigerant changeover	1
Equipment rack mount rails	10
FCT Components (Multiple components: Afocal, Imager, SGCEU, EU Interconnect, Power Supply)	1
Fluke Scopemeter	2
Goniometric translation stage	1
High Resolution Rotation translation stage	3
HP Logic Analysis system	3
HP Power Supplies and modules - 7 modules	1
HP8200n LaserJet printer	1
Image acquisition / Image Processing Computer	2
IR Systems 50-1200 DegC w/2" aperture w/ GPIB	5
IR Systems Blackbody	1
IR Systems Controller Blackbody	1
Lab equipment storage cabinet	2
Laser Jet Printers	2
Lumitron image capture and processing system	1
Micron computer w/ Matrox Genesis digital frame grabber	1
Mirror and Controller	1
Misc. fold mirror optics and mounts for optical bench	3
Miscellaneous electronic and mechanical components	1
Miscellaneous electronic test equipment & hardware	1
Miscellaneous network support items and cabling	1
National Instruments GPIB-Enet/10 interface	5
National Instruments GPIB-Enet/100 interface	9
Netgear Gigabit Ethernet switch	7
Newport Optical Test Benches	2
Newport translation stage 1-3 Axis controller	3
Notebook computers for field data acquisition	2
Pace SMD Soldering station	2
PC-hosted logic analyzer software suite	2
Replacement lead free solder, tips, and stand alone irons	4
RMI, LWIR bandpass filter for 3rd Gen DEWAR testing	4
RMI, MWIR bandpass filter for 3rd Gen DEWAR testing	4
Custom DUT Translation mounting bench assembly	3
SADA-I Devices	42
SADA-II Devices	63
Samsung 17" Syncmaster flatpanel display	12
Samsung 21" CRT Monitor	3
SBIR 4" Diff. BB System w/ target wheel & custom cables	5
SBIR Target set for Model 12 target wheel	40
SBIR Target Wheel & Controller w/custom cables	3
Storcase 14bay 4.2TB U320 SCSI JBOD RAID Box	2
Storcase 9bay 364GB U320 SCSI JBOD RAID Box	2
Super scope magnifier for PC Board assembly & inspection	1
Test and Evaluation computer	1

Tool box and tools	1

g. SEAIL Cryogenics Cooler Lab:

Item Description	Quantity
0.35-watt Linear Drive Cryo Cooler	9
1.0-watt Linear Drive Cryo Cooler	30
1.5-watt Linear Drive Cryo Cooler	8
1.75-watt Linear Drive Cryo Cooler	5
Agilent Technologies N5746A power supplies	9
Agilent Technologies Spectrum Analyzer	1
Alcatel mechanical vacuum pump for high vacuum systems	3
Allware computer	1
APC SmartUPS 3000	3
Athlon 2800XP workstation	2
Bruel & Kjaer Audio Level Meter	1
Bruel & Kjaer Calibration Exciter	1
Bruel & Kjaer Condenser Mic	1
Bruel & Kjaer Octave filter set	1
Bruel & Kjaer Sound Level Calibrater	1
Circuit Card Assembly for 1.0-watt coolers	15
Comtech computer	1
Cryocooler charging station	1
Cryocooler test vacuum dewars	7
CTI-cryogenics compressor for high vacuum systems	3
CTI-cryogenics cryopump for high vacuum systems	1
CTI-cryogenics cryopump for high vacuum systems	2
Depth micrometer	1
Dial Caliper	1
Endevco Accelerometers	6
Fluke oscilloscope	1
for HP66000A Mainframe	12
Hazardous material storage cabinet	1
HP 3852A DAQ for data acquisition	2
HP 66000A Mainframe	2
HP Automatic data printer w/ GBIP interface	5
HP Spectrum Analyzer	1
HP2200n LaserJet printer	3
HP3852A DAQ modules, Digital Multimeter & Relay actuators	10
HP6002A power supply	10
Kepco power supply	14
Lakeshore Cryogenic Thermometer	2
Laminar Flow bench for dust free work space	1
Liquid Nitrogen Dewar	2
Misc. support hardware (solder, indium wire, vacuum seals & fittings)	1
Nanao Corp 15" monitor	1
National Instruments Automatic Cooler Test Facility Intrumentation	2
National Instruments Manual Cooler Test Facility Instrumentation	1
NEC monitor	1
Oscillograph	1

PACE Soldering Station	1
Portable cryocooler charging kit	1
Samsung 17" Flatscreen	1
Thermotron Envionmental Chamber Refridgerant changeover	3
Thermotron Environmental chamber	1
Thermotron Environmental chamber	3
Toolbox for test set-up tools	2
Torque wrenches	3
vacuum manifold for cooler testing	2
Vacuum manifold test fixture for expanded test capacity	2
Varian Vacuum gauge set	3
VEECO Instruments - Helium leak detector	1
Vernier Caliper	1
Yokogawa Digital Power Meter	1
Yokogawa Digital Power Meter	4
Yokogawa Digital Power Meter for 3 phase measurements	1

h. SEAIL Soldier Sensors and Robotics Field Prep Lab:

Item Description	Quantity
4 Channel Oscilloscope TDS 300B (500MHz) Field /Lab	1
48 channel receiver	1
A12 Night vision system	1
Adaptive monitor	1
Agilent 4 Channel 500Ghz digital oscilloscope	4
Agilent Spectrum Analyzer	1
Alpha camera	1
Antistatic work benches	5
Raytheon Sys AS Camera w/ video interface	1
Boresight kit	6
Cabinet storage space (60sqft)	9
Sony Digital camcorders DCRTRV70	2
Indigo Systems Digital Camera Omega	5
Digital Oscilloscope Tektronix	1
DRS-30 DV cam	2
Helmet mounted display system Kieser Elec	2
Integrated Sight	9
IR Thermometer	2
Laser power meter	1
Laser power meter	1
Laser Power Meters w/ Pulse, CW, VIS, NIR, IR det head	1
M4 Carbine replica	5
Mini microbolometer lens	1
Miscellaneous tools	1
NI VI AN/PVS-14	2
NI VI AN/PVS-4 w/ Imager	1
NI VI AN/PVS-7B	2
Oscilloscope Portable	1
Pan & Tilt w/ controller and joystick Quick Set	1
Personal LCS Monitor	1

PMTV Thermal Imager Irvine Sensors Corp	3
Power supply HV/HP	3
Power supply LV/LP	3
Precision measurement instruments (caliper, micrometer)	2
Projector w/ remote In Focus	3
ComPaq digital projectors	3
Nitrogen Purge kit	2
Sony Recorders/reproducers	6
Safety storage cabinets	2
SMRTI Weapon sight	1
Spectrum Analyzer	1
Stroboscope	1
Thermal sensor head	1
Thermal Weapon Sight DRS NyTech U6000	7
Thermal Weapon Sight DRS NyTech U7000	2
Thermal Weapon Sight PVS-13	3
Tool boxes	3
Uncooled IR Camera	5
Sony VCR	4
Sony Video cassette recorder w/ accessories	6
Sony Video editing station	1
Video monitors	4
DRS NyTech U3000 Weapon Sight	1

i. SEAIL Manned Vehicle Sensors Field Prep Lab:

Item Description	Quantity
Binocular display	1
Camera	1
Camera	1
CITV	1
Color display helmet	1
Ethernet antenna dish	2
Flat panel display	1
Gated Camera assembly w/laser	1
Global positioning receiver	1
Head Track Sensor Suite (HTSS)	1
Hunter Sensor Suite	3
Inertia navigation unit	1
Joy stick controller	1
M1 Gunners primary sight	1
M1 Gunners primary sight w/ thermal	2
M2 Infantry fighting vehicle	1
MFS Residual components and assemblies	1
MFS System	1
Orientation tracker	1
Pace soldering station	2
M113 Personnel carrier	1
Pulsed position laser	1
Sensor lifting sling	1

Storage cabinets	5
Thermal Receiver Unit (TRU)	1
TIS	1
Toolbox and tools	1
Work benches	4

Special Needs:

a. SEAIL Special Platforms:

Item	Maint Req	Size	Weight
M113 (MFS3)	Standard	Standard	Standard
M2/3 Bradley (w/o turret)	Standard	Standard	Standard
HMMWV HSS	Standard	Standard	Standard
HMMWV HSS	Standard	Standard	Standard
CETS UGV	Sm Turbo Dsl	10ft lx 6ft w x 5ft h	4,000lbs
TALON	Battery Pwr	~2x1.5x1 ft	~110 lbs
Urbot	Battery Pwr	~2x1.5x1 ft	~65 lbs
4xPackBots	Battery Pwr	~2x1.5x1 ft	~50 lbs

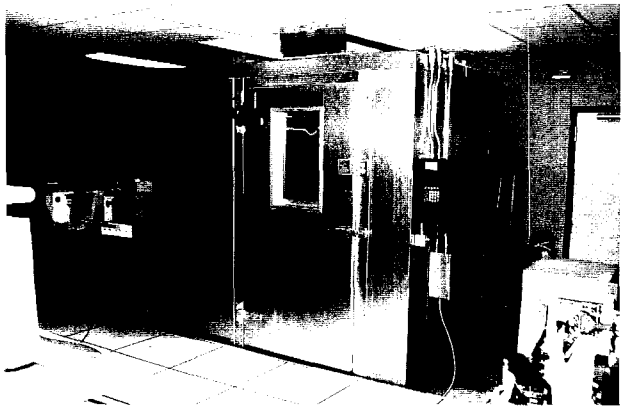
b. SEAIL Mechanical Room:

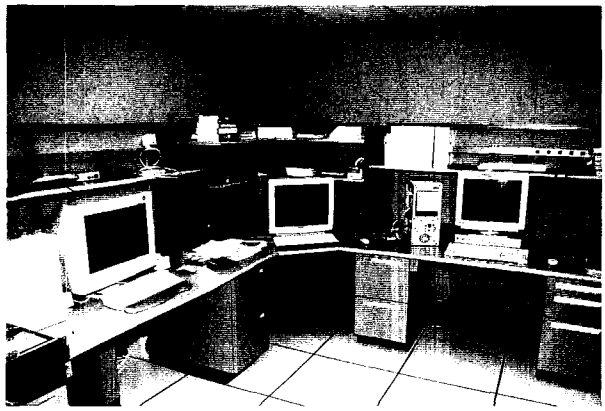
Item Description	Quantity
150KVA Motor Generator for Clean Power for isolation from house power and <20mv of electrical noise	2
Sound soak wall panels (thick black version)	1
Exhaust ventilation to assist house A/C with equipment induced heat load	1
Equipment storage cabinets	2
Refrigeration plant for environmental chamber located in Systems Lab, and remote blower module located in interstitial space	1

c. SEAIL Global

Item Description	Quantity
100psi compressed air feed w/ dryer, regulator, air gun, quick disconnects, flexible hoses, and shutoff valves	10
Anthro work benches	8
Anti-static Riased floor ~6-8" hieght for 11,444sqft using 4sqft tiles ~2861 tiles	2861
Appropriate fire extinguishers for labs	10
Catch trays with drain feeds for Thermotron chambers	4
Ceiling mounted smoke detectors	15
Compass test facility	1
Custom software development for lab equipment command & control, digital image capture, processing, analysis, and embedded computer applications	1
Electronic cipher locks	4
Emergency lighting	15
Environmental monitoring of temperature and humidity with network connectivity for remote monitoring	10
Floor drains for all Thermotron environmental chamber	5

HAZMAT Cabinets for Cryogenics Cooler, Detector Imaging/Radiometric, Systems, and Prep Labs	5
HVAC 14-16ton system with individual room zone control, humidity control +-2% and temperature control +-2degrees	1
HVAC Submicron filtering of air flow	1
Laser safety certification, safety gear, and four external warning lights with electronic cipher lock disable	1
Light tight Systems Lab, Imaging Lab, Laser Lab, and Prep Labs	1
Matching sound soak for 3400 linear feet (est. 430 12' panels)	850
Mechanical cipher locks	10
Redhat Linux site license for 25 workstations	1
Room shielding for Electronics lab to provide a low noise environment allowing for EMI type measurements	1
Safe storage for high pressure gas bottles in Cryogenics Cooler Lab and Detector Imaging/Radiometric Lab	6
Self contained chiller system to supply cooling water to cryo pumps and chambers	1
Systems viewing room with long windows to open for viewing and digital data collection of outside environment	1
True earth lab grounding common with all lab areas	1
Under raised floor smoke detectors	12
Very low noise lighting for Cryogenics Cooler, Detector Imaging/Radiometric, Systems, and Prep Labs	1
Wash sinks w/ safety eye wash	2
Windows2000 Professional edition license	6
WindowsNT4.0 license	1
WindowsXp Professional edition license	10
Work & Test Benches	1





38. Unmanned Aerial Vehicle (UAV) Laboratory

Description: The NVESD Unmanned Aerial Vehicle (UAV) Laboratory located at the Davison Army Airfield, Fort Belvoir, VA, site is a recent, 2004, addition to the complement of NVESD facilities. UAVs are an emerging, and ever growing part of the Army's acquisition and war fighting missions. As an essential part of many UAV systems NVESD is in the development of advanced sensor applications for Reconnaissance, Surveillance, and Target Acquisition (RSTA) missions, Command, Control, Communications, Computing, and Intelligence (C4I) missions, as well addressing the many other UAV missions, and requirements. In direct support of the UAV sensor development programs, NVESD maintains a UAV laboratory at Davison Army Airfield that is an augmented capability to the manned aviation assets. The UAV laboratory acts as the primary support facility for the integration, maintenance, and support of UAV sensor experimentation. NVESD maintains a number of in-house UAV test-bed aircraft including Small UAV's such as the Army's Raven and Pointer, and larger VTOL UAV, and fixed wing UAVs prototypes. Each of the UAV aircraft is special purpose modified for the purposes of experimentation, flight-testing, and demonstration of various types of sensors, and other UAV technologies.

Footprint: 2,150 Square-Feet

Personnel: 8 Government/11 Contractor (same personnel as NVESD Aviation Test Facility)

Equipment: Within the UAV laboratory, there is a shaker table to test vibration effects on equipment and a collimator to test electro-optic sensors. There are also 2 UAV simulators/trainers. In addition, there are a number of shelving units, work benches, and equipment cabinets located within the building.

Special Needs: Normal utilities/climate control

39. Virtual Prototyping and Simulation (VPS) Facility

Description: The NVESD Virtual Prototyping and Simulation (VPS) Facility, Fort Belvoir, VA, is a state-of-the-art facility that is primarily used to support advanced warfighting and technology assessment simulations, advanced sensor simulations, multiple-site experimentation, virtual reality experimentation, product demonstrations, training support, and video teleconferencing. Another key function of the VPS facility is supporting the design and fabrication of man-in-the-loop simulators. Engineering system design and prototyping efforts can be shared across multiple sites simultaneously by utilizing NVESD's in-house Computer-Aided Design, manufacturing, and analysis software for collaborative development. Its main viewing area seats 36 and presentations are projected onto a 36 feet tall x 130 feet wide screen. The facility has the ability to display up to twelve high-resolution computer simulations simultaneously, as well as choosing from any of the 128 computer sources, 48 video sources, and 64 corresponding audio sources available on the A/V router. The facility occupies 8,199 square-feet of space in Bldg 309. The VPS modeling and simulation capabilities are integrated with the Distributed Sensor Integration Facility (DSIF) and are used extensively to explore concepts, determine optimum sensor mixes and placements, and to augment the limited number of real prototype sensors available for study. The VPS, when linked to the DSIF, enables and supports systematic design, development, integration, test, and evaluation of distributed networked sensor concepts. It provides a realistic stimulation environment to support the development of sensor control software and network architectures. The VPS computer capabilities include high-end Silicon Graphics computers that are used to generate the state-of-the-art Paint-the-Night (PTN) synthetic sensor simulation. A large number of Sun and PC systems are available to host applications such as the Comprehensive Mine and Sensor Simulator (CMS2), support soldier-machine-interface simulations, and simulation scenario drivers (OneSAF Testbed, JCATS). Various night vision and electronic sensors can be simulated using the PTN and CMS2 software programs that includes atmospheric and sensor effects with realistic visual and acoustic vehicle signatures and terrain databases. The VPS is also physically linked with the CERDEC COMBAT Lab, the C4ISR Test-Bed at Fort Dix, NJ, the Mounted Maneuver Battle Lab, Ft. Knox, Army Research Lab, and other DoD research and development centers via the DREN (Defense Research and Engineering Network). The CERDEC NVESD Virtual Prototyping and Simulation Facility at Fort Belvoir, VA, has unique audio-visual presentation facilities, extensive simulation capabilities, pre-existing high bandwidth network links to key OF experimentation sites, and the proximity to the key decision makers it serves. The basic ability of the VPS facility, networking infrastructure, and staff to support pre-milestone B FCS experimentation events has already been established and demonstrated. The facility has recently supported the following events:

- Command, Control, Communication on the Move (C3OTM) remote portal for Ft. Dix
- Lead System Integrator (LSI) CAPSTONE demo with Ft. Knox - Welsh Panel
- Modeling Architecture for Technology, Research and Experimentation (MATREX) First Application demo occurring at Redstone Arsenal, Orlando, and Ft. Belvoir
- Unit of Action Mounted Battle Lab (UAMBL) FY03 CEP from Ft. Knox
- Joint Forces Command (JFCOM) Distributed Continuous Experimentation Environment (DCEE)
- FCS White Sands Missile Range (WSMR)

Footprint: 8,199 Square-Feet

Government Personnel: Up to 20 (actual use varies daily, government and contractors)

Equipment:

- Arena: Tiered Seating for 36 with twelve computer hook-ups; additional Seating for up to 60;

1 large screen (130' x 24'); 2 Christie White high resolution projectors; 1 Sanyo projector; 1 Sony projector; 1 remote computer terminal; 9 remote A/V service boxes; an audio system; a serving area with refrigerators, microwave oven, ice maker, sink, cabinets; and wired and wireless microphones

- Control Room: 3 PCs with LCD monitors, 12 20" Preview LCD monitors, 12 4" Preview monitors, 2 20" Preview video monitors, 1 remote computer terminal, 1 multi-computer KVM switch, 3 storage cabinets, 1 S-VHS VCR, 1 MiniDV / S-VHS VCR, 1 DVD recorder, 1 Super Beta VCR, 1 Direct TV satellite television system, 1 AMX touch panel control system, 1 scanner, 1 Elmo presentation camera, Polycom multiport audio/video conferencing bridge, PRI data lines, ISDN Data Lines, and a Jupiter video processor

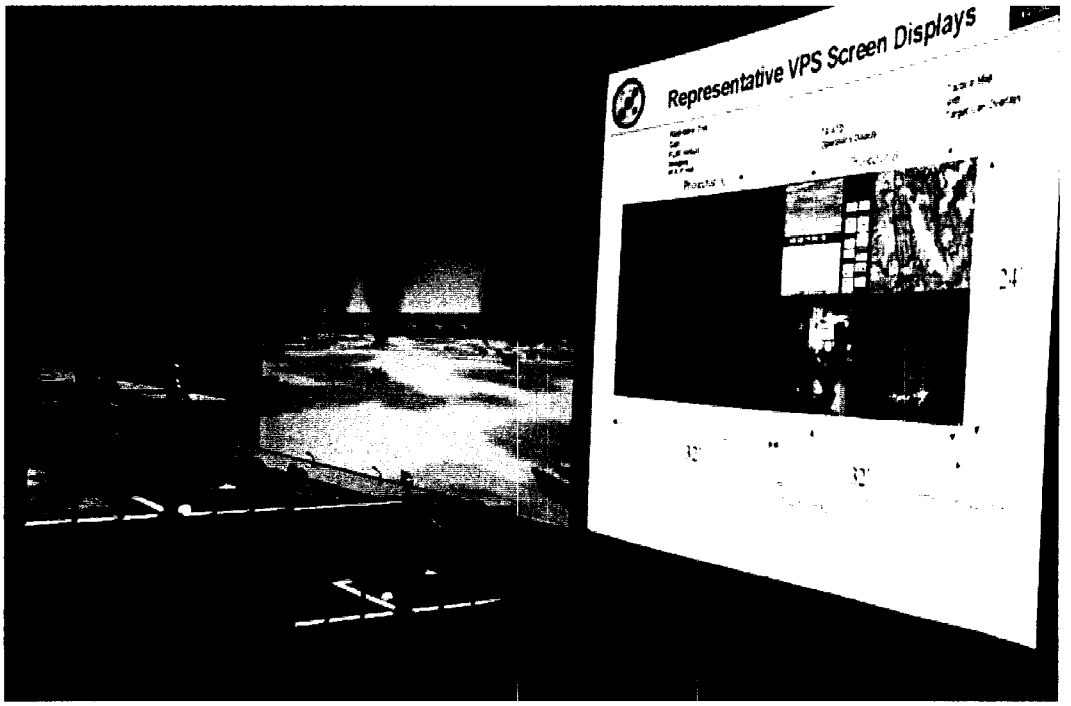
- SAR 1: 2 Sony projectors, 1 screen, 1 plasma display, 1 PC with LCD monitor, 1 Smartboard whiteboard, 1 conference telephone, and tables and seating for 16

- SAR 2: 2 Sony projectors, 1 screen, 1 plasma display, 1 PC with LCD monitor, 1 Smartboard whiteboard, 1 conference telephone, and tables and seating for 16

- Simulation Lab: 20 classified computers, 20 unclassified computers, alarm system and special locks - JSIIDS/X07 Lock/Cipher, classified VTC capabilities, encryption and networking devices, SIPRNET, DREN, S-DREN, Taclane encryption, Fastlane encryption, Gigabit networking equipment, ComSec safe, and other regular safe,

- Other Equipment for VPS: 3 VTCs (one classified), 1 RGB / video / audio router, multiple video scalers, scan converters, audio equipment (amps, mixers, controls, equalizers), and AMX control equipment

Special Needs: Air conditioning, uninterrupted backup power (54 KVA total), standby generator (natural gas, 200 KW), air handler (5-ton), miles of video and audio cabling, and for the Simulation Lab a UPS backup generator and cooling to keep 40+ computers cool



40. Woodworking Shop

Description: The NVESD Building 330 Woodworking Shop is an 11,846 sq.ft. open bay building housing the Facility Support Branch maintenance team which is responsible for minor on-spot electrical, plumbing, HVAC and carpenter issues. The facility contains numerous wood and metal working machines and a full array of hand tools.

Footprint: 11,846 Square-Feet

Government Personnel: 1 Government/8 Contractor

Equipment:

- Woodworking

2- 16" Radial arm saws
2- 10" Table saws
1- 12" Mitre saw
1- 10" Mitre saw
1- 36" Scroll saw
1- 36" Band saw
1- 18" Band saw
1- 30" Planer
1- 30" Jointer
1- 48" 3 Drum Sander
1- Mill
1- Wood turning lathe
1- 30" Disk sander
1- 12" Combination disk and belt sander
1- Spindle sander

- Metalworking

1- Bandsaw
1- Hydraulic bandsaw
1- Pipe threading machine
1- 36" Metal shear
1- 36" Metal break
1- Drillpress

Special Requirements:

Electrical Requirements: 1000 Amp 3 phase power
Sawdust exhaust system
Air compressor
Roll-up door
Outdoor wood storage area (covered)
Enclosed ceiling
Air-conditioned office and lunchroom

41. X-ray Diffraction Analytical Laboratory

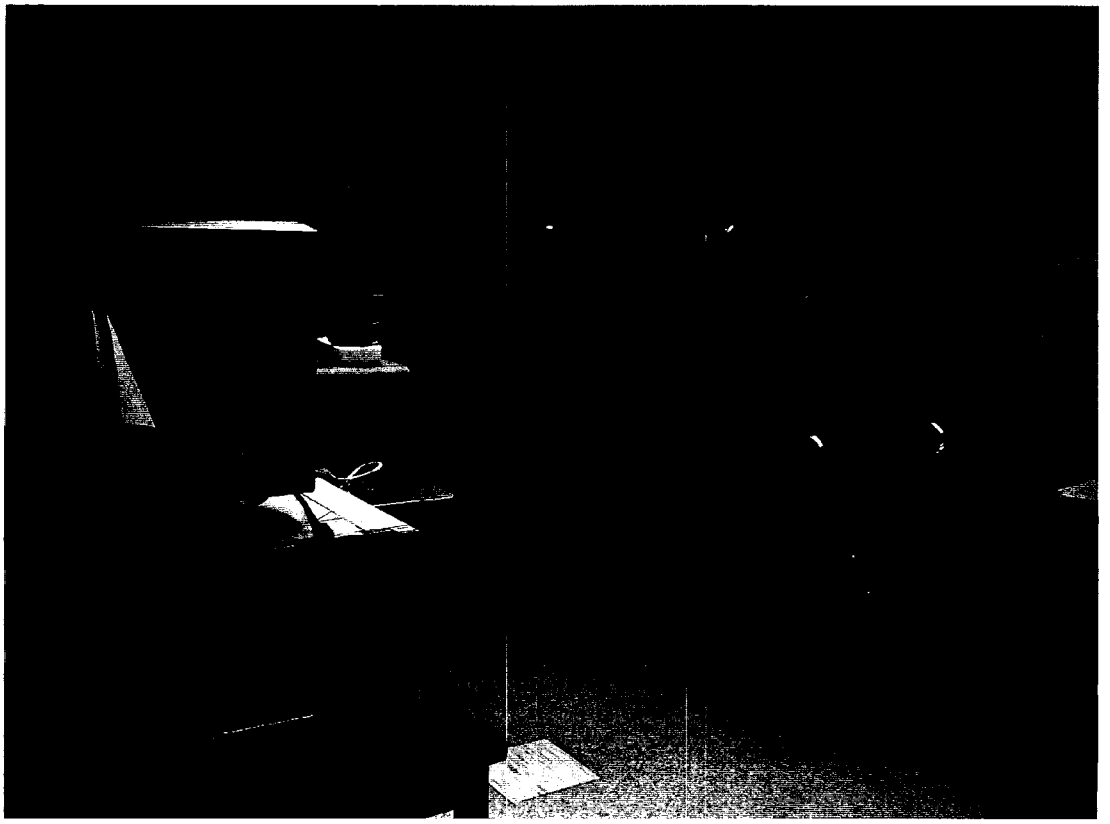
Description: The NVESD X-Ray Diffraction Analytical Laboratory is located in Building 357 at Fort Belvoir, VA. The lab is used to characterize the nature and quality of crystalline layers and substrates used for the fabrication of infrared focal plane arrays, utilizing x-ray diffraction techniques. The lab primarily supports NVESD Microfactory Facility by providing rapid feedback measurements to crystal growers, allowing them to make an informative decision on how to improve future growth runs based on x-ray diffraction analysis. It also provides broad support to the wider infrared focal plane array community by offering x-ray diffraction measurement and analysis to NVESD's collaborative partners, including government laboratories, academia and industry. Primary equipment is the Bede D1 Diffractometer, which is capable of highly accurate measurements of a material's crystalline qualities including: crystallographic orientation, lattice parameter, strain state, compositional grading, imaging of grain boundaries and other defects. Analysis of such data provides valuable insight into nearly every aspect of infrared focal plane array manufacturing, including substrate evaluation, crystal growth and device processing.

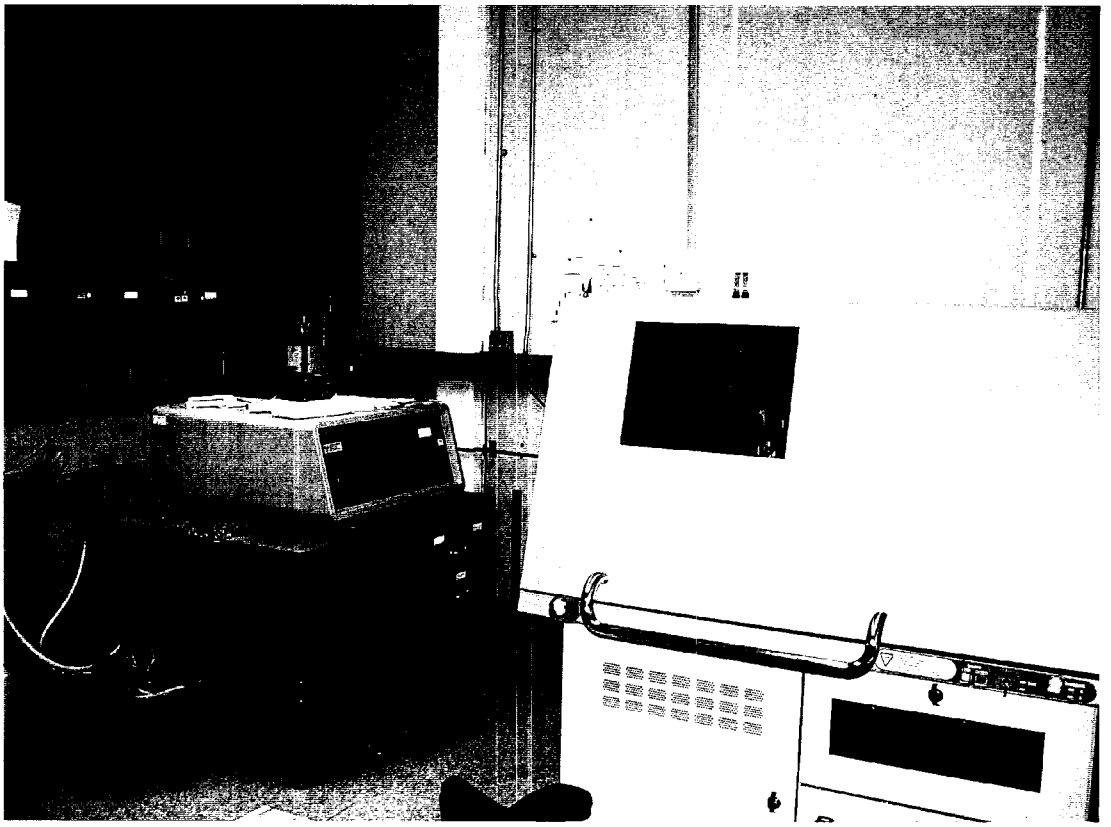
Footprint: 400 Square-Feet

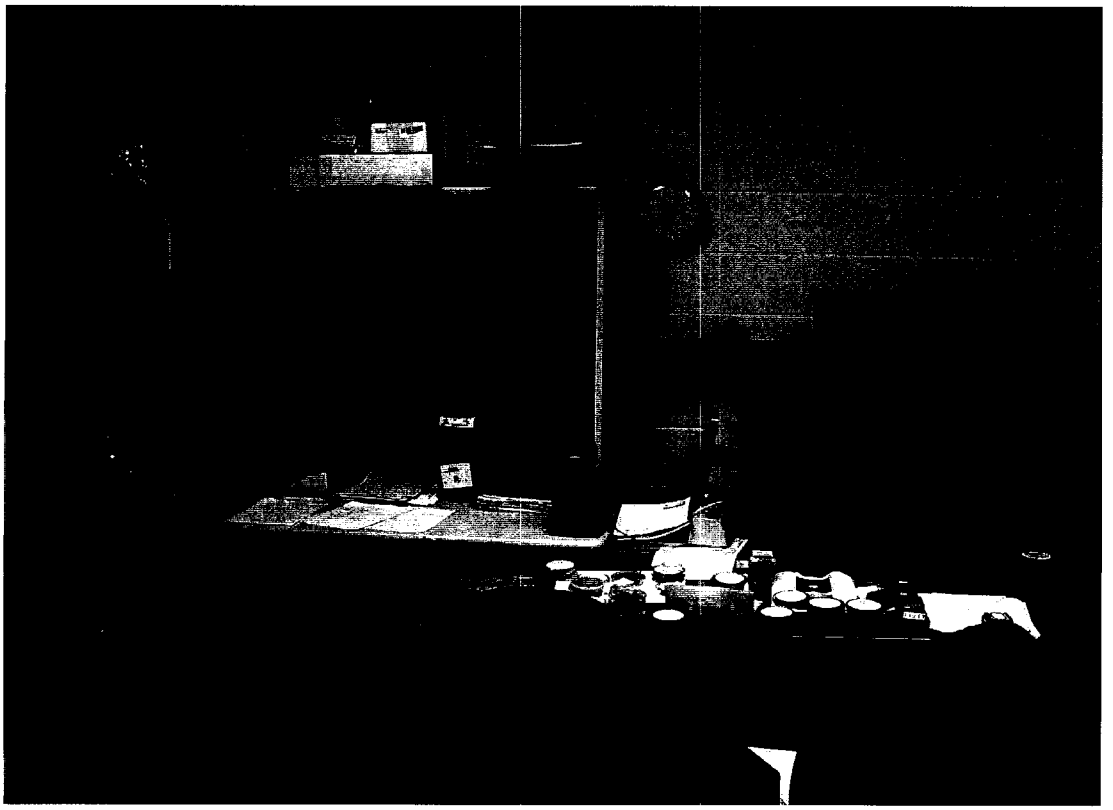
Personnel: 2 Government

Equipment: Bede D1 x-ray diffractometer, Philips PW1729 x-ray generator and Laue camera, Photonic Sciences CCD camera, and 2 Personal computers

Special Needs: Air conditioning, 2 water supplies with flow meters, 2 30 amp 250 volt outlets, and an uninterrupted power supply







42. Airborne Minefield Detection Test Range

Description: The NVESD Airborne Minefield Detection Test Range at Fort A.P. Hill, Virginia, is used to test a variety of airborne sensors to detect minefields.

Footprint: 5.35 Acres/360 Square-Feet Building Space

Personnel: 6 Government/3 Contractor (same personnel as NVESD Range 71A)

Equipment:

Special Needs:

- Parking

Visitor (4,000 Square-Feet)
Support Vehicle/Staging Area (45,000 Square-Feet)

- Buildings

Operations/Testing Office Space (360 Square-Feet)

- Airborne Detection Lanes (4.2 acres fenced)
- Airborne Minefield/Roadside Mine/IED Range (94.5 acres - included as part of NVESD Drop Zone Observation Range)
- Conex Staging Area (640 Square-Feet)
- 400 Cubic-Yards each of gravel, sand, and dirt for mine lanes
- Easy authorization for overflight testing
- Onsite weather station (satellite remote site)
- High-speed (fiber optic) cable for Internet access and e-mail
- Heavy equipment and logistics support
- Remote area with secured gates and limited access to facility
- Electrical power to detection lanes

43. Drop Zone Observation Range

Description: The NVESD Drop Zone Observation Range at Fort A.P. Hill, Virginia, is used for ground-to-ground, air-to-ground and ground-to-air sensor evaluation operations. The 3-acre compound contains a heliport with two pads and a hanger, a two-story 12-bay observation building overlooking an 800 x 3500 meter long line of sight observation range of at least 350 acres with a differential GPS vehicle/target tracking system to provide exact target locations for a fleet of 20 tactical wheeled and tracked targets and a fully instrumented meteorological (MET) collection capability. An Infrared calibrated imagery ground truth capability is also available.

Footprint: 3 Acre Compound with a 350 Acre Area/17,700 Square-Feet Building Space

Personnel: 1 Government/5 Contractor (same personnel as NVESD Laser Range)

Equipment/Special Needs:

a. Butler Building/Maintenance Shop (3500 Square-Feet):

Equipment:

Battery Building	Plasma cutter	Metal cutter	Metal break
Shop press	Elec. Hack saw	Steamer	Elec.Forklift
Tool boxes	Bands saws	Milling machine/lathe	Bolt bins
Drop coils	Nails	Air compressor	Jump pack
Tire changer	Wood plain	Belt sander	Drill press
2 welders	Radial/arm saw	Storage lockers	Miscellaneous tools/supplies

Special Needs: water, compressed air valves throughout, A/C, heat, 220V 3 phase electric, extra wide bay doors and high ceiling

b. Observer Building (4,200 Square-Feet/2 floors including 12 observer rooms and 2 large open areas):

Equipment: Instrumentation Gimbal, computers/server, 14 work benches and cabinets, antenna mast, safe, and miscellaneous equipment

Special Needs: Bathroom, utilities, A/C, heat, phone, and power shed (400HZ, 12/24 volt), plus each observer room has computer access, inter-connecting doorways, intercom system, IRIG time, and video/audio patch panels

c. MET Building (800 Square-Feet):

Equipment: 2 MET trailers (48-foot equipped semis), 2 pickup trucks, 10 work stations/forecasting equipment, and miscellaneous equipment

Special Needs: A/C, heat, computer/phone access, bathroom, 3 phase 220 volt

d. Aircraft Hangar (3,600 Square-Feet):

Equipment: 5 work benches and miscellaneous equipment

Special Needs: 25 foot bay doors, 3 phase 220V, A/C, explosion proof electrical fixtures, and a 8' x 12' security cage

e. Administratrative Building (1,720 Square-Feet):

Equipment: Computer equipment and 4 safes

Special Needs: 220 Volt power, heat, A/C, 2 bathrooms and a full kitchen

f. Three (3) M1 Secure Storage Buildings (1,500 Square-Feet each):

Equipment: None

Special Needs: Heat, A/C, insulation, and 24x12 ft. rolling doors on each end

g. Two Storage Sheds (1,440 Square-Feet each):

Equipment: Miscellaneous supplies to include lumber and metal stock

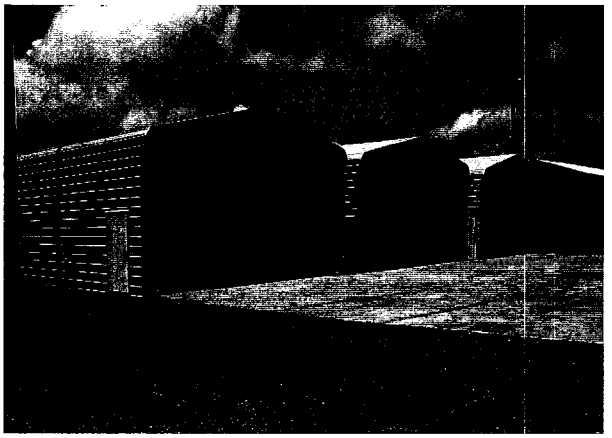
Special Needs: None

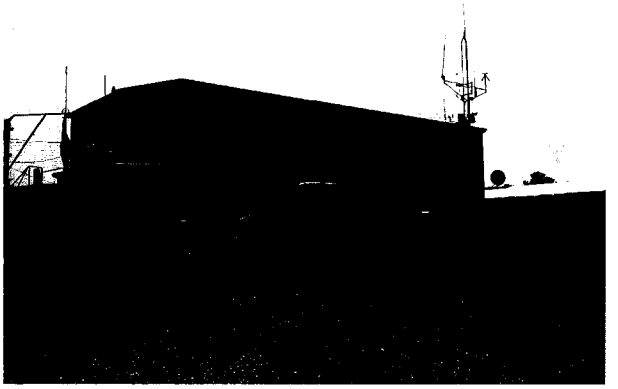
h. Other Equipment/Special Needs:

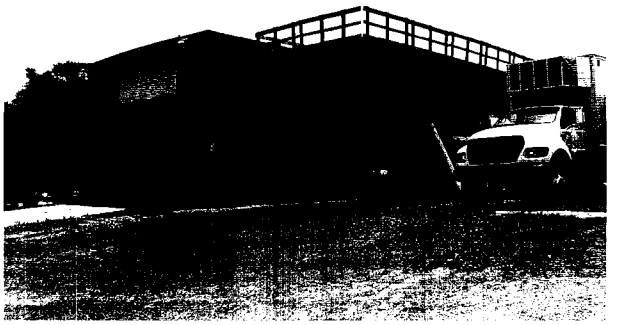
Equipment: The following vehicles:

4 APCs	2 M2 tanks	1 M1 tank	4 M60s
1 D7 Dozer	1 Loader 953C	1 road grader	3 Farm tractors
2 mowers	4 HMMWV	3 21/2 ton trucks	2 5-ton trucks
1 M88	1 Hemmett	4 pick-up trucks	1 shop truck
2 bottom plows	2 step vans	12 trailers	3 bush hogs
1 snow plow	2 fork lifts	1 Auger	1 5-wheeler
1 4-wheeler			

Special Needs: 8-foot security fence around the perimeter with 4 rolling gates, fiber optic communications within the compound, flat and cleared 340-acre 800 x 3500 meter long line of sight observation range with 24 geodetic survey points and underground electric service to 1km, 2km, and 5km points, two 20 x 60 helicopter pads, gas and diesel fuel pods (1,000 gallons), and eight 40-foot test support equipment conex's.







44. Indoor Firing / Photometric Range

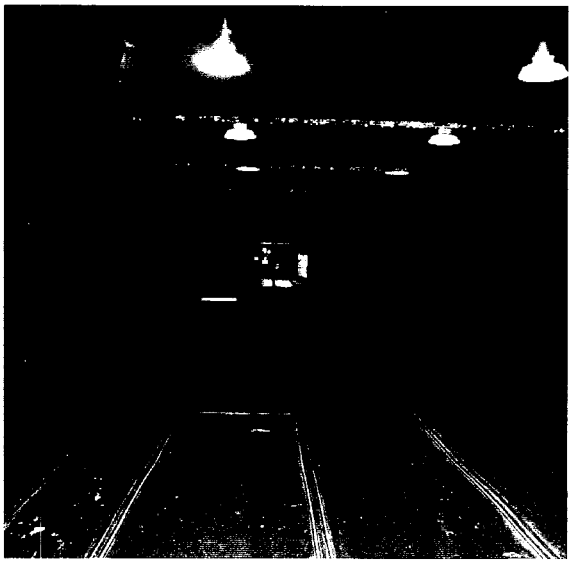
Description: The NVESD Indoor Firing / Photometric Range located in the NVESD, Fort Belvoir, VA, Building 305 is a 95-meter indoor measurement and demonstration range used to test night vision weapon sights and head mounted sensors under various light levels using all types of standard and advanced military weapons. The range is approved to fire up to 7.62 mm or 30 calibers which is equivalent to an M60 machine gun. Night conditions can be simulated for photometric testing and demonstrating night vision and electro-optical devices. It has a fully secured weapons storage vault in which the Army weapons are maintained.

Footprint: 8,000 Square-Feet

Government Personnel: 3 Government/1 Contractor

Equipment: Miscellaneous support items

Special Needs: 150 sq ft fully secured J-SIDS weapons storage and maintenance vault, 220V power, heat, A/C, special lighting, and a make up air and exhaust system for weapons firing (Exhaust Fan Type: Variable inlet vane, CFM: Min: 1800, Max: 8140. Filters: 6 HEPA 24" X 24" X 5 7/ 8" and 6 Profilers: 24" X 24" X 2")



45. Laser Range

Description: The NVESD Laser Range at Fort A.P. Hill, Virginia, is a unique, secure, and, highly instrumented facility allowing users safe testing of non-eye safe lasers. The laser range measures 5000 meters long by 200 meters wide; occupying 257 acres and the 1.5-acre range compound contains four bays, an isolation platform and an elevated platform. Targets of interest can be deployed for ground and air testing at six discrete target ranges. All four bays are equipped with high voltage, high current commercial power.

Footprint: 258.5 Acres/6,750 Square-Feet Building Space

Personnel: 1 Government/5 Contractor (same personnel as NVESD Drop Zone Observation Range)

Equipment: Miscellaneous support items

Special Needs:

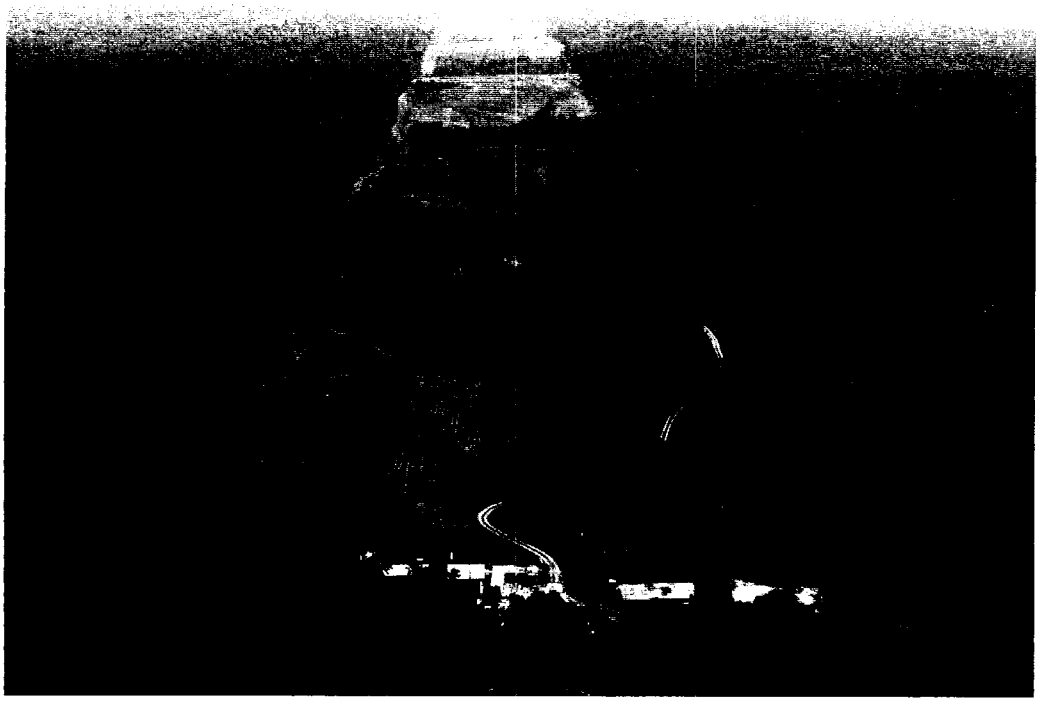
Laser Range Compound: 8 foot security fence with 2 rolling gates

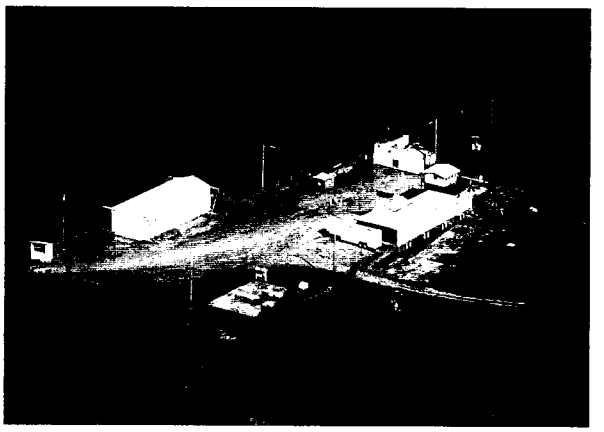
a. Laser Range Test Building (3,000 Square-Feet): 4 bays with garage doors, heating, A/C, 3-Phase, 220-Volt power, bathroom, water filtration system, isolation floor in one bay, security vault with 1 safe, and one antenna mast

b. Observer Tower (150 Square-Feet): Heating, A/C, 220-Volt Power

c. Test Support Storage Building (3,600 Square-Feet): Heating, A/C, 3-Phase, 220-Volt Power, 2 sliding hangar doors, 5 security cages

Laser Range: 12 geodetic survey points plus power and phones located at 6 increments on the range





46. Range 71A

Description: NVESD Range 71A at Fort A.P. Hill, Virginia, is a uniquely suited facility designed to facilitate the evaluation of ground-based to test mine detection technologies and mine neutralization technologies. Occupying over 80 acres, the extensive facility also incorporates the capability to evaluate the effects of mine blasts and fragmentation on personnel and equipment before and after mine blast and fragment protection technologies are applied and is specially located to allow high impact explosive demonstrations. The facility includes a 67-acre detection and clearance area, a 4.5-acre chemical detection area, and a 5-acre demolition pit. There are 8 vehicle lanes (300 meters each), 2 off-route vehicle lanes (600 meters each), 2 handheld lanes (300 meters each), and a 100 x 100 meter target grid. The facility is managed in coordination with the Joint Unexploded Ordnance Coordination Office (JUXOCO), which maintains a separate 5-acre test site integral to Range 71A. The UXO collection site is the only developmental test site in the United States for assessing the performance of detection systems for buried landmines and ordnance. The site contains 2,200 one-meter square cells of UXO and clutter.

Footprint: 80 Acres/24,000 Square-Feet Building Space

Personnel: 6 Government/3 Contractor (same personnel as NVESD Airborne Minefield Detection Test Range)

Equipment:

1 - Vibratory Roller
1 - Grader
1 - Skidster Loader (Bobcat)
2 - Agricultural Tractors (Ford and Kubota)
1 - Front End Bucket/Scoop Loader
1 - Forklift (10,000 lb,)
1 - Forklift (15,000 lb.)
1 - Cargo Maintenance Van (1 ton)
1 - Trailer, Explosives Cargo
4 - Pick-Up Truck, Ford F-350
1 - Riding Lawn Mower
1 - Landscape Trailer
1 - Mower Deck
1 - Water Bull

Special Needs:

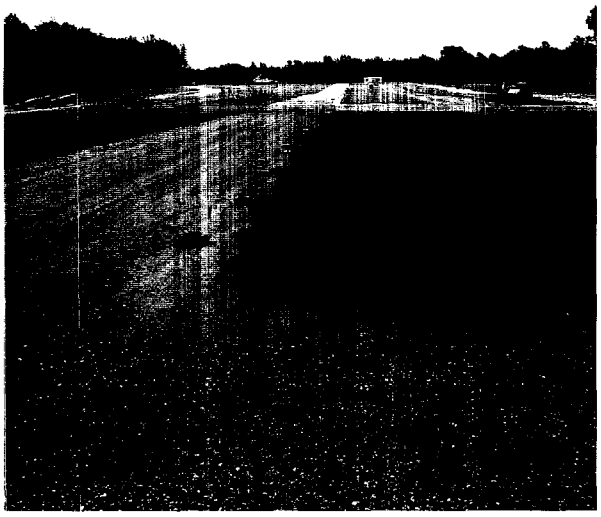
- Parking:

Visitor (52,792 Square-Feet)
Support Vehicles (53,795 Square-Feet)
Test Vehicle/Attachment Parking 121,032 Square-Feet)

- Buildings:

Operations/Testing Office Space (8,000 Square-Feet)
Vehicle Maintenance and Repair #1 (6,000 Square-Feet)
Vehicle Maintenance and Repair #2 (6,000 Square-Feet)
Equipment Storage (4,000 Square-Feet)

- Remote area with secured gates and limited access to facility
- Located in Impact Area requiring minimal security and having few environmental concerns - otherwise will require double-chain link perimeter fence with JSIDS to secure area with buried explosives
- Demolition Pit co-located with Detection Facility - otherwise will require 1,000M radius Safety Zone for new Demolition Pit
- Short distance from ASP
- ASP storage space (four hazard classes – 2,600 Square-Feet total storage)
- Onsite loading ramp (dual-height) for easy off loading of specialized and oversized equipment
- Onsite diesel fuel pumping and storage
- Onsite weather station (satellite remote site)
- On call and rapid heavy equipment and logistics support
- Onsite motor grader, compactor, and bulldozers for detection lane creation, maintenance, and repair
- Maintenance building includes a basic machine shop for use by Government and Contractor personnel providing onsite repair and assemble capabilities
- High-speed (fiber optic) cable for test data transfer, Internet access, and e-mail
- Electrical power to detection lanes
- Expeditious authorization for overflight testing
- Authorized helicopter landing area onsite



Estimated Cost (FY05 Dollars) to Reconstuct NVESD Facilities (Basic Construction & Unique Facility Costs/Equipment)

Div	Facility Name	Size (Sq Ft)	Construction	Facilities/Equipment	Total Cost
ANSD	Admin/Office Space (50 Civ/1 Mil/21 Contractor)	14,400	$2,016,000	$0	$2,016,000
ANSD	Aviation R&D Sensors Test & Evaluation Facility	29,700	$6,831,000	$0	$6,831,000
ANSD	Unmanned Aerial Vehicle (UAV) Laboratory	2,150	$494,500	$0	$494,500
	ANSD Subtotal	46,250	$9,341,500	$0	$9,341,500
CMD	Admin/Office Space (68 Civ/5 Mil/18 Contractor)	18,200	$2,548,000	$0	$2,548,000
CMD	Airborne Minefield Detection Test Range (5.35 Acres)	360	$82,800	$527,606	$610,406
CMD	Countermine Systems Laboratory	5,200	$1,196,000	$40,000	$1,236,000
CMD	Humanitarian Demining Laboratory	10,000	$2,300,000	$79,500	$2,379,500
CMD	Range 71A (Countermine/JUXOCO) (78.25 Acres)	24,000	$5,520,000	$1,570,000	$7,090,000
	CMD Subtotal	57,760	$11,646,800	$2,217,106	$13,863,906
GCSD	Admin/Office Space (80 Civ/4 Mil/21 Contractor)	21,000	$2,940,000	$0	$2,940,000
GCSD	Systems Engineering, Analysis & Integration Lab (SEAIL)	6,210	$1,428,300	$2,808,710	$4,237,010
	GCSD Subtotal	27,210	$4,368,300	$2,808,710	$7,177,010
MSD	Admin/Office Space (50 Civ/0 Mil/22 Contractor)	14,400	$2,016,000	$0	$2,016,000
MSD	Advanced Sensor Evaluation Facility (ASEF)	2,612	$600,760	$1,795,400	$2,396,160
MSD	Distributed Sensors Integration Facility (DSIF)	1,000	$230,000	$2,367,500	$2,597,500
MSD	Human Test and Perception Laboratory	760	$174,800	$787,000	$961,800
MSD	Image Evaluation Facility	2,612	$600,760	$1,723,500	$2,324,260
MSD	Virtual Prototyping and Simulation Facility	16,838	$3,872,740	$3,164,120	$7,036,860
	MSD Subtotal	38,222	$7,495,060	$9,837,520	$17,332,580
OD	Admin/Office Space (10 Civ/3 Mil/3 Contractor)	3,200	$448,000	$0	$448,000
	OD Subtotal	3,200	$448,000		$448,000
OPSD	Admin/Office Space (89 Civ/0 Mil/71 Contractor)	32,000	$4,480,000	$0	$4,480,000
OPSD	Industrial Hygiene & Material Hazardous Waste Storage and Processing Labs	480	$110,400	$200,000	$310,400
OPSD	Networking Facility	11,500	$2,645,000	$5,993,097	$8,638,097
OPSD	Woodworking Shop	11,846	$2,724,580	$1,518,000	$4,242,580
	OPSD Subtotal	55,826	$9,959,980	$7,711,097	$17,671,077

Estimated Cost (FY05 Dollars) to Reconstuct NVESD Facilities (Basic Construction & Unique Facility Costs/Equipment)

Div	Facility Name	Size (Sq Ft)	Construction	Facilities/Equipment	Total Cost
SPPD	Admin/Office Space (74 Civ/2 Mil/43 Contractor)	23,800	$3,332,000	$0	$3,332,000
SPPD	Building 305 High Bay Integration Facility/Night Vision Device Repair Facility	8,200	$1,886,000	$1,878,000	$3,764,000
SPPD	Building 331 Fabrication and Integration Facilities	56,750	$13,052,500	$10,735,000	$23,787,500
SPPD	Building 380 Sensitive Compartmented Information Facility (SCIF)	1,200	$276,000	$186,000	$462,000
SPPD	Drop Zone Observation Range (3 Acre Compound/350 Acre Range)	17,700	$4,071,000	$2,180,000	$6,251,000
SPPD	Indoor Firing/Photometric Range	8,000	$1,840,000	$2,260,000	$4,100,000
SPPD	Laser Range (258.5 Acres)	6,750	$1,552,500	$3,848,000	$5,400,500
SPPD	SAP Facility	3,440	$791,200	$150,000	$941,200
SPPD	Smart Gate	2,713	$623,990	$102,005	$725,995
	SPPD Subtotal	128,553	$27,425,190	$21,339,005	$48,764,195
STD	Admin/Office Space (95 Civ/0 Mil/20 Contractor)	23,000	$3,220,000	$0	$3,220,000
STD	Automated Sensor and Processor Evaluation Center (Autospec) Facility	2,651	$609,730	$2,770,600	$3,380,330
STD	Countermine Acoustics Laboratory	1,360	$312,800	$690,000	$1,002,800
STD	Countermine Chemical Sensor Laboratory	223	$51,290	$715,000	$766,290
STD	Countermine Prototype Systems Laboratory	540	$124,200	$515,000	$639,200
STD	Countermine Radar and EMI Laboratory	764	$175,720	$809,000	$984,720
STD	Detector Fabrication Cleanroom Facility	2,000	$460,000	$5,733,000	$6,193,000
STD	Display and Image Fusion Laboratory	1,500	$345,000	$3,244,000	$3,589,000
STD	Electronics and Glass Laboratories	1,000	$230,000	$1,566,700	$1,796,700
STD	Image Intensifier Test Facility	1,343	$308,890	$3,840,000	$4,148,890
STD	Imaging Technology Environmental Test Facility	500	$115,000	$340,000	$455,000
STD	IR Detector Semiconductor Microfactory	3,200	$736,000	$19,624,000	$20,360,000
STD	Laser Laboratories	5,239	$1,204,970	$5,160,000	$6,364,970
STD	Laser Test Tunnel	2,000	$460,000	$857,000	$1,317,000
STD	Mine Lanes Facility	14,000	$3,220,000	$2,459,000	$5,679,000
STD	Molecular Beam Epitaxy (MBE) Development Laboratory	1000	$230,000	$2,968,000	$3,198,000
STD	Near/Short-Wave Infrared Sensor Performance Characterization Lab	1,096	$252,080	$500,000	$752,080
STD	Optical Improvement Laboratory	2,000	$460,000	$965,000	$1,425,000
STD	Optics Laboratory	2,500	$575,000	$2,663,000	$3,238,000
STD	Processor Development Laboratory	1,000	$230,000	$702,452	$932,452
STD	Prototype IR FPA & IR Characterization Lab	2,000	$460,000	$1,055,000	$1,515,000
STD	Readout Integrated Circuit (ROIC) Laboratory	2,000	$460,000	$365,000	$825,000
STD	S&T Rooftop Testing Facility	900	$207,000	$0	$207,000
STD	X-Ray Diffraction Analytical Laboratory	400	$92,000	$560,000	$652,000
	STD Subtotal	72,216	$14,539,680	$58,101,752	$72,641,432
	NVESD Total	429,237	$85,224,510	$102,015,190	$187,239,700

Basis of NVESD Facilities Estimate

Basic Construction: The construction costs ($230 per square-foot for R&D space and $140 per square-foot Admin space) were derived from construction cost guides (2005 RSMeans Building Construction Cost Data) and estimates from contractors to validate those cost guide estimates. For Admin space, 200 square-feet per employee was used.

Facilities/Equipment: Facilities/Equipment includes any facility costs beyond basic construction (special security requirements, HVAC, backup power, fencing for ranges, etc.) and the replacement cost of any equipment that cannot be moved or moved without a mission interruption of greater than one or two months. In a facility where all the equipment, furniture, and computers will move to the new location, the Facility/Equipment cost is $0. There are still some unknown costs that were not included in these estimates, such as overhead cranes, surveillance systems for range perimeter fences, and running high-speed Internet access to remote ranges, that will probably result in several million dollars more of cost. The approach was to not include something if an accurate estimate could not be provided, rather than giving an over inflated cost.

The estimates do not include the cost for disassembling, packing, transporting, unpacking, reassembling, and calibrating (where necessary) the equipment and other items that will move to the new location. This cost cannot be estimated to any degree of accuracy without significantly more study and will add several million dollars to the cost of moving.

NVESD Divisions are as follows:

ANSD - Aviation & Netted Sensors Division
CMD - Countermine Division
GCSD - Ground Combat Systems Division
MSD - Modeling & Simulation Division
OD - Office of the Director
OPSD - Operations Division
SPPD - Special Products & Prototyping Division
STD - Science & Technology Division

BRAC Military Value Criterion (1): The current and future mission capabilities and the impact on operational readiness of the total force of the Department of Defense, including the impact on joint war fighting, training, and readiness.

BRAC Recommendation: The relocation of the Army Night Vision Lab From Fort Belvoir VA to Aberdeen Proving Ground MD

Substantial Deviation: Adverse Impact on Current and Future Mission Capabilities and on Joint War-Fighting

The recommendation justification states that this action will increase efficiency through consolidation of Research, Development and Acquisition (RDA), Test and Evaluation (T&E) sites. It ignores the fact that military value is provided by people. Efficiency cannot be created at the cost of decreased mission effectiveness. Experience in past BRACs has shown that 75 to 80% of the workforce will not relocate. In the case of the Army Night Vision Lab that represents the loss of from 250 to 270 uniquely skilled scientists and engineers. The mission performance and effectiveness of the organization will be disrupted for 10 years or more.

The workforce and facilities of the Army Night Vision Lab is a critical mass that accomplishes the entire range of activities necessary for the development of military Electro-Optic/ Infrared (EO/IR) sensors and Countermine Systems. The laboratory participates in selected basic research, performs applied research and advanced development, advances manufacturing technology, transitions technology to Program Managers (PMs), and provides a quick reaction capability to support combat operations and national emergencies

The Lab contributes to the mission capabilities of the total DoD force. Soldiers, Marines, Special Operations Forces and Joint Personnel Recovery teams benefit from the products of the Lab's efforts. The Defense Advanced Research Projects Agency (DARPA) relies on Night Vision's unique in-house expertise for the exploration of new concepts. The Navy relies on the Lab's expertise for imaging target acquisition sensors, and the Air Force leverages the infrared technology. The Special Operations Command (SOCOM) depends on Night Vision's quick reaction capability to remedy immediate battlefield needs. The Joint Unexploded Ordnance Coordination Office (JUXOCO) shares a live, calibrated minefield with the Lab. In addition, the Lab works closely with government Law Enforcement and Intelligence agencies to develop specialized capabilities, and with civilian First Responders who benefit from dual-use technology. Night Vision employees, equipped with new systems specifically developed for the emergency situation, were among the first responders at both the Pentagon and the World trade center after 9/11. The Night Vision Lab supports "Joint" capabilities and readiness in a manner that goes beyond the normal definition of that term.

The Night Vision Lab also has a unique partnership with Industry. The Lab seeds new technology with its expertise, and supports it until it is commercially viable and can be applied in military systems. Night Vision provides the electro-optic performance models for all of Industry and DoD. Equipment evaluations are done under standardized test procedures developed by the

Lab. Collaboration with Industry partners in specific areas and on specific systems is instrumental in resolving both technical and management issues.

The critical element for the successful performance of this mission is the workforce. The Night Vision Lab has 519 government employees, 340 of whom are scientists and engineers (S&E). Their technical specialties are in numerous advanced, unique areas. This S&E team represents over 55% of the EO/IR specialists in the Department of Defense and is responsible for over 50% of the DOD funding in the technology area. Although this group is only some 3% of the Army science and technology (S&T) workforce, it executes 17% of the Army's approved S&T programs; more than any other non-medical Army research and engineering organization. The unique, experienced workforce has provided some 20 special quick reaction projects that are fielded in support of combat operations, with many more currently in the works.
The team also supports work on 20 technology transition agreements with Army Program Managers to provide new technologies that will support future capabilities and systems.

Based on past experiences in BRAC scenarios, 75 to 80% of these science and engineering employees will not relocate from Northern Virginia to the Aberdeen area. This workforce cannot be easily replaced. Its expertise requires training in more that one academic field and is ultimately realized through hands-on experience and mentoring from senior members of the team. The requirement for a security clearance eliminates many math, science and engineering students from employment since technical academic programs are often dominated by foreign nationals. For example, the percentage of foreign nationals in the physics and computer/electrical engineering graduate programs at two Maryland universities, Johns Hopkins and Maryland, is approximately 65%. The current backlog for security clearances stands at over 328,000 people.

The justification for this recommendation also states that consolidation will achieve synergy at a lower cost and preserve a business model by collocation of RDA functions. However, the recommendation ignores the synergy that already exists among the Night Vision Lab and its customers/partners in the Northern Virginia area. The Rapid Equipping Force, PEO Soldier, PM Close Combat Systems and JUXOCO are within walking distance of the Lab. DARPA, the Army and Naval Research Labs, the Institute for Defense Analysis and the Naval Explosive Ordnance Disposal Technology Center are nearby. The Marine Corps Warfighting Lab and the FBI Engineering Research Facility are conveniently located in Quantico, VA. The recommendation removes this proven, existing synergy.

This recommendation is not a result of quantitative analysis but the product of military judgment. DoD Policy Memorandum Two – BRAC 2005 Military Value Principles – dated October 11, 2004, provides the direction for the use of military judgment in deliberative processes. The principle of "Recruit and Train" and "Equip" raises serious issues:

> **Recruit and Train**. The Department must attract, develop and retain…civilian and contractor personnel who are highly skilled and educated…to support advances in technology, and to respond to anticipated developments in joint and Service doctrine and tactics."

Equip. ...effectively place superior technology in the hands of the warfighter to meet current and future threats."

A Night Vision Lab realignment conflicts with the principles quoted above. The Army will lose uniquely skilled personnel. The majority of the mentors to train new employees will be gone. This will disrupt, possibly irreparably, the continued development of the superior technology that enables a combat overmatch for our forces today and tomorrow. A decline is inevitable.

Military value is provided by people. Should the Night Vision Lab lose 75- 80% of its workforce it will likely take over 10 years to reconstitute it. Losses would begin in the near future and continue during the four years leading up to the actual move. Hiring prior to a major relocation will be extremely difficult at best. Replacing from 250 to 270 skilled personnel and developing their skills could take 10 years in itself. The damage to the Lab's capabilities could be irreparable and this nation would likely lose its lead in sensor technologies to other nations, and hence its night-fighting advantage. The current and future mission capabilities of our Armed Forces will suffer from even a minor disruption to the Night Vision Lab's important work, with an immediate effect on our Warfighters currently in combat. The failure to adequately consider the impact of the personnel losses and the adverse impact on the total force of the Department of Defense is a substantial deviation from Military Value Criterion (1). The disruption of the existing synergy between the Lab and its Army, DoD and Federal Agency partners at its present location adds to the extent of this deviation.

BRAC Military Value Criteria (2): The availability and condition of land, facilities, and associated airspace (including training areas suitable for maneuver by ground, naval, or air forces throughout a diversity of climate and terrain areas and staging areas for the use of the Armed Forces in homeland defense missions) at both the existing and potential receiving locations.

BRAC Recommendation: The Relocation of the Army Night Vision Lab from Ft. Belvoir, VA to Aberdeen Proving Ground, MD

Substantial Deviation: Adverse Impact of the availability and condition of land, facilities, and associated airspace at Aberdeen Proving Ground, MD on the mission of the Night Vision Laboratory

The Night Vision Lab has many unique in-house laboratories, facilities and ranges. These include: Science and Technology component development labs, a virtual prototyping and simulation facility, a mine lanes facility, system prototyping, fabrication and integration facilities, indoor firing range, and field use for testing and demonstrations at Fort AP Hill, VA. Costs are described in the discussion of Criteria 5.

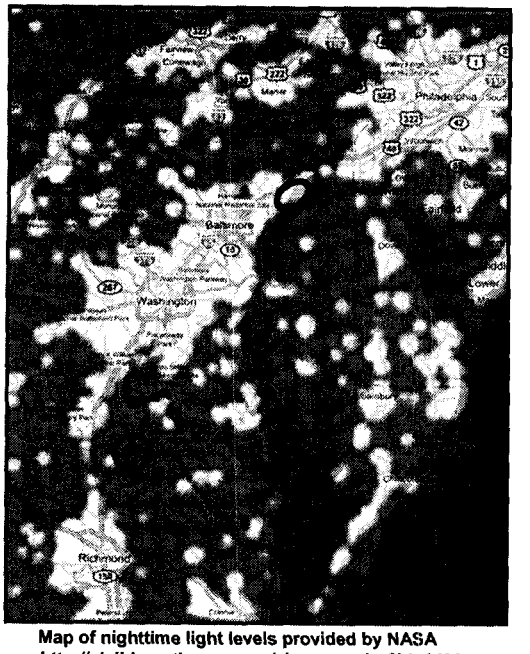
The justification for the closure of Fort Monmouth and relocation of the Night Vision Lab states: "Military value is enhanced by relocating the research functions to under-utilized and better equipped facilities." Mr. David W. Carter, P.E., Chief, Engineering and Construction Division, Directorate of Installation Operations, US Army Garrison, Aberdeen Proving Ground, toured NVESD facilities and labs on 14 Jun 05, and stated that APG had no existing facilities that would meet Night Vision's laboratory requirements and that new construction would be required, with very few exceptions. On 12 Jul 05 during a CERDEC/NVESD visit to APG, Mr. Carter again stated that new buildings would have to be constructed to accommodate CERDEC/NVESD laboratory/facility requirements with limited "win-win" exceptions (one possible high-bay integration facility was mentioned).

Some facilities will probably not ever be replicated at Aberdeen Proving Ground. These include:

- A fully instrumented, secure 5 km laser range for eye damaging lasers (fenced off)
- An in vacuum, IR detector microfactory – delicate Molecular Beam Epitaxy
- Live (but inoperable) minefields with controlled dielectric soils
- A mine lanes facility with controlled climate and no metal in construction below ground level (foundation, retaining walls, etc…)
- An instrumented Electro-Optic test range with a large search area and long lines of sight with uninterrupted access
- Airspace to overfly 80+ square miles of land and roads and for UAV testing

Environmental issues compound the feasibility of labs, facilities and field ranges. Vibrations from munitions firing at Aberdeen Proving Ground may impact finely tuned lasers, optics and detector microfactory labs.

The ambient nighttime light level at Aberdeen is also a major concern. The Night Vision Lab uses the facilities at Fort AP Hill Light for measuring night vision devices and camera performance. Light levels were measured at Aberdeen using a night Sky Spectrometer and compared with the AP hill data base. The level is 5X brighter than that of Fort AP Hill due to light pollution from populated areas and would preclude the measurement of night vision goggles and light sensitive camera performance under true starlight conditions. The map below of nighttime light levels taken by NASA illustrates this point.



Aberdeen, MD
Ft. AP Hill, VA

Map of nighttime light levels provided by NASA
http://visibleearth.nasa.gov/view_rec.php?id=1438

Range use is critical to the Night Vision Lab's mission. The ranges are heavily utilized all year for a multitude of testing. This includes day and night, ground and air, unclassified and classified. The observation/driving/ airborne range is used 80 to 85% of work days during the year. The Night Vision Lab flies over 300 hours a year over ranges with manned aircraft for its test needs. This translates into over 100 individual sensor tests using manned aircraft per year. For UAV testing, there are approximately 3-5 days of testing every six weeks. The laser range is used about 70 to 75% of work days during the year.

The lack of suitable facilities at Aberdeen contradicts the statement in the recommendation that justifies the relocation of the Night Vision Lab by "...relocating the research functions to under-utilized and better equipped facilities" and by "utilizing existing space and facilities at the gaining installations." The facilities do not exist at Aberdeen. Environmental conditions and spatial considerations raise doubts as to whether

the facilities could be reestablished at the required levels of capability and performance. As is graphically illustrated by the NASA information, the ambient light level at Aberdeen precludes the sensitive sensor and camera measurements that are the essence of night vision developmental work. The lack of facilities and airspace, combined with the existence of light pollution, show the Aberdeen area to be inferior to the present facilities at Forts Belvoir and AP Hill, and constitute a substantial deviation from Military Value Criterion (2).

Military Value Criterion (4): The cost of operations and the manpower implications.

BRAC Recommendation: The relocation of the Army Night Vision Lab From Fort Belvoir VA to Aberdeen Proving Ground MD

Substantial Deviation: Inaccurate Cost of Operations

The recommendation justification states that this action will increase efficiency through consolidation of Research, Development and Acquisition (RDA), Test and Evaluation (T&E) sites. It claims that the consolidation would achieve efficiency and synergy at lower cost. However, the cost of operations at Aberdeen measured in Cost/Square Foot (SF) for occupied square footage is more than double that for Fort Belvoir.

The unadjusted Base Operations Cost per SF at Aberdeen Proving Ground is slightly less than that of Fort Belvoir, as shown below:

Unadjusted Average Base Operations Cost per SF			
	Budget	**Square Footage**	**Operations Cost/SF**
Aberdeen Proving Ground	**$209, 980, 684**	**14,429,407**	**$14.55**
Fort Belvoir	**$128,202,380**	**7,954,402**	**$16.12**

However, adjusting those costs for unoccupied, vacant square footage dramatically increases operating costs by a factor of more than 2.4. The adjusted average costs, shown below, indicate that base operating costs per square foot at Aberdeen are more than double those for Fort Belvoir.

Adjusted Average Base Operations Cost per SF					
	Budget	**Existing SF**	**Less Vacancy**	**Net SF**	**Adjusted Cost/Net SF**
Aberdeen Proving Ground	**$209,980,684**	**14,429,407**	**8,572,249**	**5,857,158**	**$35.85**
Fort Belvoir	**$128,202,380**	**7,954,402**	**319,527**	**7,634,875**	**$16.79**

The claim that lower costs will result from a relocation of the Night Vision Lab from Fort Belvoir to Aberdeen Proving Ground are incorrect based on the adjusted base operations costs. Failure to use accurate cost data is a substantial deviation from Military Value Criterion (4).

Substantial Deviation: Manpower Implications

The justification for this recommendation also speaks of the need for integrated research in C4ISR technologies. It fails to address the make-up of the workforce that will be available to conduct that research. In the case of the Night Vision Lab, 75 to 80% of the workforce will choose not to relocate and will find other employment in the Northern Virginia area. The composition of the workforce that becomes available for operations at Aberdeen will be lacking in both numbers and capabilities.

The loss of personnel will begin in the very near future. A relocation announcement will be an impetus for members of the workforce to seek other opportunities, and for prospective employers to lure talented government professionals into the private sector. The 340 scientists and engineers (S&E) presently employed at the Night Vision Lab will be prime targets. The period leading up to the actual relocation is anticipated to be four years. A time-phased hiring plan will be difficult to implement. Government employees are not contractually bound in terms of employment and are able to resign or retire, if they are eligible, in the space of one day. During this four year period, there will be a stream of departures from the workforce. The departures will not be balanced by new hires, since hiring during a transition period prior to a move will be difficult in terms of both finding employees and having the personnel assets at the Lab to execute the hiring process. In addition, Night Vision employees are required to have security clearances. The current backlog, over 328,000 persons, will preclude a rapid recomposition of the workforce.

The pool of potential employees is constrained. The Night Vision Lab must compete with the private sector for the talents of scientists and engineers with high technology specialties. The security clearance requirement alone disqualifies many math, science and engineering students from employment since technical academic programs are often dominated by foreign nationals. For example, the percentage of foreign nationals in the physics and computer/electrical engineering graduate programs at two Maryland universities, Johns Hopkins and Maryland, is approximately 65%.

The Lab's successes are based on the quality of its workforce. The recruitment of talent would be the start, not the finish, of a reconstitution. Night vision scientists and engineers require skills in more than one academic area. The unique specialties associated with sensor R&D and systems are learned over time, on the job, through mentoring and experience. They are not taught at universities. The role of mentors is critical. Their knowledge in the academic sphere and experience in practical applications are the basis for developing less senior members of the workforce. Individual capabilities are derived in large part from the collective wisdom of the mentors. The senior element of the workforce is arguably the least likely to relocate due to retirement eligibility and established roots in the Northern Virginia area. The technical capabilities of an inexperienced workforce will not begin to approach the level of achievement that the Night Vision Lab provides today. It is difficult to imagine how long it would take to reach the current level of expertise without the mix of senior, intermediate and junior personnel that exists today.

Military value is based on people. Experience in past BRACs indicates that 75 to 80% of the workforce at the Army Night Vision Lab will not relocate. Four years of initial personnel losses prior to relocation will be followed by many more years of recruitment and training. Reconstitution to the current level of mission performance, if achievable, will take more than

10 years. Both ongoing war support efforts and the planned execution of sensor R&D will be disrupted. It is likely that the Nation will lose the sensor technology lead it has enjoyed since the field was pioneered 40 years ago – at the Army Night Vision Lab. The failure to recognize the impact of personnel losses on the availability of skilled manpower to accomplish a critical technology mission is a substantial deviation from Military Value Criterion (4).

BRAC Military Value Criterion (5): The extent and timing of potential costs and savings, including the number of years, beginning with the date of completion of the closure or realignment, for the savings to exceed the costs.

BRAC Recommendation: The Relocation of the Army Night Vision Lab from Fort Belvoir VA to Aberdeen Proving Ground MD

Substantial Deviation: Incomplete Costs and Savings

The justification for the recommendation to realign Fort Belvoir, VA, by relocating and consolidating Sensor, Electronics, and Electronic Warfare Research, Development and Acquisition activities, including the Army Night Vision Lab, to Aberdeen Proving Ground, MD, reports a one-time cost of $822.3M . There is no cost savings associated with the relocation of the Night Vision Lab from Fort Belvoir to Aberdeen, only costs. The Lab and Aberdeen Proving Ground are both in the Washington-Baltimore-Northern Virginia locality area, so there is no labor cost savings. In addition, the COBRA database understates replacement costs by failing to include Night Vision's lower dollar-value facilities and labs, and those established after FY03. As a result, the replacement costs for following NVESD facilities/labs, totaling nearly $40M, were not included in the COBRA database:

Facility Name	Size	Replacement Cost (FY05$)*
Unmanned Aerial Vehicle (UAV) Lab	2,150 Sq Ft	494,000
Countermine Systems Lab	5,200 Sq Ft	1,236,000
Humanitarian Demining Lab	10,000 Sq Ft	2,379,500
Distributed Sensor Integration Facility (DSIF)	1,000 Sq Ft	2,597,500
Human Test & Perception Lab	760 Sq Ft	961,800
Image Evaluation Facility	2,612 Sq Ft	2,324,260
Networking Facility	11,500 Sq Ft	8,638,097
High Bay Integration Facility/NV Device Repair Facility	8,200 Sq Ft	3,764,000
Building 380 SCIF	1,200 Sq Ft	462,000
Indoor Firing/Photometric Range	8,000 Sq Ft	4,100,000
SAP Facility	3,440 Sq Ft	941,200
DoD Smart Gate	2,713 Sq Ft	725,995
S&T Countermine Prototype Systems Lab	540 Sq Ft	639,200
Electronics & Glass Labs	1,000 Sq Ft	1,796,700
Imaging Technology Environmental Test Facility	500 Sq Ft	455,000
Laser Test Tunnel	2,000 Sq Ft	1,317,000
Molecular Beam Epitaxy (MBE) Development Lab	1,000 Sq. Ft	3,198,000
Optical Improvement Lab	2,000 Sq Ft	1,425,000
Processor Development Lab (PDL)	1,000 Sq Ft	932,452
Readout Integrated Circuit (ROIC) Lab	2,000 Sq Ft	825,000
X-Ray Diffraction Analytical Lab	400 Sq Ft	652,000
Totals	67,215 Sq Ft	$39,864,704

*Replacement Cost includes basic construction, unique facility costs, and equipment not moving from the current location

Also, the BRAC recommendation and supporting COBRA database do not include the Night Vision Lab's ranges at Fort A.P. Hill, VA. The Lab has a 258.5 acre Laser Range, a 350 acre Drop Zone/Observation Range, a 78.25 acre Countermine Range it shares with the Joint Unexploded Ordnance Coordination Office (JUXOCO), and 5.35 acre Airborne Minefield Detection Test Range at Fort A.P. Hill. The facilities at APG do not meet these range requirements. The costs to establish new R&D ranges at APG are not included in the COBRA analysis. Construction, facilities and equipment would amount to nearly $20M. The DoD recommendation also does not include a cost for maintaining dual capabilities during a transition.

Estimated Cost (FY05 Dollars) to Reconstruct NVESD A.P. Hill Range Facilities (Basic Construction & Unique Facility Costs/Equipment)

Facility Name	Size (Sq Ft)	Construction	Facilities/Equipment	Total Cost
Airborne Minefield Detection Test Range (5.35 Acres)	360	$82,800	$527,606	$610,406
Range 71A (Countermine/JUXOCO) (78.25 Acres)	24,000	$5,520,000	$1,570,000	$7,090,000
Drop Zone Observation Range (3 Acre Compound/350 Acre Range)	17,700	$4,071,000	$2,180,000	$6,251,000
Laser Range (258.5 Acres)	6,750	$1,552,500	$3,848,000	$5,400,500
STD Subtotal	48,810	$11,226,300	$8,125,606	$19,351,906

An R&D activity like the Night Vision Lab frequently follows a test-fix-test cycle and requires unencumbered access to highly instrumented ranges. If new ranges are not constructed at APG, and the Night Vision Lab must continue to test at Fort A.P. Hill, there are significant operational and opportunity costs. Fort A.P. Hill is approximately 60 miles from Fort Belvoir and the driving time in an automobile is slightly more than one hour. Aberdeen is approximately 160 miles from Fort A.P. Hill. The driving time is three hours under optimal conditions, but the trip is complicated by the need to transit two very congested metropolitan areas, Baltimore and Washington DC. Travel times for equipment transport vehicles can be double that of automobiles. Overnight stays will often replace local travel, and travel will consume time that could be better used for mission activities.

The payback for this recommendation does not include lower dollar-value facilities and those established after FY03, nor does it include the range complexes that are an essential part of a R&D organization. Taken together, the reestablishment of these facilities amounts to a cost of nearly $60M. There are no cost savings to be realized from a relocation of the Night Vision Lab to Aberdeen to start with. Failure to account for the additional costs which must be assumed is a substantial deviation from BRAC Criterion (5).

BRAC Selection Criterion (Other Considerations) (7): The ability of the infrastructure of both the existing and potential receiving communities to support forces, missions, and personnel.

BRAC Recommendation: The relocation of the Army Night Vision Lab From Fort Belvoir VA to Aberdeen Proving Ground MD

Substantial Deviation: Erroneous Conclusion on the Ability of the Aberdeen Community Infrastructure to Support Families

The BRAC recommendation states that a review of community attributes revealed no significant issues regarding the infrastructure of communities when moving from Fort Belvoir to Aberdeen, MD. That is not the case. There is an error in the report regarding the quality of education in the Aberdeen area. When the correct information is considered, four local area attributes decline when moving from Fort Belvoir: Education, Employment, Safety and Transportation. Only Cost of Living improves. There is also an error in the GS Locality Pay assigned to Aberdeen. In fact, the Locality Pay is the same as that for Fort Belvoir and should have been 14.6%.

The recommendation states that Cost of Living and Education improve when moving to Aberdeen. The statement for education is erroneous. As the attached document points out, the education information contains an incorrect entry for the Pupil/Teacher ratio. The actual value, as supported by the referenced document, is **15.65:1**, not the stated value of **1.2:1**.

The effect is shown in the following matrix which contains the same information fields as the original BRAC document, with the exception of capacity and enrollments:

	Aberdeen	Belvoir	Comments
Average Pupil/Teacher Ratio	~~**1.2:1**~~ **15.65:1**	15.6:1	After correction, about the same Belvoir slightly better
Avg. High School Graduation Rate (US Avg 67.3%)	80.5%	96.7%	Belvoir much better
Avg Composite SAT I Score (US Avg 1026)	992	1077	Belvoir better Aberdeen below US Avg 1026
Avg ACT Score (US AVG 20.8)	20	21	Belvoir better Aberdeen below US Avg 20.8
Available Graduate/PhD Programs	6	6	Same
Available Colleges and/or Universities	7	15	Belvoir much higher
Available Vocational and/or Technical Schools	12	2	Aberdeen much higher

BRAC Document 1645 states, "The pupil/teacher ratio, graduation rate, percentage of certified teachers and composite SAT I/ACT scores provide a relative quality indicator of education. This attribute also attempts to give communities credit for the potential intellectual capital they provide." (The percentage of certified teachers was ultimately dropped from Criterion 7 consideration as described in the attachment.) Based on the four indicators, specifically the pupil/teacher ratio, graduation rate, and composite SAT I/ACT scores, and once the error in pupil/teacher ratio for Aberdeen is corrected, Ft. Belvoir scores better in all four categories than Aberdeen.

Fort Belvoir scores much higher than Aberdeen on the number of available Colleges and Universities. Aberdeen has more vocational and technical schools. However, judgment should not rate these as important as the availability of colleges and universities for the education of their children to a highly educated workforce of scientists and engineers.

The pupil/teacher ratio for Aberdeen, MD is incorrect by more than an order of magnitude. The error most likely drives the comparison for relocation from Fort Belvoir to Aberdeen to the incorrect conclusion that the quality of education improves. As detailed above, the Quality of Education at Ft. Belvoir is superior to that of Aberdeen.

The impact of this correction on the conclusion concerning the Aberdeen community infrastructure is significant. Correction of the Education error in the attribute evaluation means that only one attribute, Cost of Living, improves in a move from Fort Belvoir to Aberdeen. Four attributes, Education, Employment, Safety and Transportation, decline. This result calls into question the judgment in the BRAC Report that there are no significant issues regarding the community infrastructure when moving from Fort Belvoir to Aberdeen, MD.

It is unreasonable to expect that a highly-educated workforce will move to an area in which the quality of education is lower for their children, and the crime index, as reported in Document 1645, is 25% higher than that for the Fort Belvoir area. In addition, employment opportunities are important to a workforce that has a significant fraction of dual career couples. The unemployment rate in the Aberdeen area was 1.6% higher than for Fort Belvoir during the final year considered in the report, 2003. Aberdeen's job growth rate for the same period was 1.6% below that of Fort Belvoir, below the national average and, in fact, negative (-.4%).

The conclusion that there are no significant issues related to community infrastructure is questionable at best. It is not a result of quantitative analysis but the product of judgment. DoD Policy Memorandum Two – BRAC 2005 Military Value Principles – dated October 11, 2004, provides the direction for the use of military judgment in deliberative processes. Although, strictly speaking, this result may not be the product of military judgment, the comment on Quality of Life is worth noting:

Quality of Life: "The Department must provide a quality of life, including quality of work place that supports recruitment, learning, and training, and enhances retention."

A relocation in which the workforce is expected to accept an overall decline in Quality of Life is unrealistic. The Quality of Life issue also affects the recruitment of new employees. The fact that four attributes, including Education and Safety/Crime, decline in a move from Fort Belvoir to Aberdeen, while only one improves, is evidence of an overall decline in the Quality of Life. The incorrect assertion that there are no significant issues related to community infrastructure is a substantial deviation from (Other) Criterion (7).

Education Assessment Related to BRAC Criterion (7)
Aberdeen, MD Data Inaccurate

DOD Recommendation: Realign Ft. Belvoir, VA by relocating and consolidating Sensors, Electronics and Electronic Warfare Research, Development and Acquisition activities to Aberdeen Proving Ground, MD. Reference 1: BRAC Report, Volume I, Part 2 of 2, Section 1, Detailed Recommendations, May 2005. Page, Army-12.

Community Infrastructure Assessment: When moving from Fort Belvoir to Aberdeen, MD, the following local area capabilities improve: Cost of living and Education. Reference 1. Page, Army -14. Per the graphical representation of the Criteria Seven Evaluation Tool, Education "Improves" in moving from Fort Belvoir to Aberdeen Proving Grounds. Reference 2: Document 1645 in the BRAC E-Library. Page, 154.

Key BRAC documents addressing education are:

- Reference 2: Document 1645 in the BRAC E-Library, Pages, 156 – 157 for Aberdeen Proving Ground, MD and Page 160 for Fort Belvoir, VA.
- Reference 3: Data Bases for US Dept of Defense BRAC 2005, Department of Army Responses for Aberdeen PG and Ft, Belvoir; http:www.defenselink.mil/brac/minutes/databases/Army/, Question 1405 Community Education Facts and Question 1406 Community Education High School. (Aberdeen is averaged over 7 school districts. Fort Belvoir is averaged over 2 school districts.)
- Reference 4: Document 2983 in BRAC E-Library, BRAC 2005 Joint Process Action Team for Selection Criterion 7 Final Report, Attribute Four: Education, pages 14 – 17.

Inaccurate Data

The Average Pupil/Teacher Ratio of 1.2:1 for Aberdeen is incorrect as reported in Reference 2, Page 157. Using the Methodology of Reference 4 and the Data of Reference 3, the Weighted Average for the Pupil/Teacher Ratio for Aberdeen computes to be 15.65.

Effect of Incorrect Data on Comparison

The error in Pupil/Teacher Ratio for Aberdeen is over an order of magnitude, actually 13 times. Per Reference 2, pg 156: " The pupil/teacher ratio, graduation rate, percentage of certified teachers and composite SAT I/ACT scores provide a relative quality indicator of education. This attribute also attempts to give communities credit for the potential intellectual capital they provide." Certified Teachers was later dropped from Criterion 7 consideration per Reference 4. The numbers as reported for these criteria in Reference 2 are listed below for side by side comparison.

	Aberdeen	Belvoir	Comments
Average Pupil/Teacher Ratio	~~1.2:1~~ **15.65:1**	15.6:1	After correction, about the same Belvoir slightly better
Avg. High School Graduation Rate (US Avg 67.3%)	80.5%	96.7%	Belvoir better

Avg Composite SAT I Score (US Avg 1026)	992	1077	Belvoir better Aberdeen below US Avg
Avg ACT Score (US AVG 20.8)	20	21	Belvoir better Aberdeen below US Avg
Available Graduate/PhD Programs	6	6	Same
Available Colleges and/or Universities	7	15	Belvoir much higher
Available Vocational and/or Technical Schools	12	2	Aberdeen much higher

Therefore, based on the four indicators, specifically the pupil/teacher ratio, graduation rate, and composite SAT I/ACT scores, and once the error in pupil/teacher ratio for Aberdeen is corrected, Ft. Belvoir scores better in all four categories than Aberdeen.

Conclusion: As detailed above, the Quality of Education at Ft. Belvoir should be considered superior to that at Aberdeen.

NIGHT VISION AND ELECTRONIC SENSORS DIRECTORATE
ATTN: AMSRD-CER-NV-OPS
10221 BURBECK RD
FORT BELVOIR, VA 22060-5806

BRAC Commission
JUL 25 2005
Received

OPERATIONS DIVISION

DATE: July 25 2005

TO: Wes Hood

AGENCY: BRAC Commission

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COMMENTS: Wes, Per E-Mail. The edits are in the interests of OPSEC.

Jim

U.S. Department of Justice
Federal Bureau of Investigation
Washington, D. C. 20535-0001

July 1,2005

Dr. Fenner Milton,
Director,
Night Vision & Electronic Sensors Directorate
AMSRD-CER-NV-OD
10221 Burbeck Road
Fort Belvoir, VA 22060-5806

Dear Dr. Milton,

It seems appropriate at this time to express to you personally as Director, and cumulatively to your staff, the sincere appreciation of the FBI=s Operational Technology Division (OTD). Over the past 25 years, NVL has assisted in meeting the FBI=s emergency operational requirements by granting our people immediate access to your facilities and staff. This has significantly benefitted our capability in meeting near and long term technical and operational requirements.

The close physical proximity of the NVL has enabled our Electro-Optic Technology (EOT) initiative to cultivate and develop a close working relationship with the leadership and technical experts of the NVL. On many occasions, the NVL has provided instant access to our people. This inter-agency cooperation has been considered critical to rapid response in emergency situations, both domestically and world wide. This cooperation has resulted in rapid deployment of equipment, and techniques which otherwise may not have been possible.

In addition to assisting with immediate operational requirements, the NVL has become a focal point for the FBI and many government agencies concerning longer range joint projects in Research, Design, Development and Testing of equipment, materials and techniques concerning Night Vision as well as other areas of concern to the various Federal Agencies and local law enforcement.

The NVL has worked with FBI to develop specifications and performance requirements of night vision goggles for use in all aspects of investigations and quick response field support. As a result the FBI has fielded over 1500 night vision goggles.

Through contacts at NVL, the FBI was able to initiate and fully develop a night vision pocketscope kit which contains modular components for interchanging lenses for direct viewing, video recording and photographic recording. The multiple functions of the pocketscope has made it more useful than night vision goggles because it is capable of both short range and long range tactical night surveillance. The FBI has fielded over 2000 pocketscopes and has been able to upgrade the components to generation III and near generation IV capabilities.

As a result of meetings with NVL representatives and private industry, the FBI was able to develop and provide to every field office, low cost uncooled thermal video cameras.

The instant access to the various testing facilities at NVL has enabled the FBI to obtain quick technical data and evaluation of technology critical to do in house requirements, equipment field deployments and support to night vision operations.

NVL has performed quality assurance testing in order to resolve disputes between the FBI and night vision contractors regarding actual performance parameter measurements on night vision systems and intensifiers.

The overall performance, professionalism, and spirit of inter-agency cooperation of the Night Vision Laboratories (NVL) has consistently been in keeping with the highest traditions of Federal Service. The benefit to our country is incalculable. The Operational Technology Division of the FBI extends, in the strongest possible way, sincere gratitude for your personal efforts as Director, and for the many individual and cumulative efforts of your most talented and distinguished staff. Please extend our sincere gratitude to your entire staff.

Sincerely,

Unedited original signed

Kerry E. Haynes
Assistant Director
Operational Technology Divison

U.S. Department of Homeland Security
UNITED STATES SECRET SERVICE

Forensic Services Division
950 H Street, N.W. Room 4200
Washington, D.C. 20223

July 21, 2005

Dr. Fenner Milton, Director
U.S. Army Research, Development and Engineering Command
Night Vision and Electronic Sensors Directorate
10221 Burbeck Road
Fort Belvoir, VA 22060-5806

Dear Director Milton:

This letter is to express our appreciation for the assistance you have given us in several areas of mutual interest.

We frequently rely on you for technical guidance when considering the operational features of the several thermal imagers currently manufactured.

Your close proximity is important and a great advantage to us as it facilitates our attendance of critical meetings or demonstrations. On several occasions we have been notified by your staff about new technology that could be useful to our missions and, being so close, several of us have been able to be there and back quickly. Similarly, your staff has visited our headquarters on short notice.

We appreciate the assistance and cooperation you have given us. The professionalism of your staff is beyond reproach and its expertise highly unique and valuable to us. We look forward to our continuing cooperation.

Sincerely,

Unedited original signed

Antonio A. Cantu, Ph.D.
Chief Research Scientist
Forensic Services Division
United States Secret Service

USE OF THE LASER RANGE AT ABERDEEN PROVING GROUND

We have not used the laser range at APG because it is much more expensive than AP Hill. The higher cost is in part due to the fact that the APG range extends over waterway that is accessible to public, so that APG-manned boats have to be stationed in the water to prevent "stray exposure".

Lew

Lew Goldberg
Laser Technology Branch Chief
Night Vision Laboratory