DCN:11619

NVESD Facility Description

Night Vision & Electronic Sensors Directorate
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As of 7 July 05

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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

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1. Advanced Sensor Evaluation Facility (ASEF)

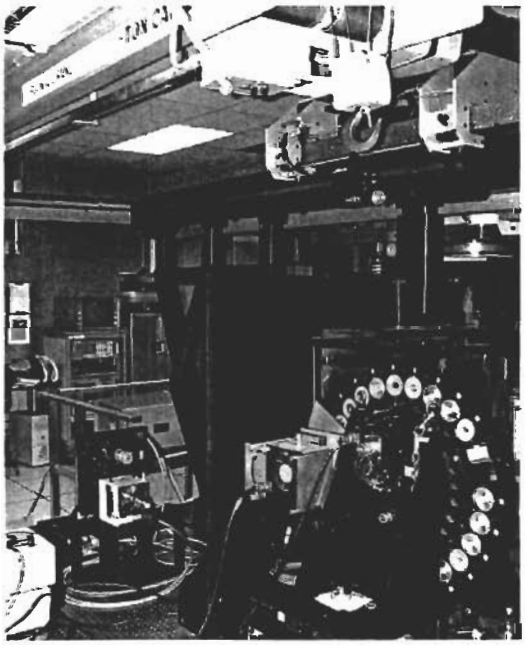
Description: The NVESD Advanced Sensor Evaluation Facility (ASEF) - With new model development comes the requirement of characterizing the sensors in such a way as to directly measure the relevant parameter used in the model. Perception testing to determine the effect of sensor artifacts on human perception 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.

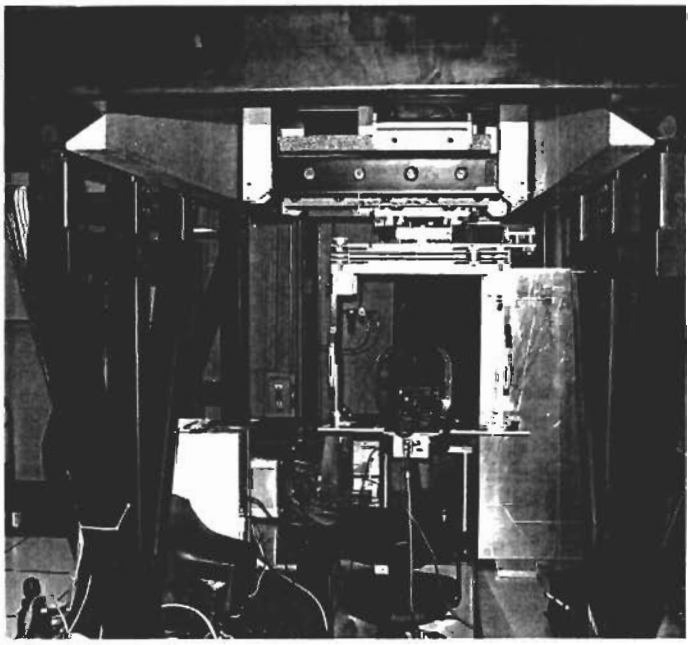
Footprint: 2,612 Square-Feet

Personnel: 4 Government

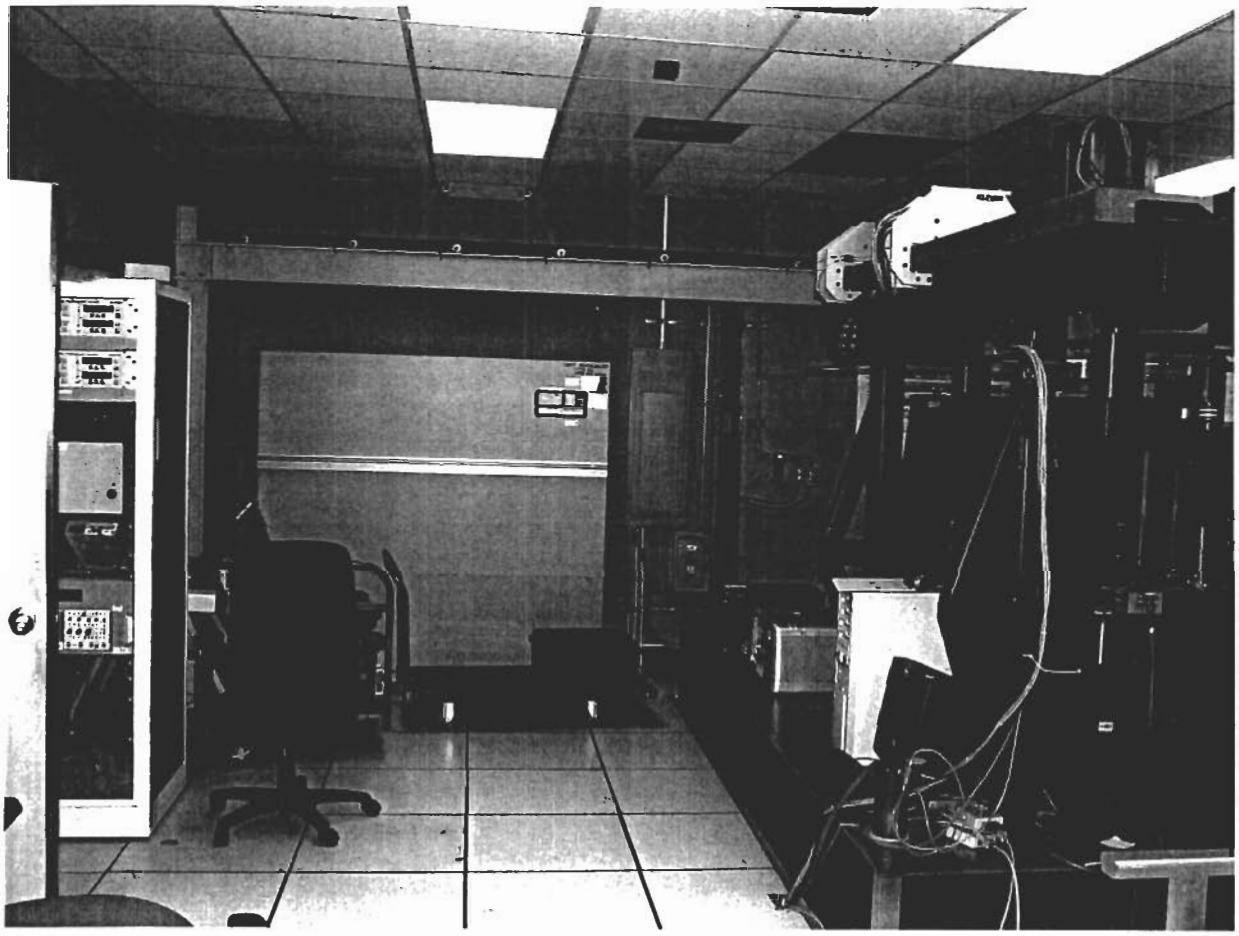
Equipment: Multiple 8' x 16' sealed hole optical benches table top with tuned damping for vibration isolation, a 1-ton capacity overhead crane, multiple small through large refractive collimators and 2 very large reflective collimator setups for multiple collimator configurations, a large mutliaxis translation/rotation 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





DCN:11619



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.

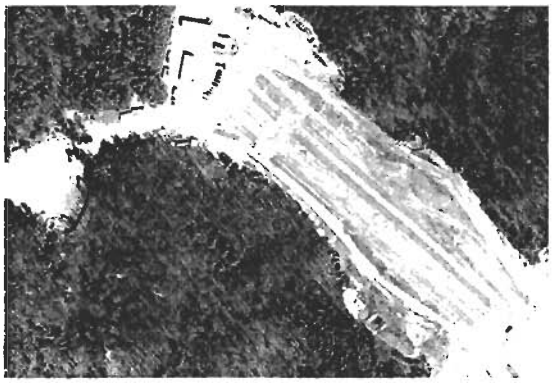
- Flight Operations Building

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)

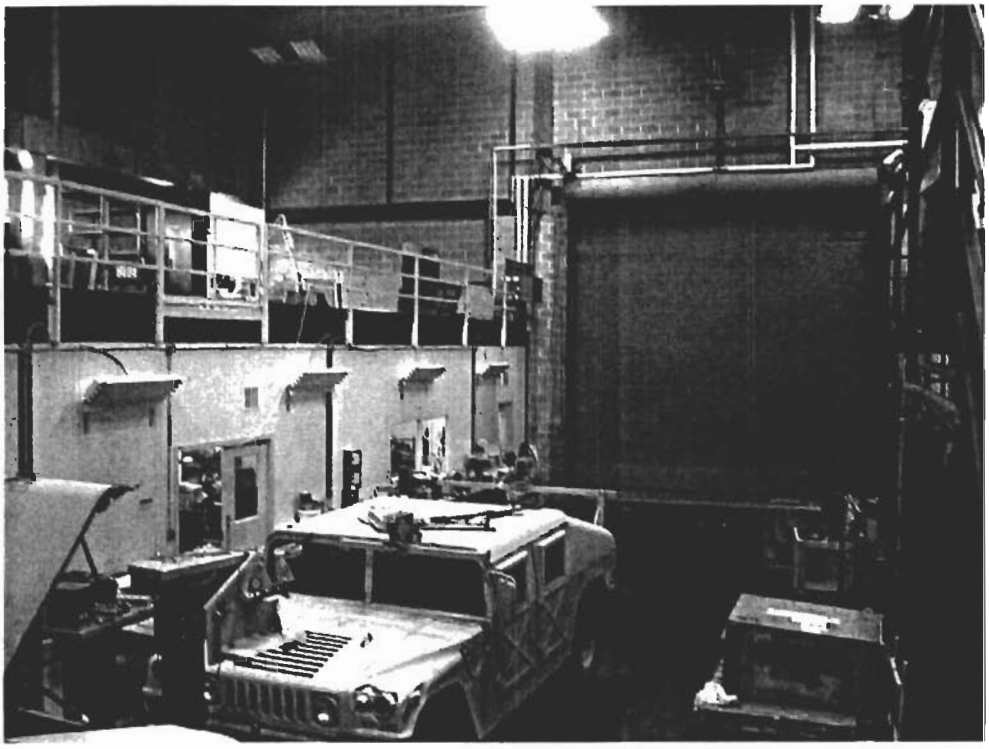
Special Needs:

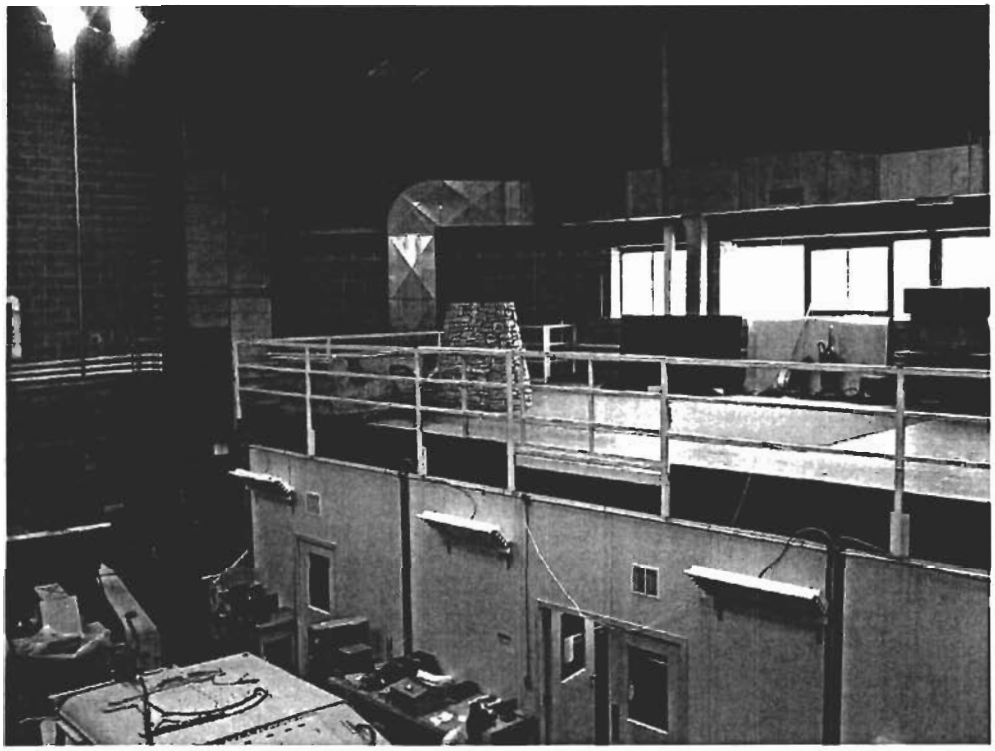
- 10-ton hoist

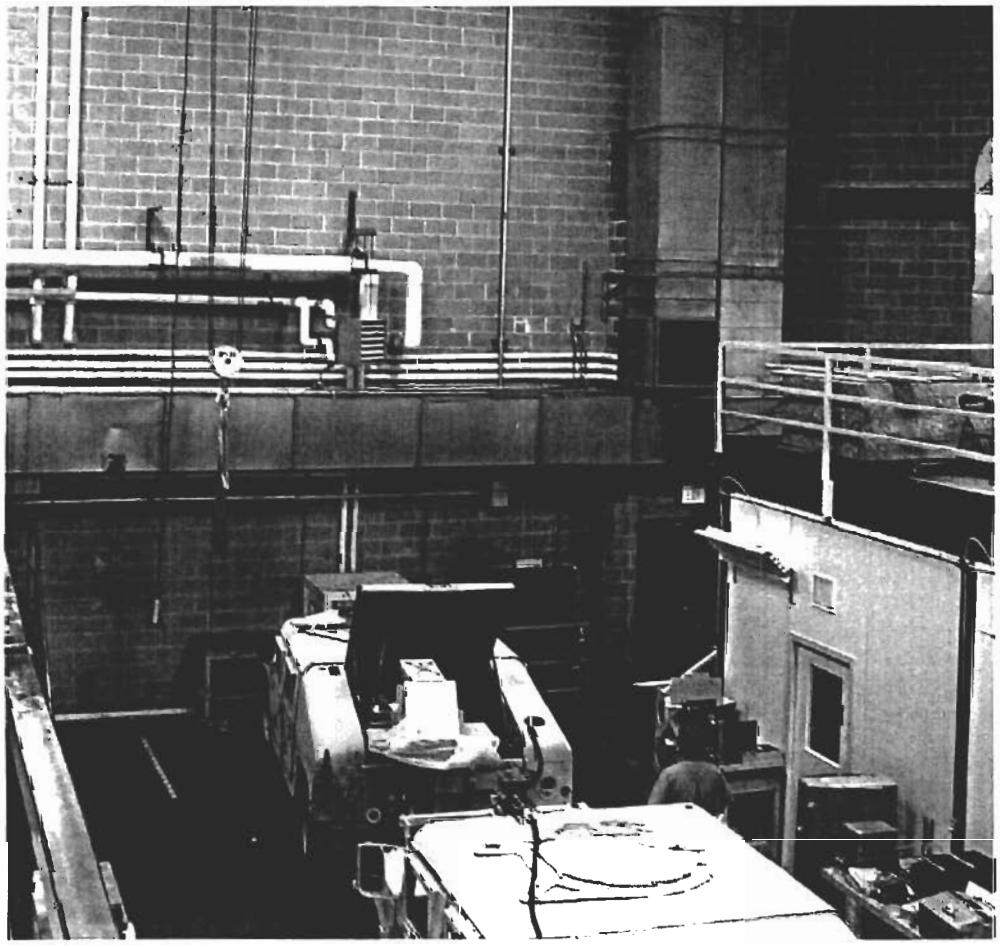
- Vehicle Exhaust System

- 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

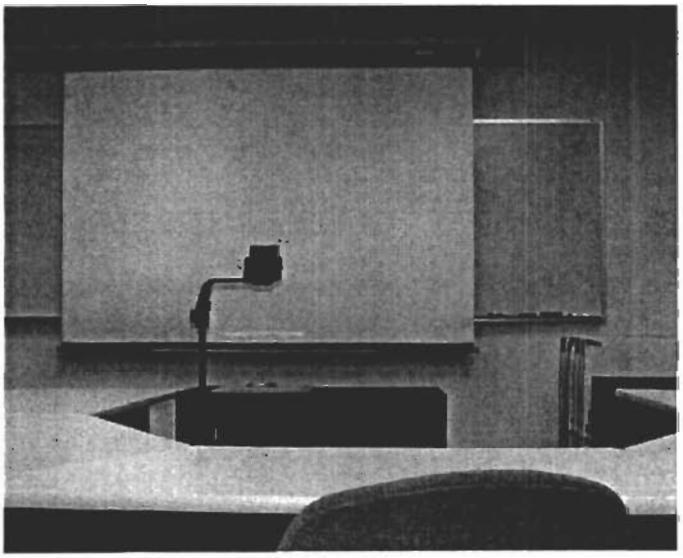
Collateral Accredited – SIPRNET
1 – Server with Communications/Crypto Interface system
3 – SIPRNET Workstations with computers and monitors
1 – Color Printer
1 – B/W Printer
6 – LAN Drops
1 – T1 Communications Circuit
1 – Backup communications circuit or path

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

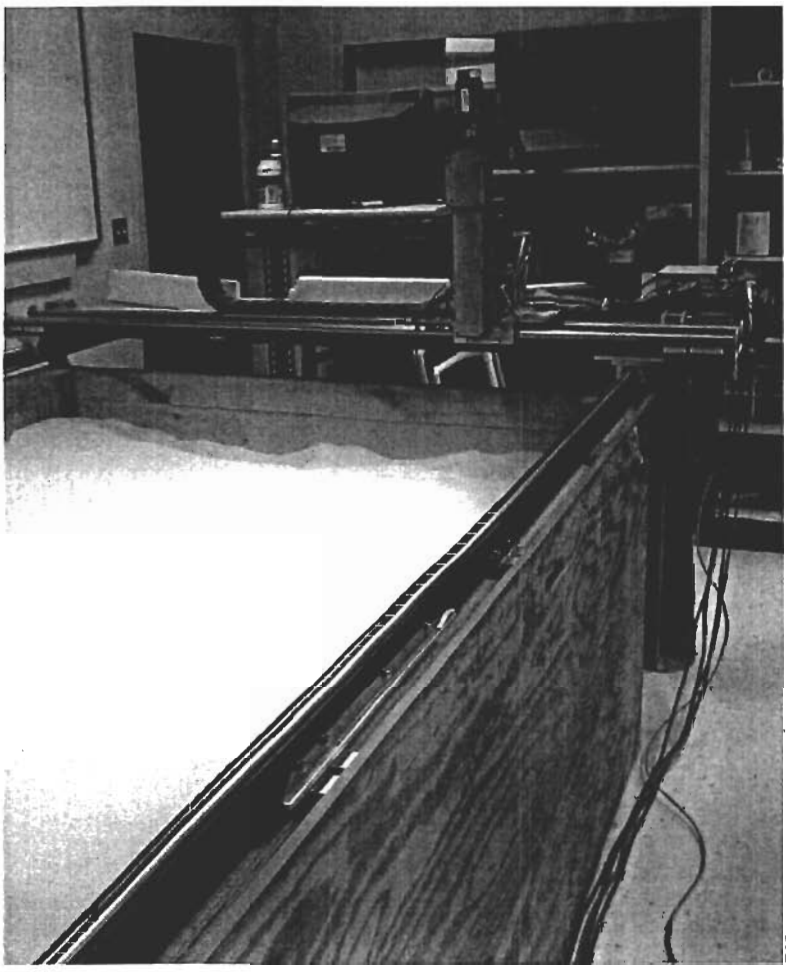
Description: The NVESD Countermine Acoustics Laboratory is a new NVESD laboratory that supports the development of sensor technologies specifically for acoustic mine detection applications. Located in the NVESD Fort Belvoir, VA, Building 357, rooms 122 and 134, the lab occupies 1,360 square-feet of space. 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

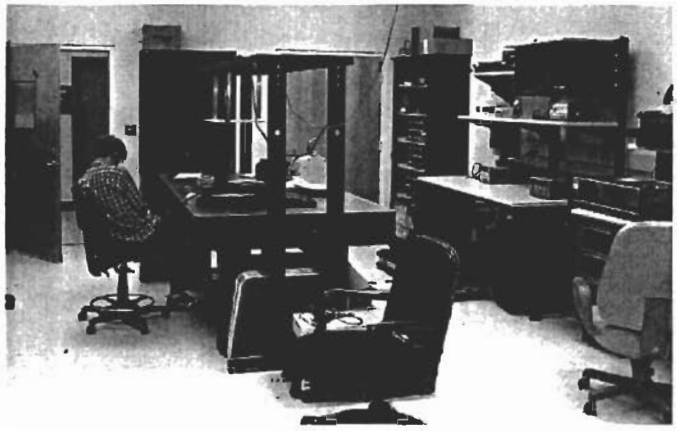
Description: The NVESD S&T Division Countermine Prototype Systems Laboratory located in Building 357, Fort Belvoir, VA, is a NVESD S&T Laboratory to evaluate tele-operated or remotely controlled vehicle-based mine/IED detection and neutralization technologies. These technologies are evaluated for their 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

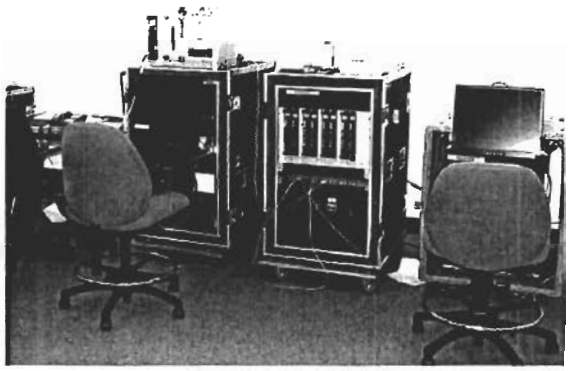
Description: The mission of the data processing laboratory is to advance the state-of-the-art of specialized geospatial intelligence processing in support of the selected Countermine mission areas (currently at secret level, but need TS/SCI level facility). This lab collaborates with the national intelligence 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.

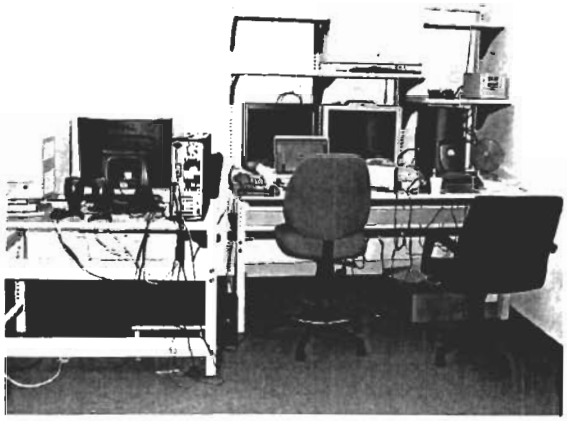
Footprint 800 Square-Feet

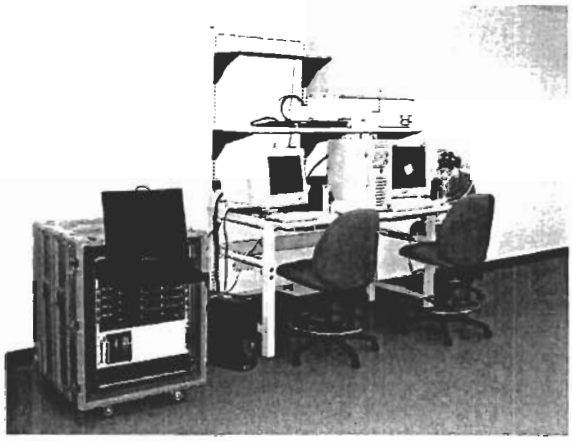
Personnel: 2 Government/4 Contractor

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

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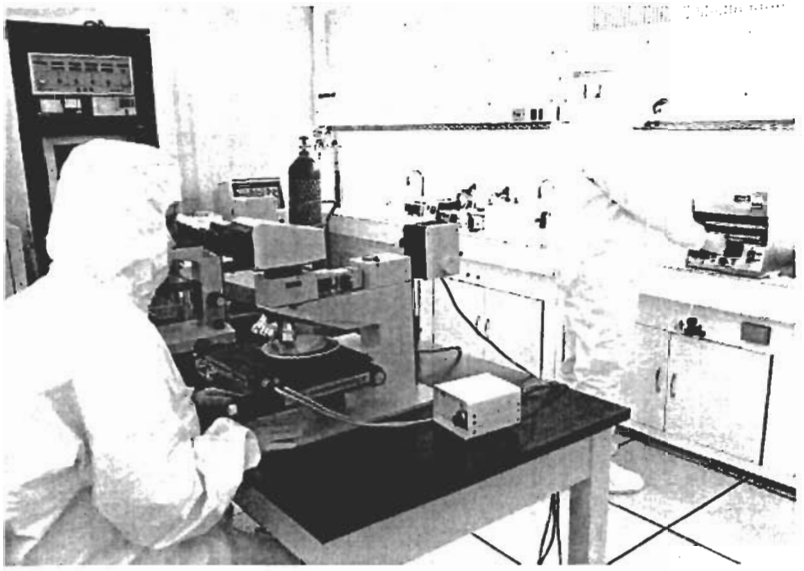


13. Display and Image Fusion Laboratory

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:

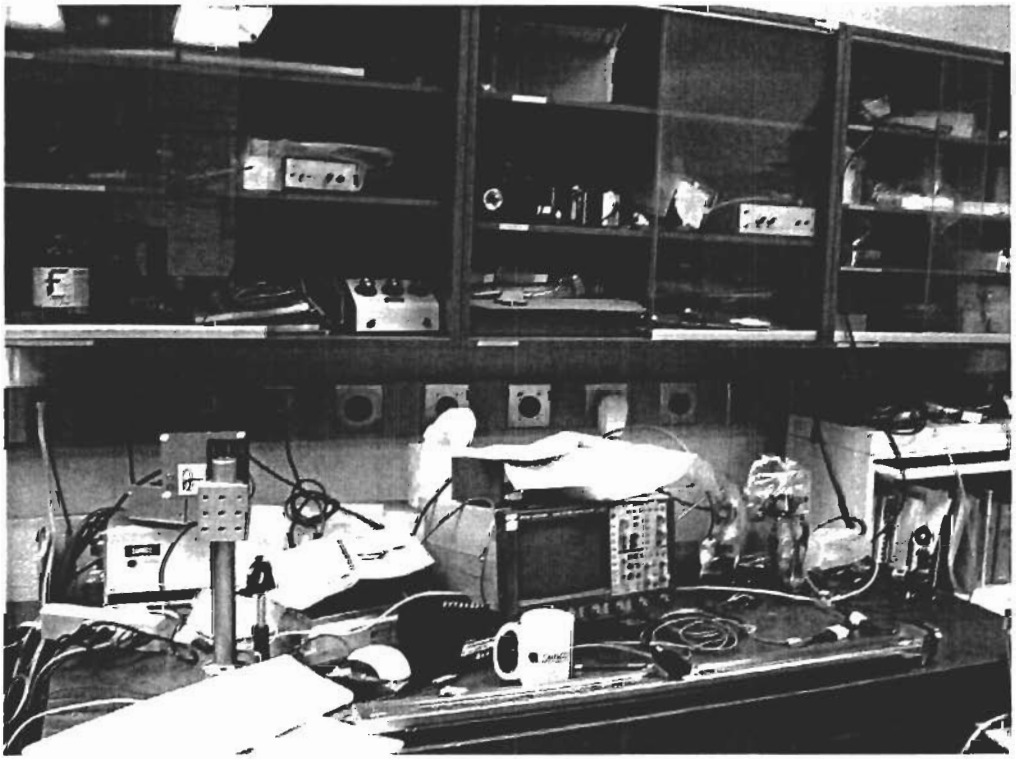
Equipment: Computer, motion control system, and a spectroradiometer

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)

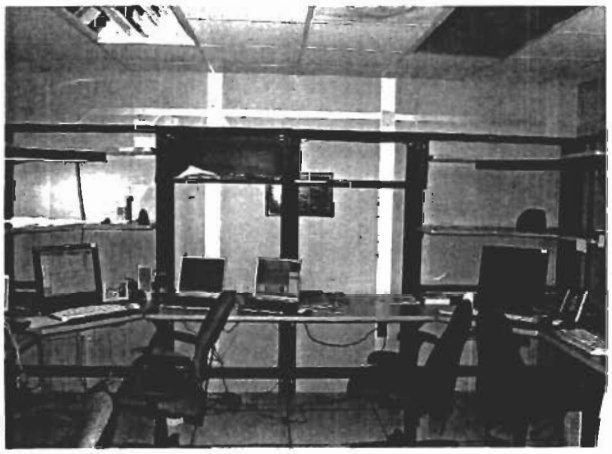
Description: The NVESD Distributed Sensors Integration Facility (DSIF), Building 371, is a new NVESD, Fort Belvoir, VA, facility which supports the integration and demonstration of small, low cost, targeting and ID sensors with day/night capability that are networked together with software tools. The 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 ilnternal 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

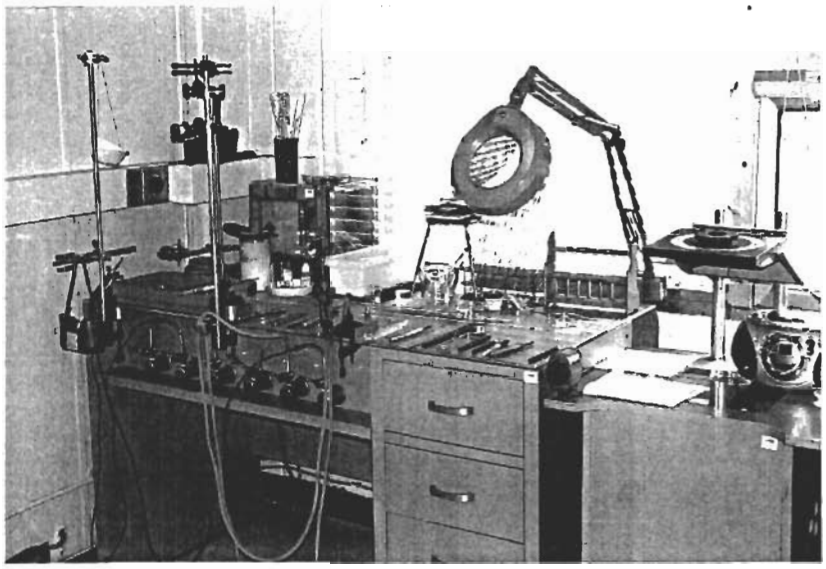
Personnel: 3 Government

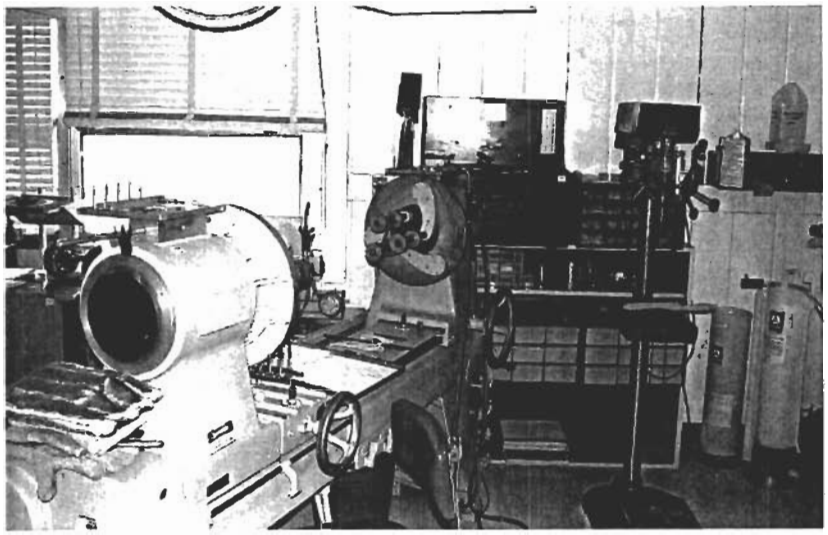
Equipment:

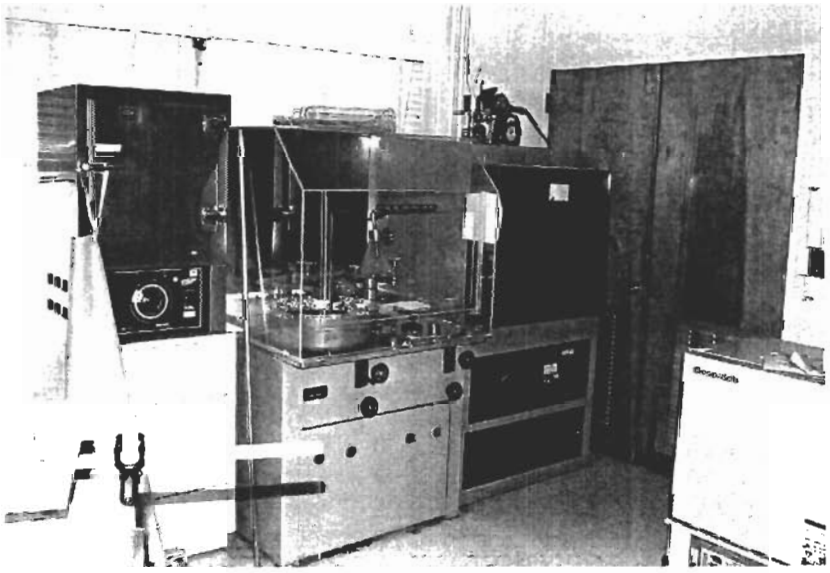
- Electronics Lab: Fume hood; microscope; soldering equipment; MMR Hall Van Der Pauw system; Anneal oven and related control electronics; portable electronics rack; electronic work bench; dewar for cryogenic operation and testing of infrared devices; temperature controllers; oscilloscope; function generator; 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







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

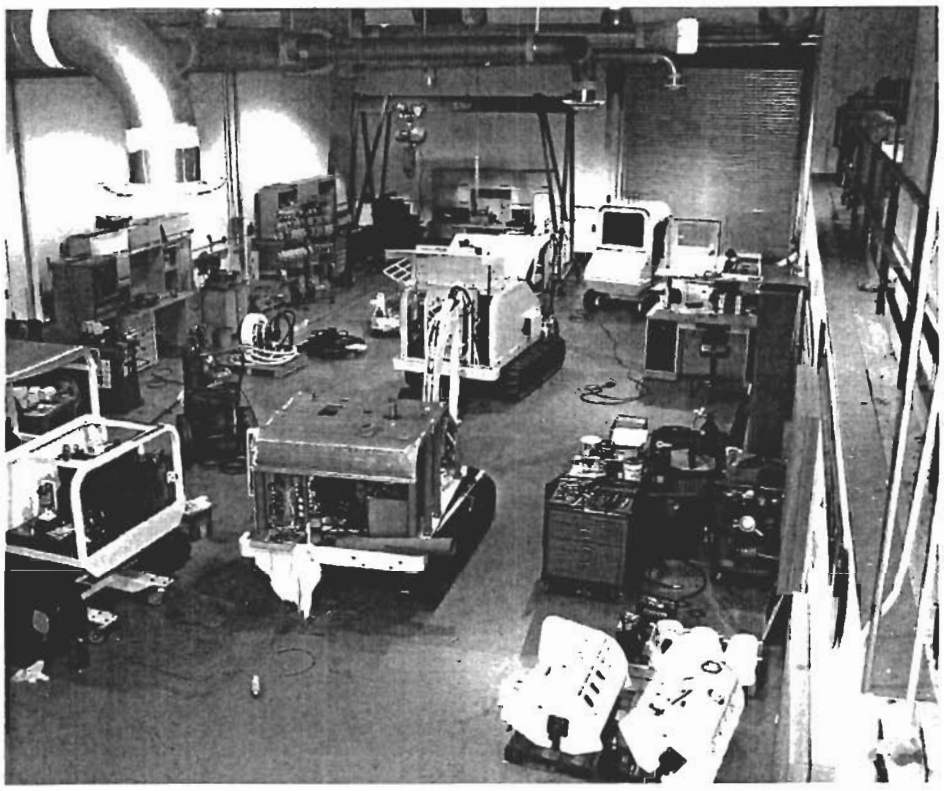
Footprint: 10,000 Square-Feet

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:

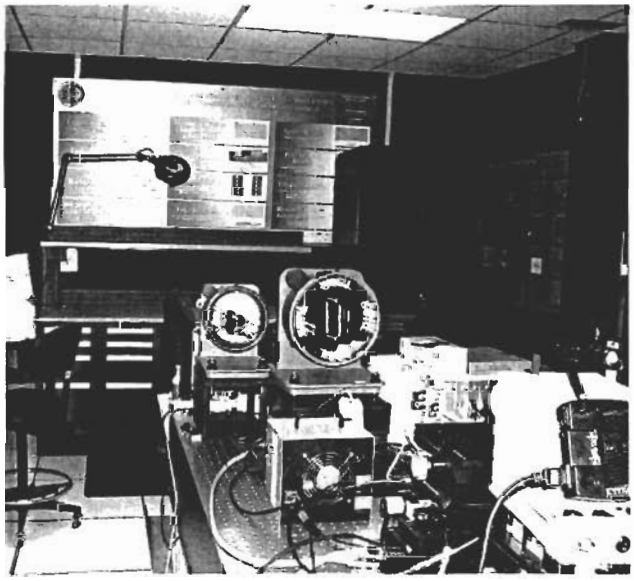
- Develop new measurement methodologies and metrics associated with existing, new, and emerging EO/IR systems, such as 3rd Gen, hyper-spectral, super resolution, passive/active millimeter wave/Terahertz, and active imaging
- Characterize EO/IR physics at the system and/or component level for the purposes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

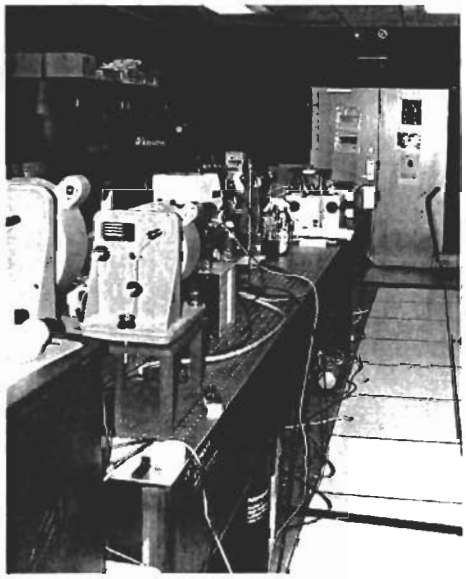
Footprint: 2,612 Square Feet

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

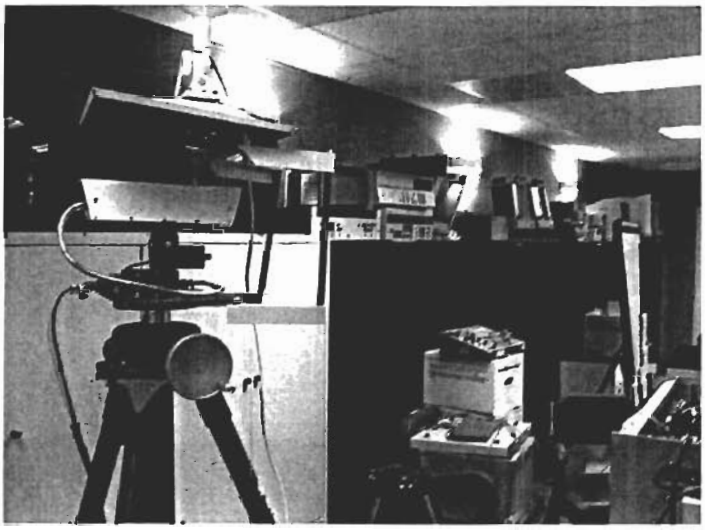
- Reliability Test System: Light source/tube fixture assembly and control console

- 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

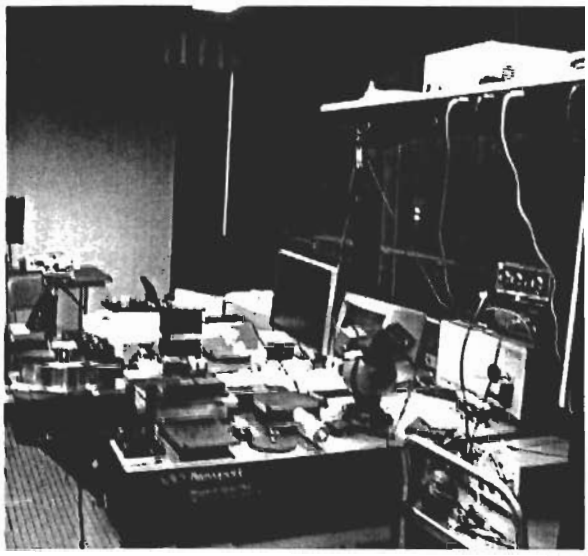
Personnel: 2 Government

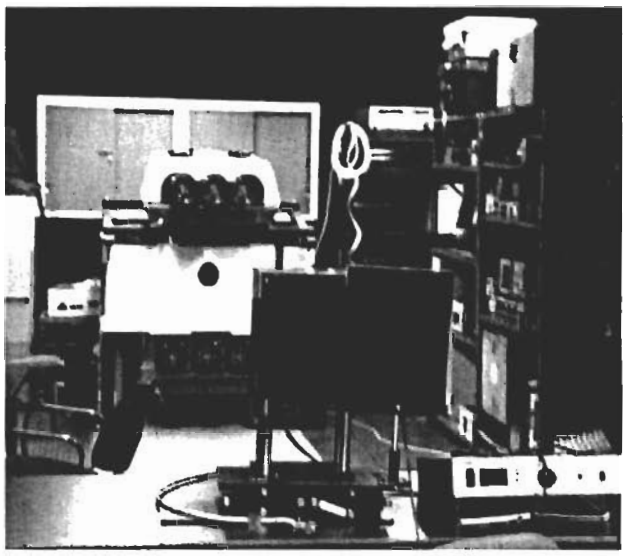
Equipment:

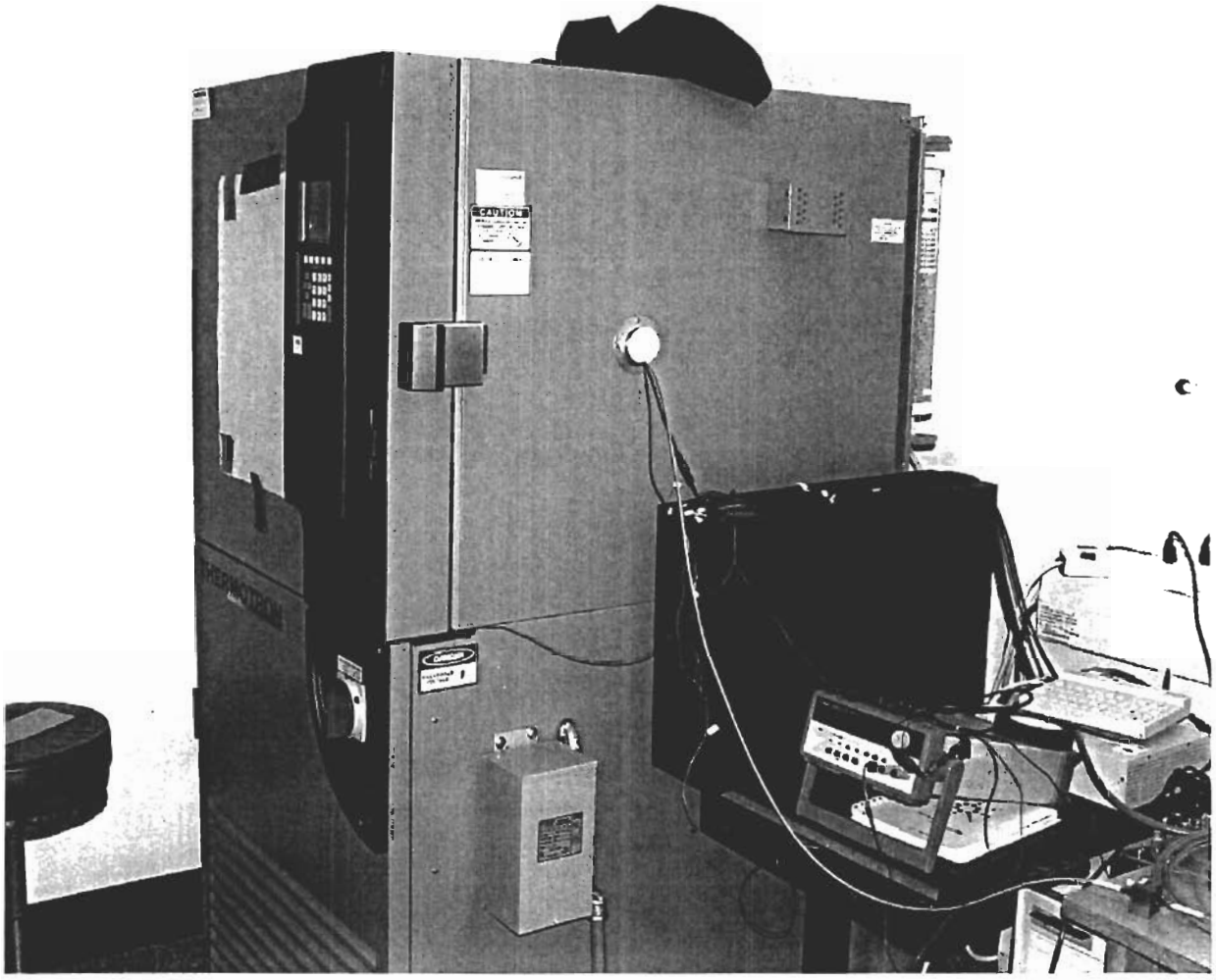
- Environmental Test Station: Stand-alone desktop PC, Thermotron SM8-7800 Environmental chamber, and a support equipment rack

- 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







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.

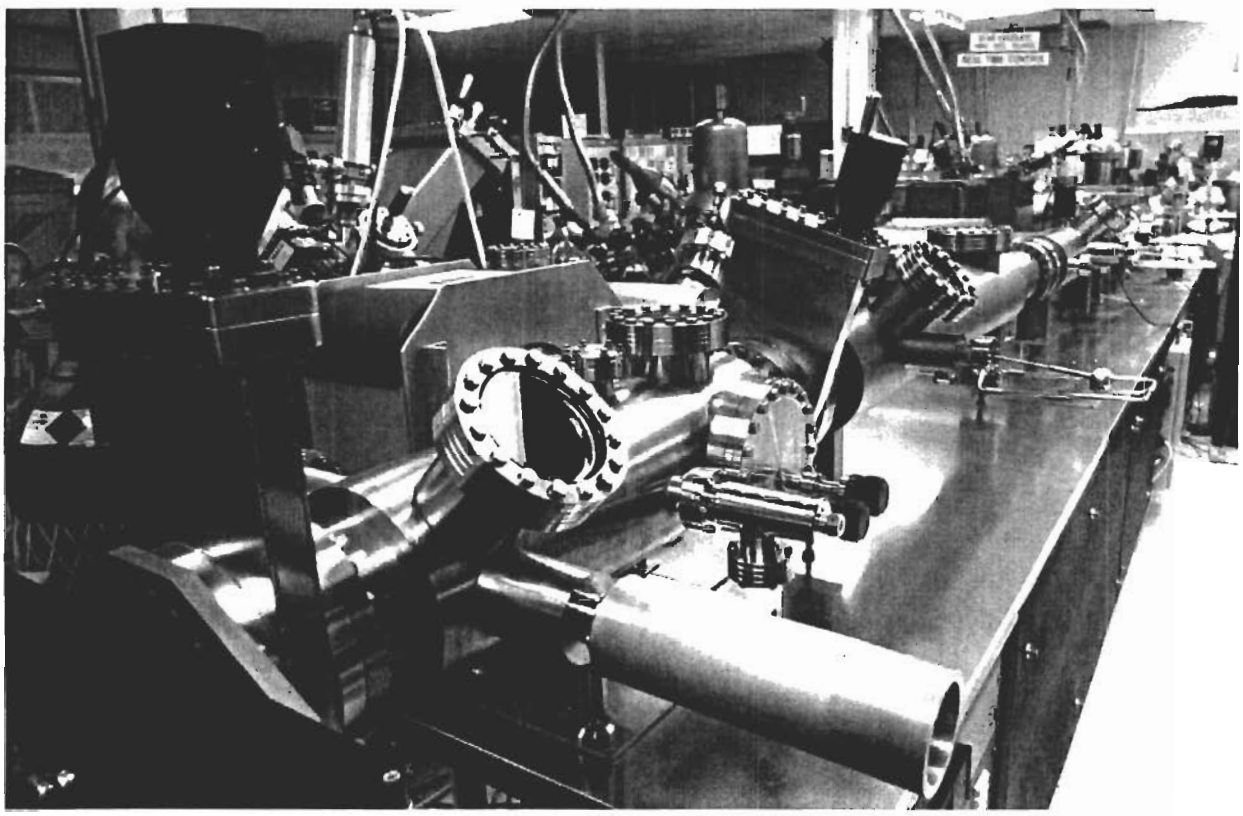
Footprint: 3,200 Square-Feet

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

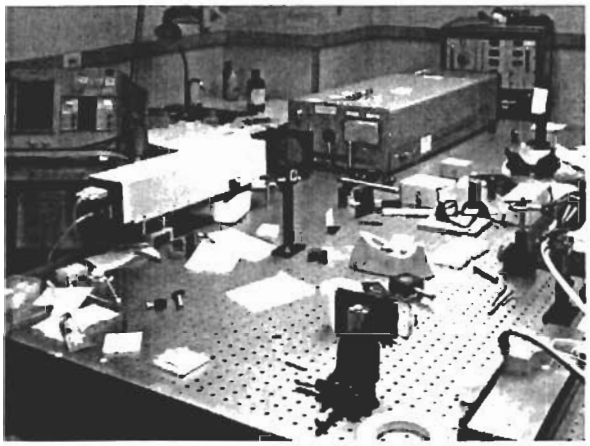
g. Laser Optics Lab:

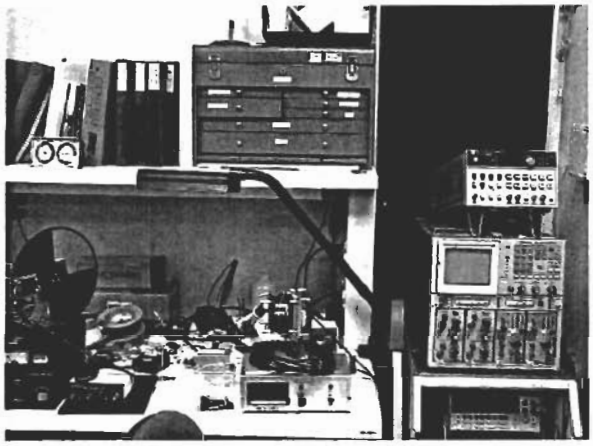
Description: Laboratory for assembly and testing of microchip lasers

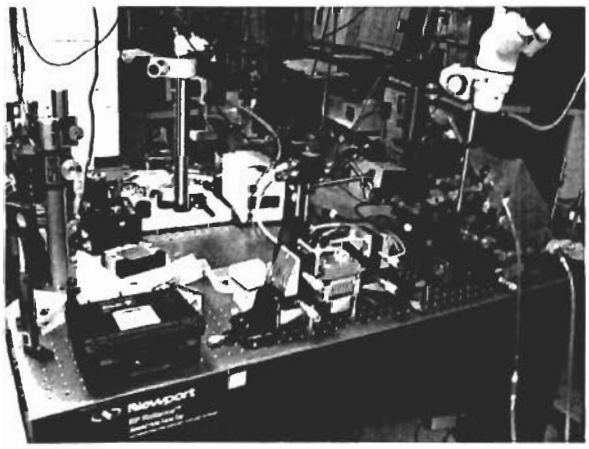
Personnel: 2 Government

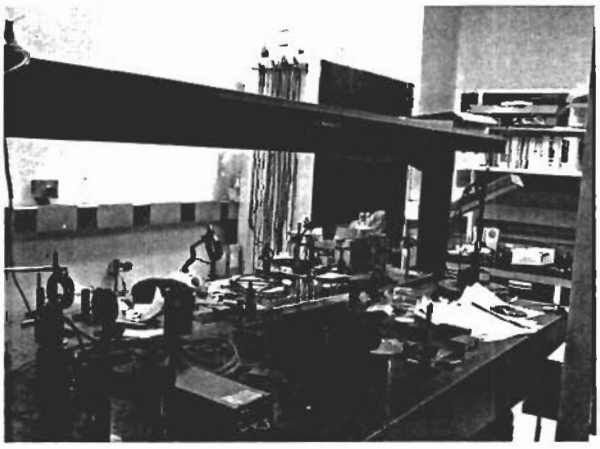
Equipment: Optical spectrum analyzer; short pulse measurement system; two 4x8' optical tables with pneumatic vibration isolation legs and overhead shelf; two NIR cameras and monitors; and SWIR cameras and monitors

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









24. Laser Test Tunnel

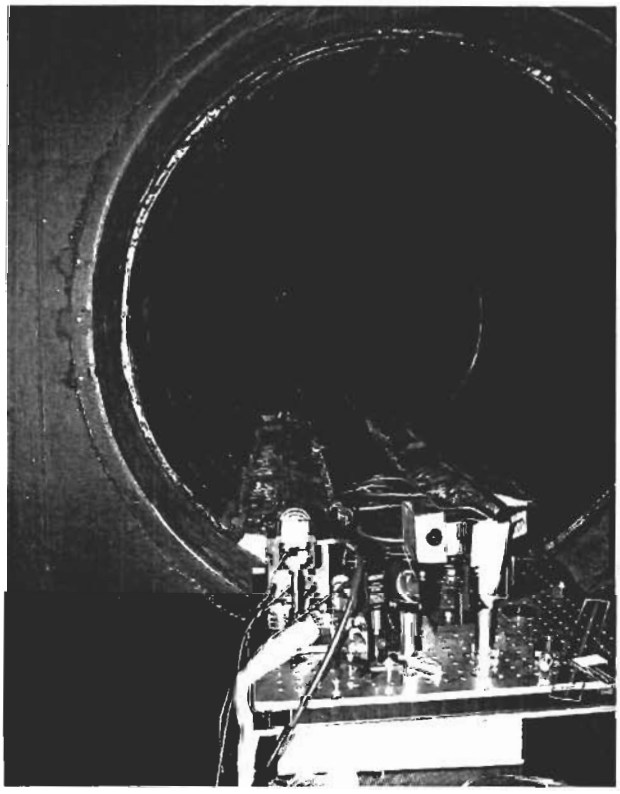
Description: The NVESD Laser Test Tunnel located in the NVESD Fort Belvoir, VA, Building 357 is a long (55 m) enclosed space in which lasers and remote sensing systems can be tested as well as performing alignment and measurement of laser rangefinders and LADAR equipment. The enclosed nature of the tunnel 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

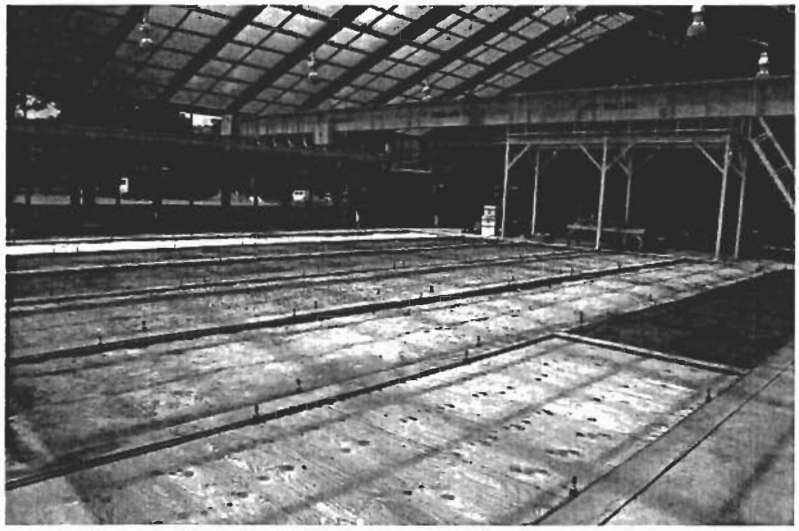
Description: The NVESD Mine Lanes Facility, Building 353, at Fort Belvoir was built in 1959 to support Countermine testing. It is one of the few indoor mine lane facilities in the world. During 2003, the facility underwent extensive renovation to add a greenhouse portion with moisture controlled lanes. 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.

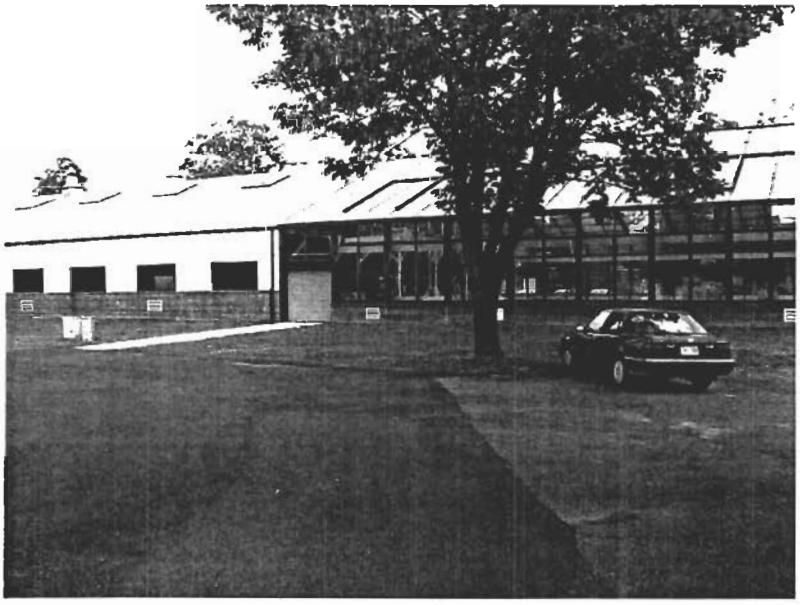
Footprint: 14,000 Square-Feet

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.

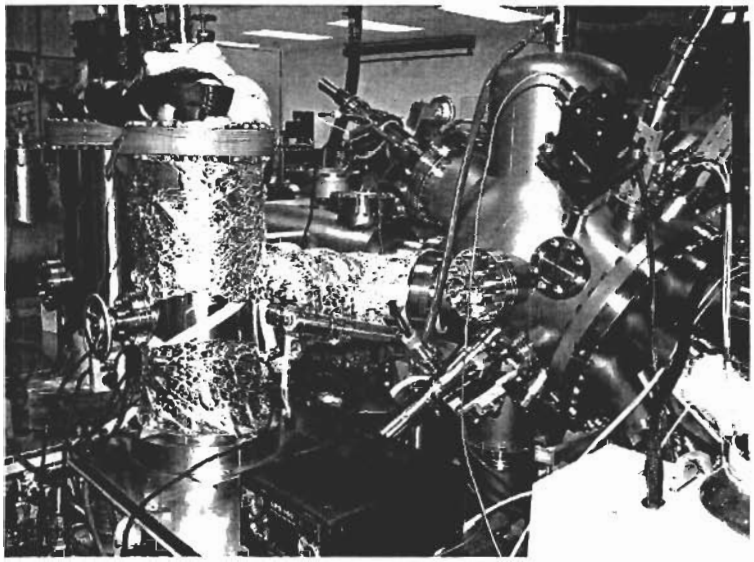
Footprint: 1,000 Square-Feet

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)

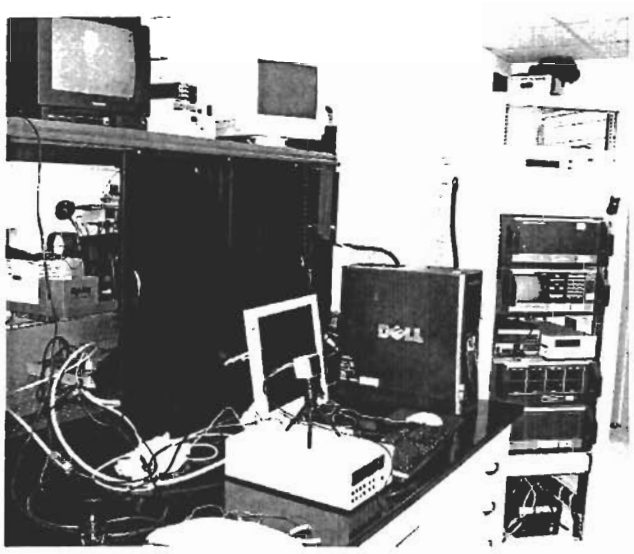
- 3 UPS Units rated at 5 kVA each for laboratory to keep equipment operational for proper powerdown in the event of power failure

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

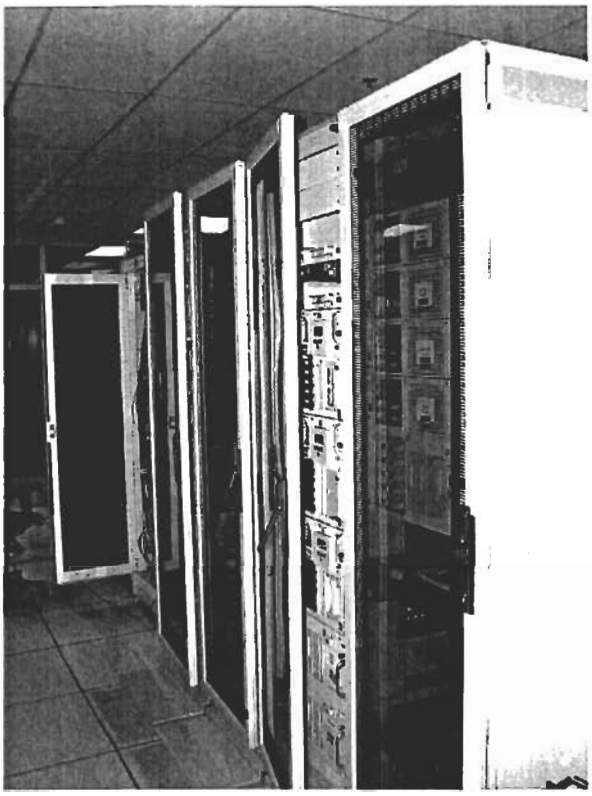
Engineering Development Network Servers:
(11) Windows Servers
(7) UNIX Servers

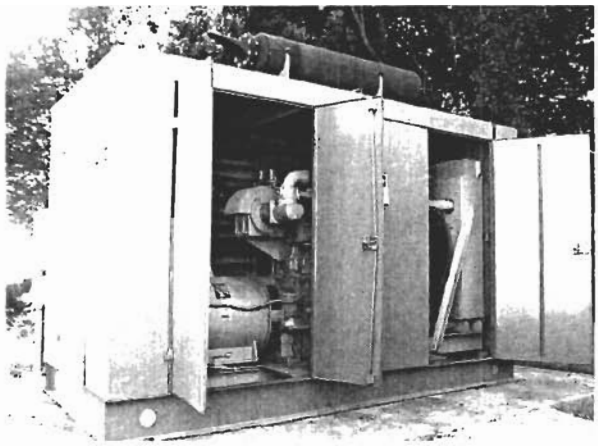
Hitachi Storage Area Network (SANS) – 27 TB
Spectro Logic Spectra T950 LTO-2, 200 Tb Tape Backup Library
ALT P3000 DLT 7000, 18 Tb Tape Backup Library
CISCO PIX Firewall
CISCO 6500 Catalyst Switch

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

DCN:11619





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

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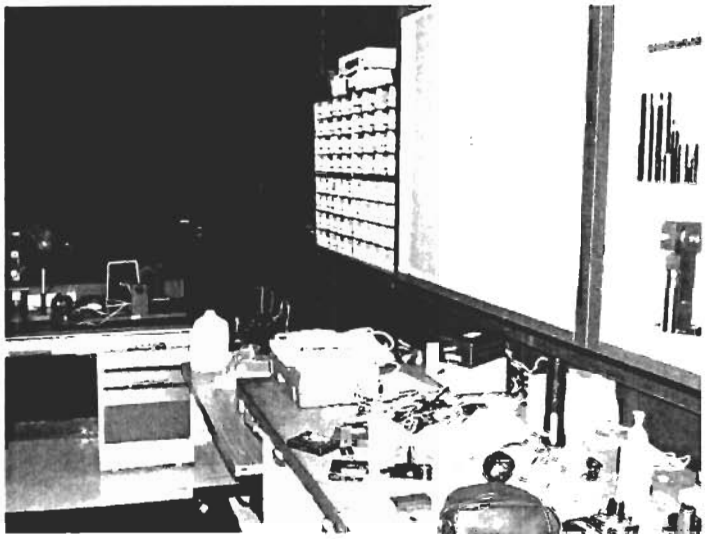
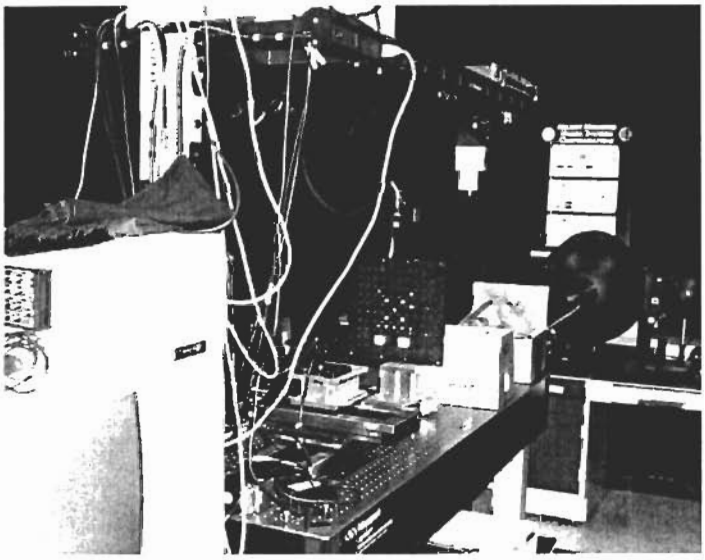
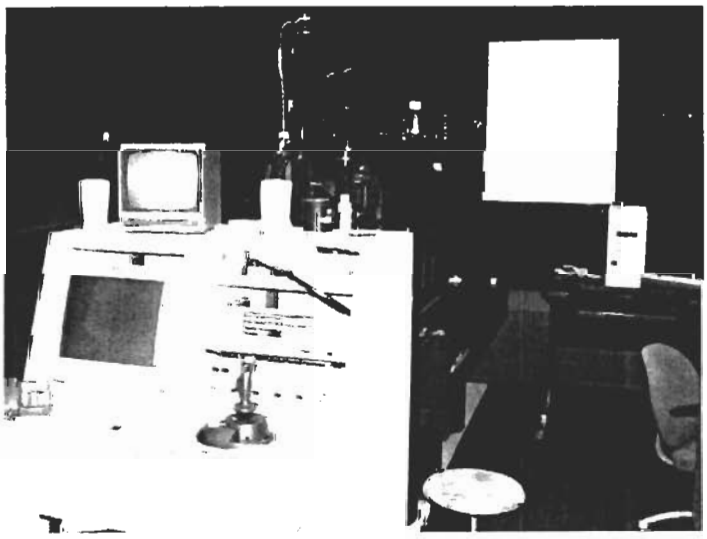






30. Optics Laboratory

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

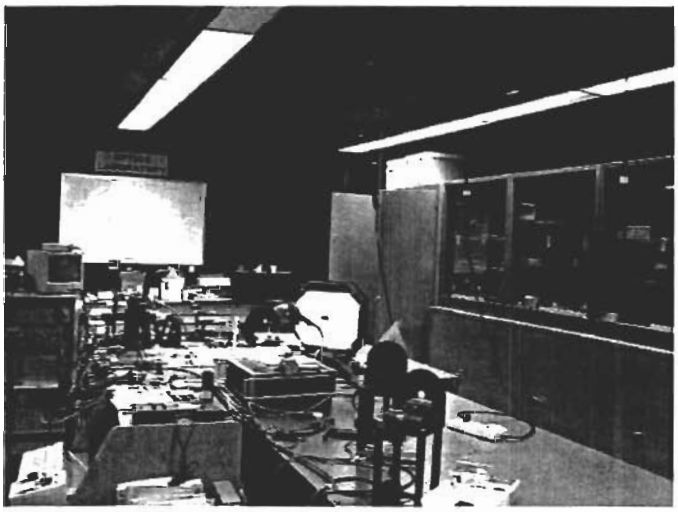
- Optronics Spectroradiometer - Optics: 2 double grating monochromators, light source, collimator, stand-alone desktop computer, light source power supply, integrating sphere - gold plated, integrating sphere – visible, silicon detector, and a HgCdTe detector

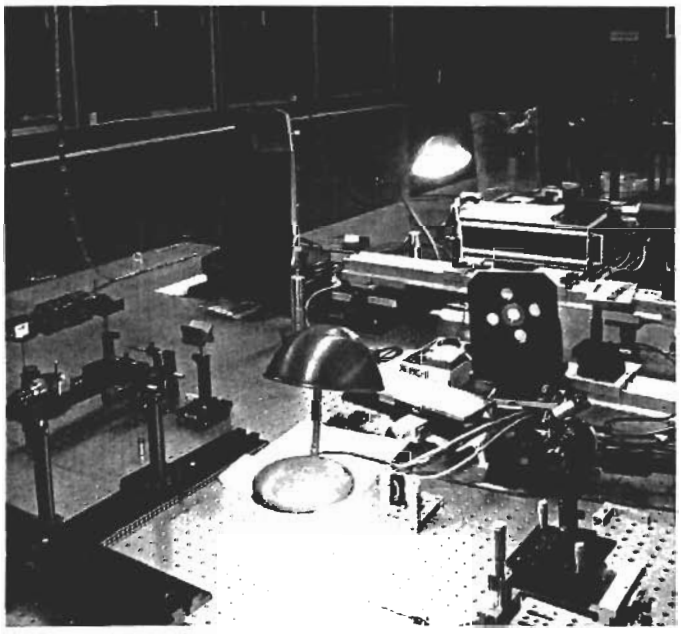
- Veiling Glare Test Station: Photometer - PR 1980A Prichard, motorized rotation stage, motor controller, stand alone computer, light source, and a light source power supply

- 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.

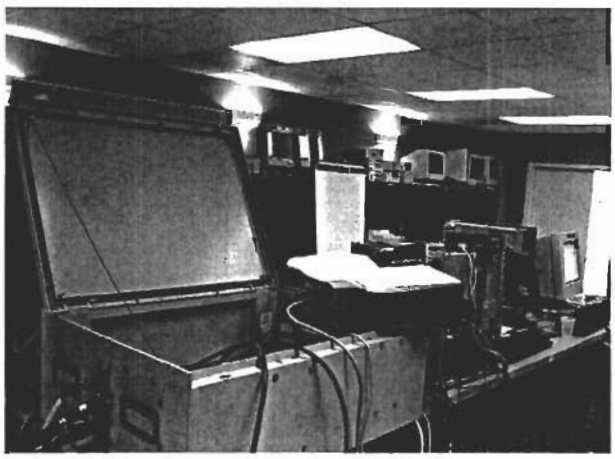
Footprint: 1,000 Square-Feet

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), I/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

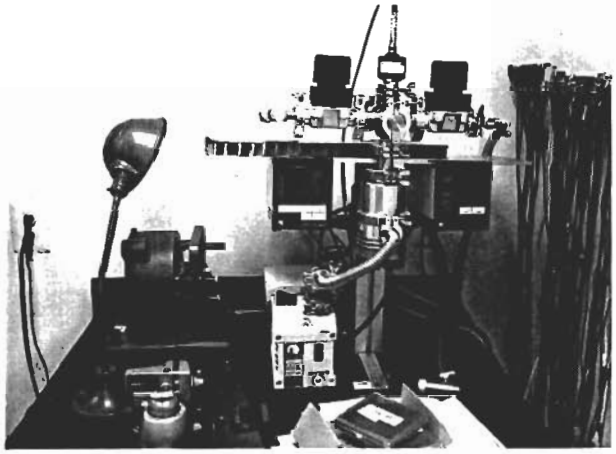
b. Air Conditioning:

- 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.

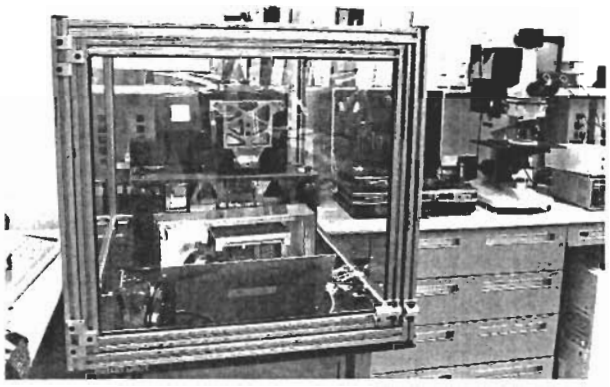
Special Needs:

- 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

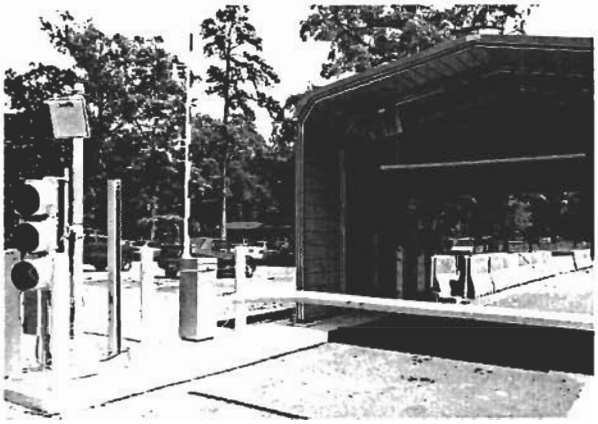
Equipment:

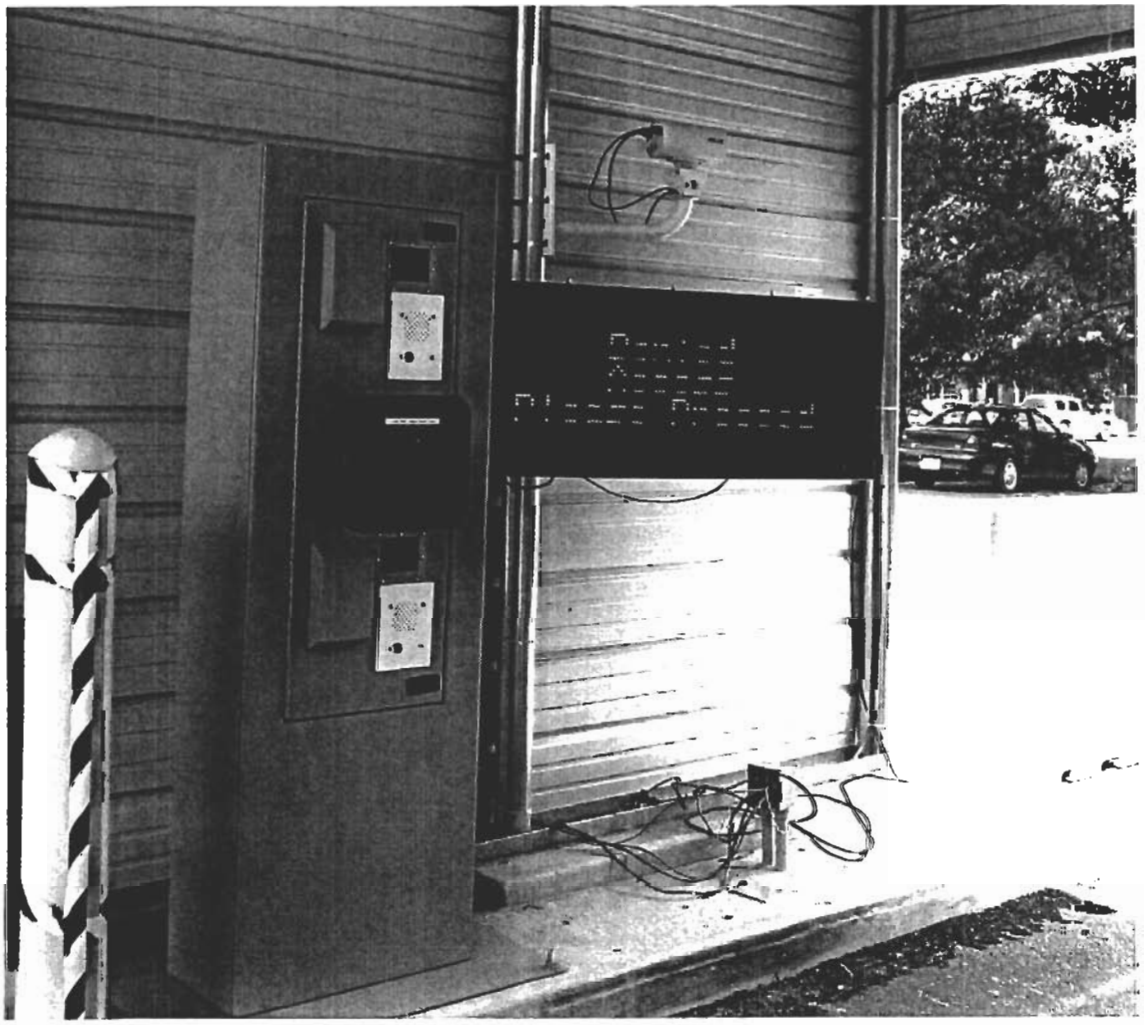
4 Computers (SG Lane Control)
2 Computers (Biometrics)
2 Computers (Surveillance System)
2 Computers (SG Operations)
1 48"x60"x16" NEMA enclosure with: 4 opto22 switches, 4 A&E loop controllers (2 loops per controller for 8 loops), Test switch bank for all Magnetic Ground Loops, Light Curtain, and Swing 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

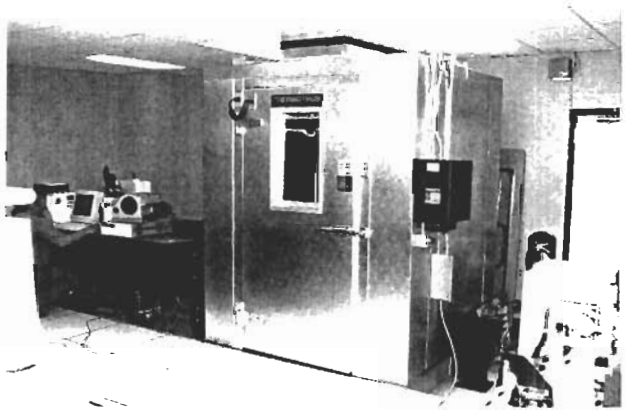
b. SEAIL Mechanical Room:

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

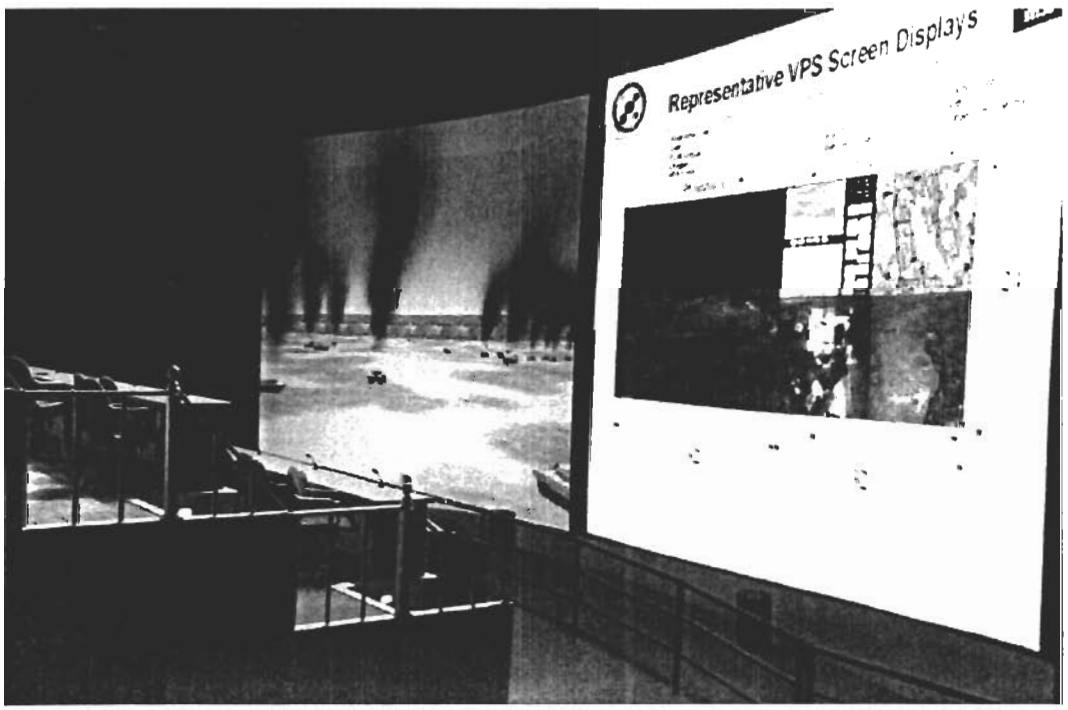
- SAR 1: 2 Sony projectors, 1 screen, 1 plasma display, 1 PC with LCD monitor, 1 Smartboard whiteboard, 1 conference telephone, and tables and seating for 16

- 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



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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

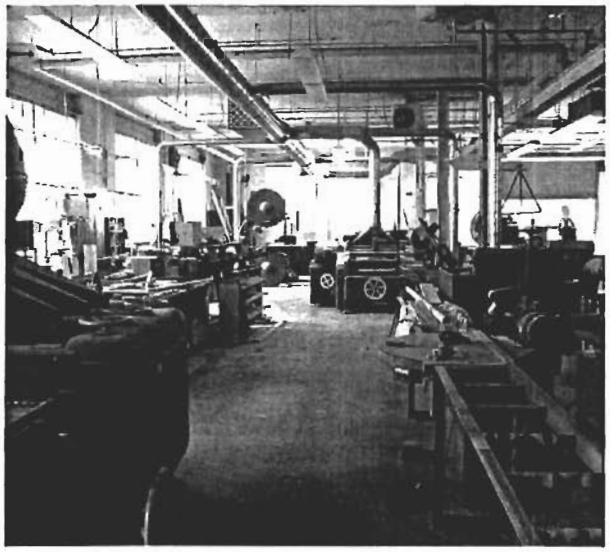
2- 16" Radial arm saws
2- 10" Table saws
1- 12" Mitre saw
1- 10" Mitre saw
1- 36" Scroll saw
1- 36" Band saw
1- 18" Band saw
1- 30" Planer
1- 30" Jointer
1- 48" 3 Drum Sander
1- Mill
1- Wood turning lathe
1- 30" Disk sander
1- 12" Combination disk and belt sander
1- Spindle sander

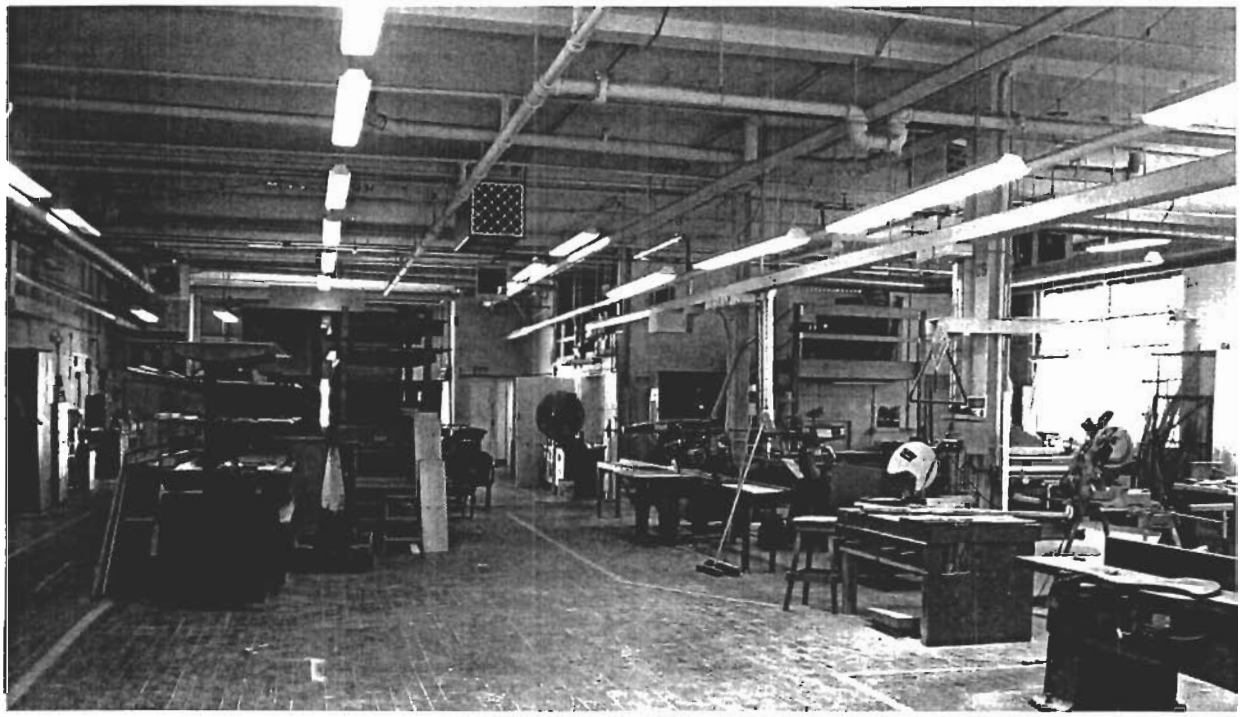
- Metalworking

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

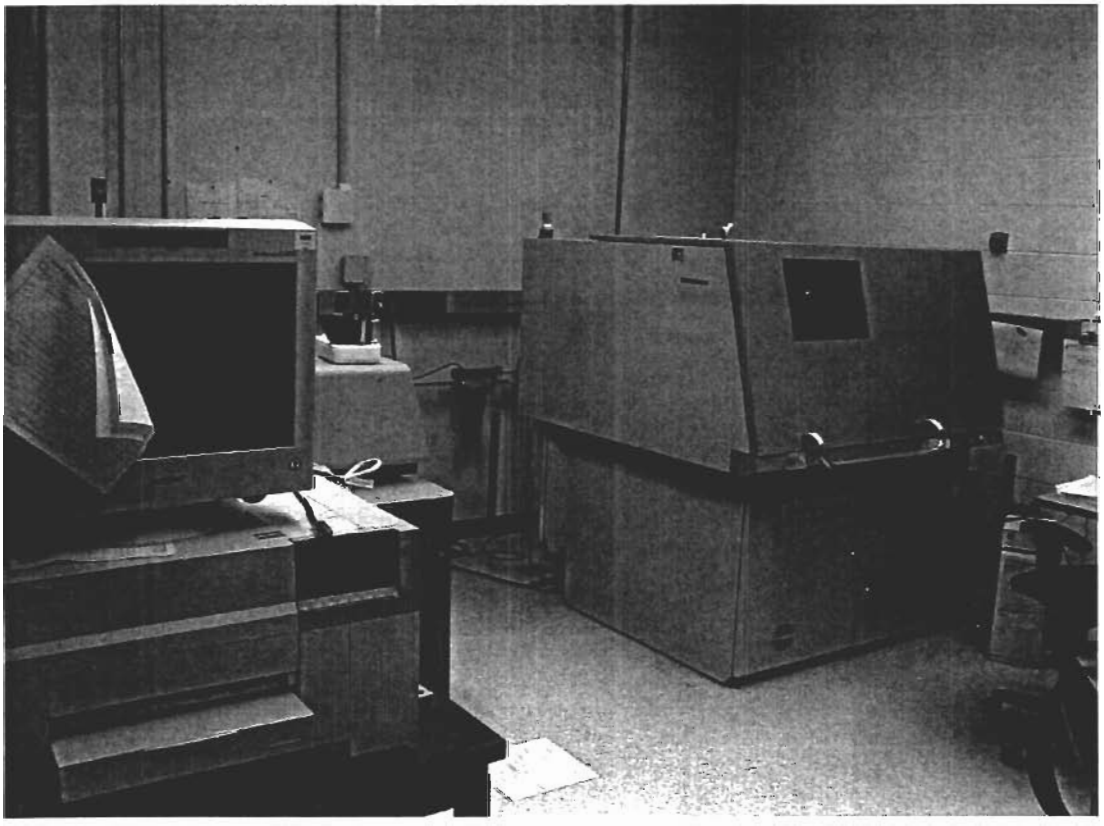
Description: The NVESD X-Ray Diffraction Analytical Laboratory is located in Building 357 at Fort Belvoir, VA. The lab is used to characterize the nature and quality of crystalline layers and substrates used for the fabrication of infrared focal plane arrays, utilizing x-ray diffraction techniques. The 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.

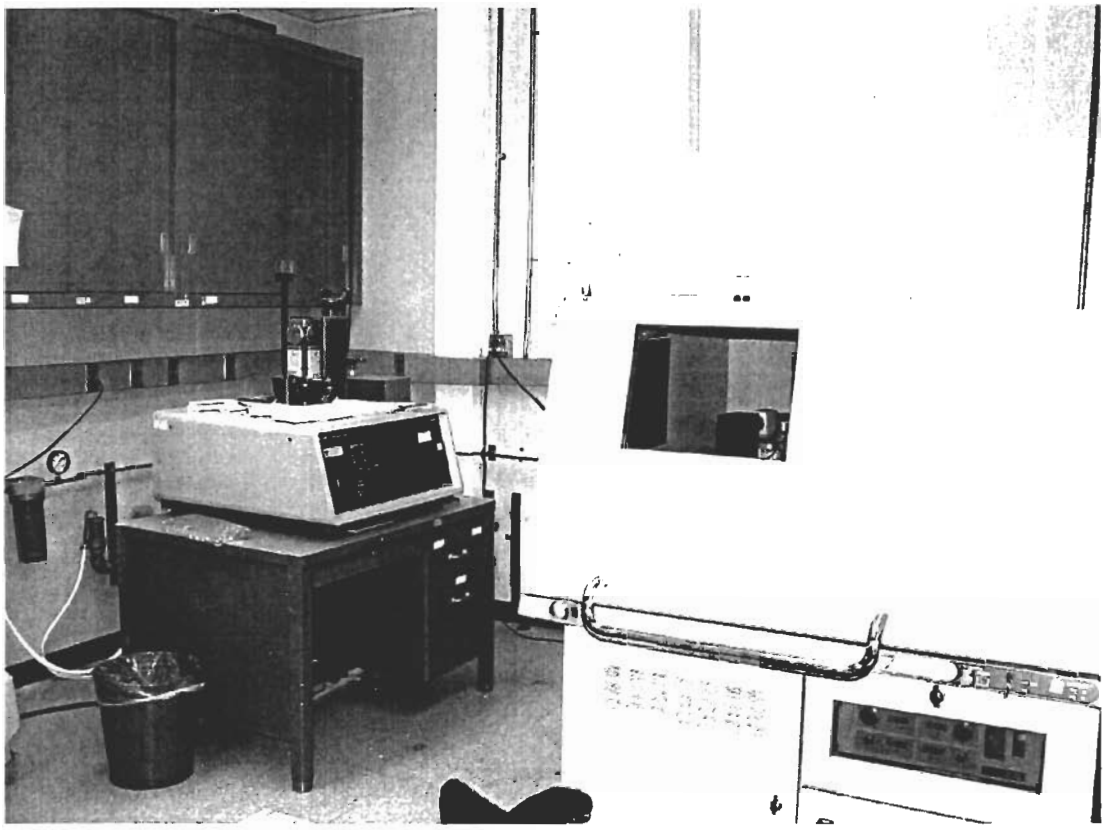
Footprint: 400 Square-Feet

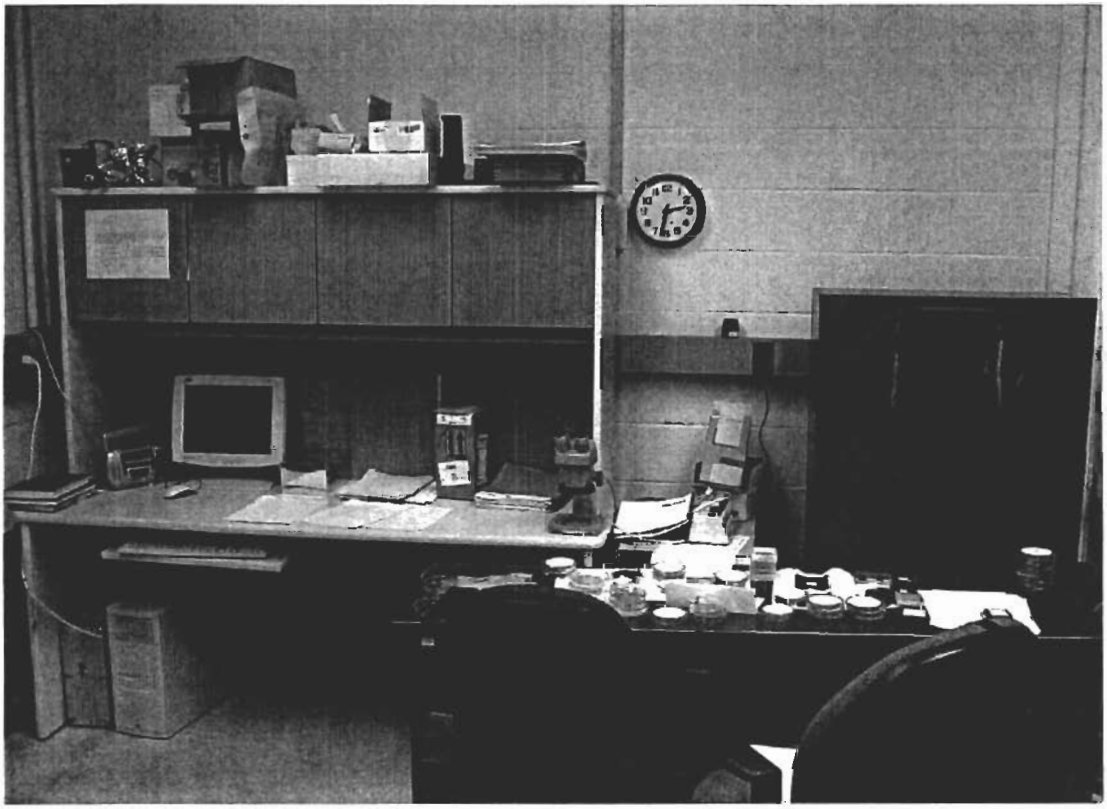
Personnel: 2 Government

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.

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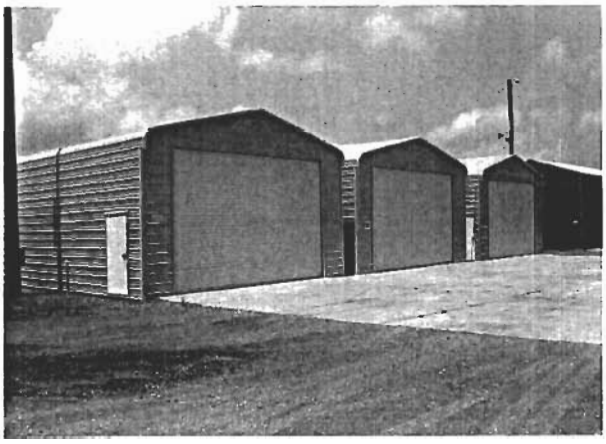

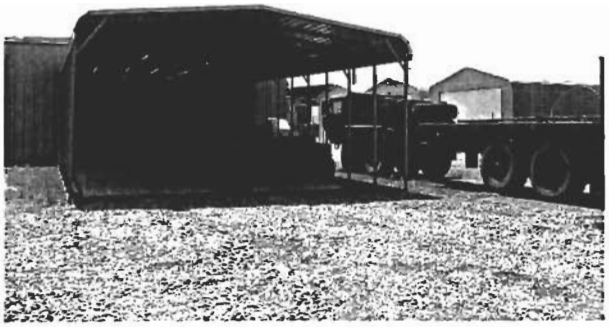

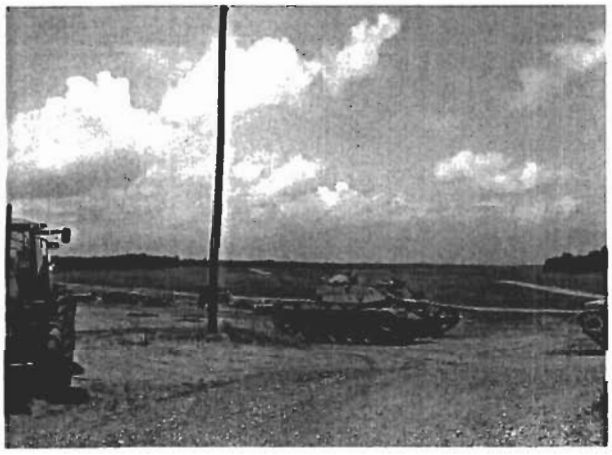

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44. Indoor Firing / Photometric Range

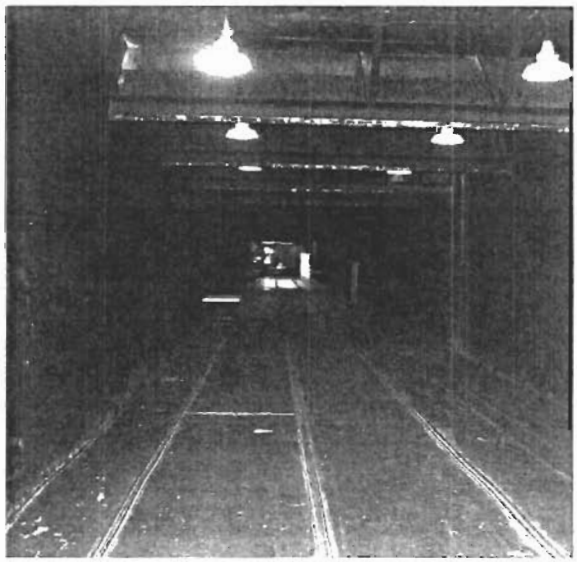
Description: The NVESD Indoor Firing / Photometric Range located in the NVESD, Fort Belvoir, VA, Building 305 is a 95-meter indoor measurement and demonstration range used to test night vision weapon sights and head mounted sensors under various light levels using all types of standard and advanced military 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:

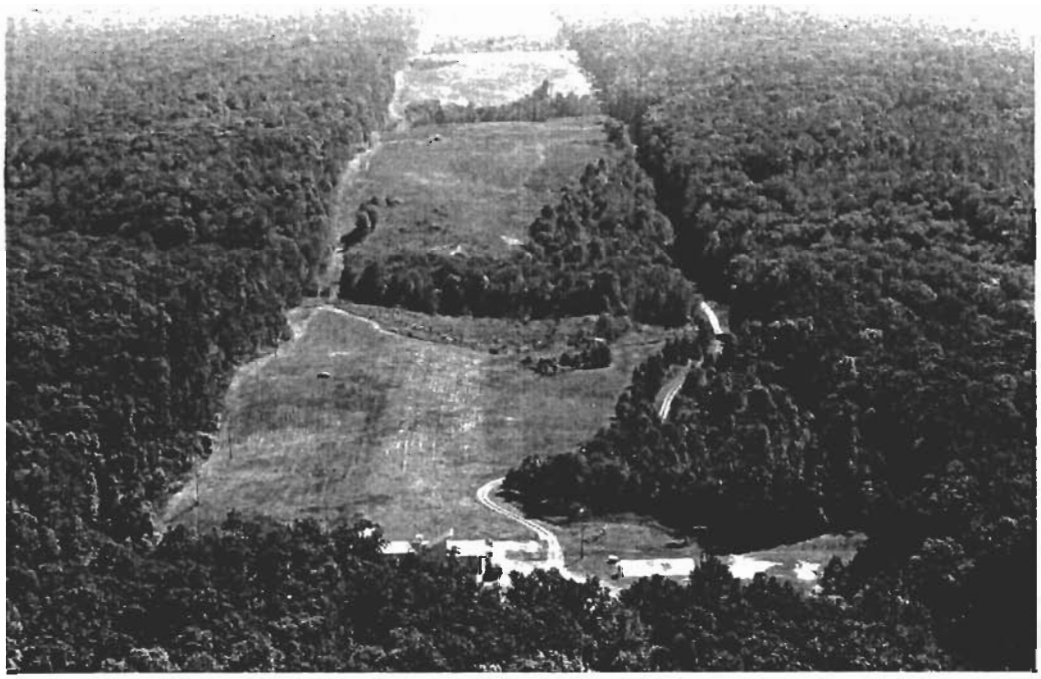
Laser Range Compound: 8 foot security fence with 2 rolling gates

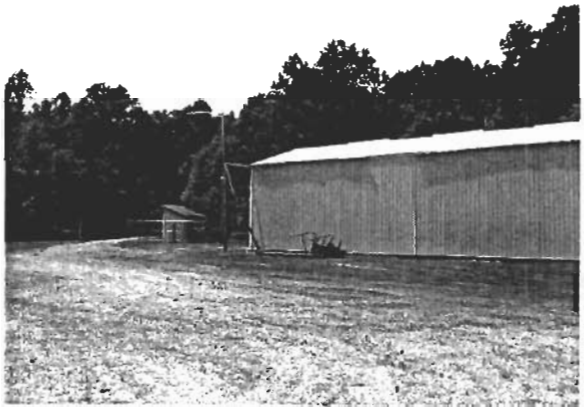
a. Laser Range Test Building (3,000 Square-Feet): 4 bays with garage doors, heating, A/C, 3-Phase, 220-Volt power, bathroom, water filtration system, isolation floor in one bay, security vault with 1 safe, and one antenna mast

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

DCN:11619

DCN 4714
Executive Correspondence

Congress of the United States

House of Representatives

Washington, DC 20515

July 14, 2005

Mr. Philip E. Coyle III
Commissioner
Base Realignment and Closure Commission
2521 South Clark Street, Suit 600
Arlington, VA 22202

Dear Commissioner Coyle:

It was good seeing you at the Regional Hearing in Baltimore, Maryland, on July 8. I hope you found New Jersey's presentations about Fort Monmouth helpful and informative. I want to take this opportunity to follow-up on the questions you raised at the hearing, but also want to reiterate our argument that C4ISR capability would be diminished greatly, immediately, and for at least a decade by the proposed closure and move. This is independent of cost and payback calculations.

You are correct that the Department of Defense (DOD) failed to account fully for workforce transition costs, and we have attempted to capture the significant cost of recruiting and training a potential new workforce at Aberdeen Proving Ground (APG). However, in the data made available to us, the salary cost savings from closing Fort Monmouth and the salaries added for new people at Aberdeen are considered in the same manner, and not included in COBRA runs (with the exception of positions eliminated, and the pay differential that results).

Our analytical team, led by Vice Admiral (ret.) Paul Gaffney II, conducted a thorough analysis of the recruitment and training costs for reconstituting a workforce at Aberdeen. A summary of our calculations is attached. In every case, we have been conservative in our assumptions.

When we submitted our report to the BRAC Commission on July 8, we calculated the payback period to be 21 years using a "constant dollar" payback period. However, all BRAC recommendations use a "net present value" payback period. Using the "net present value" data, the payback period for moving Fort Monmouth would be 33 years. (A correction was submitted to Chairman Principi by VADM Gaffney on July 12.) As you will see, the payback period expands to 44 years when costs for reconstituting a new workforce are included.

Attached you will find a short summary of our calculations for recruitment and training costs, including our sources, assumptions, and methodology. Also attached is a more complete answer to your second question, which sought a listing of programs in use in Iraq that would be disrupted by a closure of Fort Monmouth. A complete, more digestible version will follow next week.

I hope this information is useful to you. Please do not hesitate to contact me if I can be of further assistance.

Sincerely,

Rush Holt

Rush Holt
Member of Congress

Workforce Models

There are extensive studies available in the body of pertinent literature that analyze and describe recruitment, training, and lost productivity costs when an employee must be hired to backfill the "leaver," i.e., the employee who must be replaced. For example:

- "Private Sector Downsizing: Implications for DoD" by Michael L. Marshall and J. Eric Hazell (published in The Acquisition Review Quarterly, Spring 2000) listed several parameters that apply to replacing personnel, including advertising and marketing; recruitment, hiring, and training; overtime to personnel taking up the slack; productivity losses; and lost training for departed workers. The article concludes, "Regardless of the exact number of businesses, there is widespread agreement that ***turnover costs are somewhere between high and Olympian***."

- "The Business Cost and Impact of Employee Turnover" by William Bliss of Bliss & Associates (2000) concludes that the cost of employee turnover is at least 150% of the leaver's annual salary.

- A Price Water-House Saratoga Institute workforce replacement model cited in "It's Costly to Lose Good Employees" by J. Fitz-enz (1997) estimates that the total cost of turnover ranges from 100 to 200% of the leaver's pay and benefits.

- A workforce replacement study conducted by Kwasha Lipton (referenced in The Acquisition Review Quarterly Spring 2000) concludes that replacing exempt workers costs 150% of the leaver's salary, and for non-exempt workers, it costs 175% of the leaver's salary.

Assumptions

- DoD's analysis reflects a transfer of 3,879 civilians from Fort Monmouth and 767 from Fort Belvoir to APG for a total of 4,646 civilian personnel. Of this total, history and recent polling suggest that a maximum of 20% of employees are expected to transfer to their new location. The remaining 80% (3,717 employees) would have to be hired at APG. The bulk of these employees are scientists, engineers, and highly special technical experts.

- For purposes of this analysis, 15% of the 3,717 employees are considered administrative/clerical (and therefore have lower base salaries).

- Given the differences of the functional knowledge required to develop, acquire, test and field C4ISR systems and equipments, the professional skills domain is split into two subsets; Scientists/Engineers (SE) and Acquisition/Logistics (AL).

- COBRA used a civilian salary of $59,959, an unrealistic figure for recruiting and training senior and journey-person SE and AL personnel. Using the Bliss study as the model, we have used the salary of a GS-14/Step 5 as representative of senior employees. For journey-person (JP) employees (GS-13 and below), we have used the salary of a GS-12/Step 5. In all cases, 28.9% is applied for cost of benefits.

- We have conservatively included lost productivity costs only during the period of time the new employees are being trained. Also, we have not included any productivity impacts likely to result from an immature workforce, such as program disruptions.

Conclusions

High End of the Cost Spectrum.

1. Recruiting Cost Factors. The Bliss study percentage of full salary (150%) was applied for senior SEs and adjusted down for JP SEs (75%), Senior AL (100%), and JP AL (75%) positions.
2. Recruiting Calculations.
   a. 160 SE x $ 129,096 SALARY x 150% = $30,983,000
   b. 1200 JP SE x $ 91,866 SALARY x 75% = $82,680,000
   c. 211 AL x $ 129,096 SALARY x 100% = $ 27,239,000
   d. 1588 JP AL x $ 91,866 SALARY x 50% = $ 72,942,000
   e. Subtotal = $214 M
3. Training Costs Factors. Training is conservatively estimated to be required for at least a three-year period. The assumption is that the newly hired SE employee will be in a training environment for three months of each year for three years, and for an AL employee, two months per year for three years. That is the time considered necessary to bring the newly hired individuals to a level where they are able to perform and contribute commensurately with the individuals they are replacing. Training costs are calculated as a percentage of full salary, on the assumption that training time is non-productive in the year of training.
4. Training Calculations
   a. 160 SE x $129,096 x .25 x 3 = $15,492,000
   b. 1200 JP SE x $91,866 x .25 x 3 = $82,679,000
   c. 211 AL x $129,096 x .167 x 3 = $13,647,000
   d. 1588 JP AL x $91,866 x .167 x 3 = $73, 087,000
   e. Subtotal = $185 M
5. **Bottom Line. Based on the set of assumptions above, the high end recruiting and training cost is $399M ($214M for recruiting, $185M for training).**

Low End of the Cost Spectrum

1. Recruiting Cost Factors. Drawing on other conclusions from other studies, the Bliss study percentage of full salary was adjusted significantly downward to establish a lower bounding for the range: senior SEs (75%); JP SEs (50%); senior AL (50%); JP AL (30%)
2. Recruiting Calculations.
   a. 160 SE x $ 129,096 SALARY x 75% = $15,492,000
   b. 1200 JP SE x $ 91,866 SALARY x 50% = $55,120,000
   c. 211 AL) x $ 129,096 SALARY x 50% = $13,620,000
   d. 1588 JP AL x $ 91,866 SALARY x 30% = $43,765,000
   e. Subtotal = $128 M
3. Training Costs Factors. Again, training is conservatively estimated to be required for at least a three year period. The assumption is that the newly hired SE/AL employee will be in a training environment one month of each year for three years to bring the newly hired individuals to a level where they are able to perform and contribute commensurately with the individuals they are replacing. Training costs are calculated as a percentage of full salary, on the assumption training time is non-productive in the year of training.
4. Training Calculations
   a. 160 SE x $129,096 Salary x .083 x 3 = $5,143,000
   b. 1200 JP SE x $91,866 Salary x .083 x 3 = $27,450,000
   c. 211 AL x $129,096 Salary x .083 x 3 = $6,783,000
   d. 1588 JP AL x $91,866 Salary x .083 x 3 = $36,325,000
   e. Subtotal = $76 M
5. **Bottom Line. Based on the set of assumptions above, the low end recruiting and training cost is $204M ($128M for recruiting, $76M for training).**

Return on Investment (ROI)

Taking the midpoint between the high estimate and low estimate, the amount of $300M factored into the COBRA formula yields an ROI (payback) of 44 years.

Current Fort Monmouth and Team C4ISR Support to Operation Iraqi Freedom

Quick Response: Aircraft Survivability. This Team C4ISR effort provides aviators from Army and the other military services with life-saving systems. Team C4ISR develops, fields and sustains the radar warning receivers and missile warning systems found on Army, Navy, Marine Corps, Air Force, and Presidential Fleet helicopters. These systems rely on software that contains current threat information tailored to specific regions of the world. Just prior to the outbreak of hostilities in Iraq, Team C4ISR updated that software, in record time, with new threat information for Southwest Asia. The team also adapted the systems to operate better in the harsh desert environment.

Quick Response: Guardrail Common Sensor System. Guardrail is a theater-level airborne signals intelligence collector system. Due to geopolitical boundaries and restrictions, it was not able to function as designed in Operation Iraqi Freedom. Team C4ISR field software engineers, deployed with the system, assessed the problem and reported it to Team C4ISR at Fort Monmouth. Our engineers developed a solution and fielded it in less than a week allowing Guardrail to collect the actionable intelligence that was vital to our military success. Bottom line here is that our forces need Guardrail to locate threats so they can neutralize them. By fielding our software solution, we saved warfighter lives.

- **GUARDIAN EAGLE** is a Quick Reaction Capability (QRC) to insert into the Guardrail/Common Sensor (GR/CS) Fleet of aircraft the ability to Detect, ID and locate LPI communications. GR/CS was the only Army Tactical Airborne asset in OIF with this capability. The two battalions equipped with this capability provided unique essential information on High Value Targets in the months leading up to hostilities as well as during the actual conflict. Team C4ISR continues to work with the units to provide constant updates to this capability. This QRC was accomplished on the first two systems four months after receipt of funds. We were uniquely equipped to accomplish this because of extensive technical expertise with all the GR/CS systems gained over twenty years of designing, building and fielding these systems. Other factors that contributed to our success were our flight activity at Lakehurst NAEC and our unique location that affords us the quiet zone in the warning areas over the Atlantic for calibration, and our ability to acquire the TCDL link located on the roof of building 600 and bring the data into our labs for analysis.

Lightweight Counter Mortar Radar Support. The LCMR detects and locates enemy mortar firing positions rapidly and with deadly accuracy so that coalition forces can instantly destroy them. Team C4ISR managed the accelerated development of LCMR to meet urgent warfighter needs. Team C4ISR helps field the LCMR to units, provides training on its use to soldiers throughout the theater and will work to keep it running around the clock.

FireFinder Radar System. Firefinder tracks and locates the source of incoming mortars and rockets. The Radar rapidly became an extremely critical system in the OEF/OIF

theater, with a demand for the deployed systems to essentially be available 100% of the time to provide troop protection. Since the onset of hostilities several new capabilities have been added to the Firefinder system, through a series of new software packages. These enhanced capabilities come in direct response to the ongoing and developing threat in Iraq and Afghanistan. For example, the ability to detect mortar fire was improved by 25 percent. Of note is the new capability to provide an "early warning capability" as well as an intercept capability. Team C4ISR community has taken extraordinary measures to support the deployed systems, and to get returning systems ready for re-deployments. Daily contact with the units in theater is maintained, spare parts and maintainers have been positioned forward and intensive transportation and tracking has been implemented. Additional LARs have been sent forward, and a Telemaintenance Capability has been established to assist unit maintainers and operators in areas where transportation to the radar sites is difficult, dangerous and LAR support may be delayed. Performance of the Radars in the harsh conditions of OEF/OIF has been exceptional, thanks to the dedicated support provided by the Fort Monmouth community.

AN/PPS-5D Man-Portable Battlefield Surveillance Radar. PPS-5D is the US Army's Man-Portable Battlefield Surveillance Radar system used to target enemy personnel and vehicles. This Radar system played an essential role in the protection of U.S. forces at the beginning of Operation Iraqi Freedom when it was the only system available that could penetrate through a sandstorm and successfully target approaching Iraqi tanks, leading to their destruction. It was successfully used throughout Operation Iraqi Freedom (OIF) by the 82nd Airborne Division (Ft. Bragg), the 103rd MI Battalion (Ft. Stewart), the 101st Airborne Division (Ft. Campbell) and the 312th MI Battalion (Ft. Hood). The radar was an essential system used to target enemy personnel and vehicles. During the sand storm early on in the conflict, the Army was forced to remain stationary, making them vulnerable to enemy attack. The AN/PPS-5D radar proved to be the only system available that could penetrate the wind driven sand and dust to locate enemy targets. Through the sand and dust, the radar successfully targeted approaching Iraqi T-72 tanks at nearly 20km, leading to their destruction. The radar was also used for force protection and perimeter surveillance, once the coalition entered Baghdad.

TROJAN Special Purpose Integrated Remote Intelligence Terminal (SPIRIT). More than 20 TROJAN Special Purpose Integrated Remote Intelligence Terminal (SPIRIT) systems were deployed to U.S. Army and U.S. Marine Corps units and operational in support of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). Both the AN/TSQ-190(V) TROJAN SPIRIT II and the AN/TSQ-226(V) TROJAN SPIRIT LITE variants have been utilized to provide crucial secure communications reachback capabilities, to include near-real-time data, Unmanned Aerial Video (UAV) video, and other video, into national networks and databases to support Military Intelligence (MI), force protection, and other requirements. Over 20 systems were deployed by the US Army and US Marine Corps during height of OIF and remained operational availability rates of over 95 percent. The TROJAN Program is managed by Team C4ISR, TROJAN Systems Integration and Fielding Office (SIFO), Fort Monmouth, NJ.

Counter-Radio Controlled Improvised Explosive Device (C-RCIED) System (WARLOCK). Beginning in FY03, existing Shortstop Electronic Protection System (SEPS) technology was modified by Team C4ISR into several variants of an Electronic Countermeasures (ECM) system to protect convoys, warfighters, engineers, Unexploded Ordnance (UXO) squads, and VIPs from various RCIEDs. This program, a Quick Reaction effort in response to multiple Operational Needs Statements from MNC-I and CFLCC, was conducted jointly with Team C4ISR and the US Army Rapid Equipping Force (REF), and fielded nearly a thousand units within nine months in direct support of OEF/OIF. To date 1000+ systems, of varying capability and target set have been fielded and are protecting troops today.

Improvised Explosive Device Characterization Lab. The Lab began operation during 1QFY04 to identify the performance characteristics of remote controlled triggers used to activate improvised explosive devices. Analyses conducted by this lab identify deficiencies in existing or emerging coalition systems and are provided to Team C4ISR Countermeasures and IED detection programs for immediate action. I2WD also worked closely with the FBI's Terrorist Explosive Device Analysis Center (TEDAC) and has on site personnel at the TEDAC facility. These technicians conduct preliminary evaluations of incoming devices and prioritize the devices for analysis by the Characterization Lab.

SIGINT Support. Team C4ISR has provided extensive expertise in the area of Signals Intelligence (SIGINT) supporting the National Security Agency (NSA) Army Cryptologic Operations Office (ACO) and the Intelligence and Security Command (INSCOM). Team C4ISR personnel have provided specialized technical, operational, logistical and maintenance support for both OEF and OIF. We have developed and provided technology solutions known as Quick Reaction Capabilities (QRC's) in response to requests for assistance from the field to acquire, identify, collect and exploit signals of interest. Team C4ISR personnel have deployed to the field to assist with training and operation of SIGINT equipment fielded as a result of these QRCs to answer critical SIGINT needs. Personnel possessing extensive knowledge and experience in SIGINT technology and the application of this technology directly supported the Combined Forces Land Component Command and served as SIGINT Operations Officers in the Joint SIGINT/Electronic Warfare Coordination Cell.

- **Prophet**. Prophet detects, collects, and exploits conventional and modern military emitters. A secondary mission will be Electronic Warfare against selected enemy emitters to interrupt, spoof, disrupt, and/or disable target command and control nodes. Prophet is mounted on a High Mobility Multipurpose Wheeled Vehicle (HMMWV), with a quick-erect seven-meter antenna mast. Prophet also has a dismounted man-pack version, which supports airborne, early entry, and urban operations. Both configurations provide intelligence support to a division, Stryker/heavy/light brigade, regiment, UA or task force. This intelligence support provides indications, warning, location, tracking, and identification of threat emitters. Prophet will cross-cue other battlefield sensors (e.g. tactical unmanned aerial vehicles, PBS2 radars, etc.) as

well as provide additional data that may confirm indications and detections from the other manned and unmanned battlefield sensors. Testimonials to PROPHET include:

- "Long-haul communication capability and data downlink need to be added to the Prophet."
- "Lack of TACSAT bandwidth for SIGINT hindered the ability to communicate at TS/SCI level with ground collectors." -10th MTN OEF IBOS AAR
- "The Prophet Hammer was the preferred SIGINT collection system available to the 4th ID." - 4ID IBOS Way Ahead Recommendations to LTG Alexander Army G2 - 11 May '04
- 101st CG states: "Prophet is invaluable"

- **PROPHET HAMMER.** Team C4ISR developed this specialized Signals Intelligence (SIGINT) and provides support to the Intelligence and Security Command (INSCOM) during Operation Iraqi Freedom by fielding PROPHET HAMMER systems, training, and providing post-deployment support to MI units. Team C4ISR engineers and intelligence specialists are still in Iraq with the same MI units providing long-term sustainment support and sustainment training.

STARGRAZER. This provides a previously unavailable Special Purpose Electronic Attack (SPEA) capability specifically developed and deployed in under 9 months as a Quick Reaction Capability for OEF and OIF forces. The system is composed of an "Extreme" ruggedized PC fitted with specially developed PCI based system capabilities. Additional components include multiple antenna options, an external power amplifier, and a complete power subsystem allowing the system to operate with a BB-390 battery pack, HMMWV, commercial vehicle or 110/220V AC power. Initially, Team C4ISR delivered ten (10) units to CFLCC/MNC-I OIF/OEF. The STARGRAZER system has gone through two subsequent capability upgrades to include additional capability for OEF/OIF deployed forces as well as other Team C4ISR customers supporting the Global War on Terrorism (GWOT). In addition, five (5) of these systems were recently transitioned to the Naval Central Command (NAVCENT) in support of counter narcotics patrolling. Team C4ISR continues to support STARGRAZER users by providing all necessary training and system support.

SANDPIPER (SP). SP is a "Leave Behind" Quick Reaction Capability (QRC) prototype consisting of a HMMWV with an Electronic Warfare (EW) system shelter, support vehicle with generator, and multiple antenna configurations.

COUNTER ROCKET, ARTILLERY, MORTAR (C-RAM). C-RAM utilizes the Lightweight Counter Mortar Radar (LCMR) to provide initial cueing for C-RAM "Sense and Warn" and as the first line sensor providing incoming target track to C-RAM Command and Control (C2) net for active engagement and interception.

LYNX SYNTHETIC APERTURE RADAR. Team C4ISR engineers have been providing technical support and training in the operation and use of the Lynx Synthetic

Aperture Radar as deployed on an IGNAT UAV by Team C4ISR. Development of techniques in change detection for the detection of small targets has been ongoing and is being utilized in the field. Complementary efforts in Change Detection are ongoing with other agencies.

Joint Users Interoperability Communications Exercise (JUICE). Team C4ISR received reports from Kuwait regarding the inability to make secure wireless calls through the local wireless provider. Technically, the data portion of the call (i.e. the port needed to go secure), would not work. Based upon the experience and expertise of software engineers stationed at Fort Monmouth, experimentation began immediately with several wireless systems that might provide a solution. Team C4ISR software engineers began a dialogue with the wireless provider in theater to better understand the local conditions and the exact nature of the problem. Combining the engineering expertise along with the test bed capabilities at Fort Monmouth enabled the software engineers to recreate the problem and develop and deliver the required capability. The solution enables secure wireless calls in the theater of operations to be placed; thereby enabling command and control among deployed forces.

Combined Arms Planning and Execution Monitoring System (CAPES). CAPES was provided to the 4th Infantry Division for use in Operation Iraqi Freedom. This unique system automates the development of detailed battle planning and provides visual situational awareness of operations during execution of battle plans. CAPES was named one of the top ten technologies in the US Army Material Command Greatest Inventions Program for 2002.

Joint Satellite Communications Engineering Center (JSEC). The JSEC has provided hotline and on site support to the troops in Iran and Afghanistan by responding to numerous requests for technical support.

- Over the last year the JSEC Strategic Systems Lab has responded to 75 requests for assistance from the Teleport/ STEP sites at Landstuhl & Ramstein Germany, Bahrain, Wahiawa, Hawaii, and Ft Buckner, Japan. These sites provide most of the communications to and from our troops in that area of the world. An example of the kind of response by Team C4ISR was the development of procedures and assistance in restoral of critical satcom network control.

- The JSEC Tactical Systems Lab (TSL) has provided extensive support to warfighters in both Afghanistan and Iraq. The TSL provides 24/7 Help Desk support to SMART-T and SCAMP EHF satellite communications terminals users in the field. During FY04 the Help Desks responded to approximately 200 calls and emails from users in both Afghanistan and Iraq. This level of support continues in FY05 and is expected to continue for the foreseeable future. The nature of the support includes troubleshooting issues with the operation of the terminals, communications planning, logistics and upgrades to terminals software. The TSL also assists units scheduled to deploy with equipment preparations and terminal training.

- The JSEC TSL has conducted an upgrade of software and hardware to 82 SMART-Ts deployed to SWA. The TSL has also conducted the upgrade on 23 SMART-T returned from SWA and redeployed.

- The JSEC TSL also supported urgent materiel releases of the military satellite communications Global Broadcast System (GBS) receive suites for the 101st AB, 10th Mountain Division, Stryker Brigade Combat Team (SBCT) 3and V Corp, who are all deploying to Iraq.

- A representative from the JSEC TSL also provided on site field support to the 3rd and 5th Special Forces Group and AF Special Operations Command in Afghanistan, Uzbekistan, Oman, Pakistan and Kuwait from Feb to Apr 2002. Support provided users with Internet Protocol communications over the military satcom system known as Low Data Rate Milstar, as well as communications planning to the Region Satellite Support Center.

Joint Network Node Capability Spiral 1 (JNTC-S). The Joint Network Node Capability (JNTC) Spiral 1) has been fielded to the 3ID currently deployed in Iraq and will be fielded to all other Army Divisions rotating into theater. The JNTC is the main communications backbone for the deployed Warfighters. The JNTC is composed of Unit Hubs, Joint Network Nodes (JNNs), Battalion Command Post Nodes (BnCPN) and associated SATCOM KU Band Trailers. Team C4ISR Engineers directly support these systems prior to and during deployment. Team C4ISR Engineers develop initial system configurations and are on call 24/7 to help the deployed units with troubleshooting or reconfiguration. Team C4ISR engineers deploy to OEF/OIF with JNTC equipped units to assist in initial setup and configuration.

Stryker Brigade Combat Team Systems. Brigade Subscriber Nodes (BSNs), Network Operations Center – Vehicles (NOC-Vs) and Battlefield Video Teleconference Systems (BVTCs) have been fielded to SBCT 1, 2 and 3 and are currently deployed in Iraq with SBCT-2. Team C4ISR Engineers directly support these systems prior to and during deployment. Team C4ISR engineers designed, developed, integrated, and fabricated these systems while providing 24/7 technical support to assist with troubleshooting.

- The BSN provides secure and non-secure backbone IP switching and network services with RF data rates of up to 8 Mbps and reachback capability over Secure Mobile Anti-jam Reliable Tactical Terminal (SMART-T) and legacy satellite systems. It incorporates a legacy gatekeeper to allow one seamless global numbering plan for all subscribers whether connected to BSN or Mobile Subscriber Equipment (MSE).

- The NOC-V provides the S6 with an operational facility and an integrated means to plan, manage, monitor and control tactical systems and networks within their management domain. The NOC-V contains a Force XXI Battle Command Brigade and Below (FBCB2) suite for battlefield Situational Awareness (SA) message traffic, a Tactical Internet (TI) Manager for the Internet and TOC management, a Global

Broadcasting System (GBS) for watching worldwide news and the Armed Forces Network in the field, and radio links via Single Channel Ground and Airborne Radio System (SINCGARS), Enhanced Position Location Reporting System (EPLRS), and Near Term Digital Radio (NTDR).

- The BVTC provides support to the TOC's at all echelons down to Brigade. Despite being separated by many kilometers, the BVTC capability gives the commander and his staff the tools to plan face-to-face and coordinate activities far more effectively and quickly than before. BVTC was chosen as a critical component for the STRYKER BCTs, the JNTC-S 3rd Infantry Division (ID) effort, and the Baseband Node (BBN) program.

High Frequency Tracker & Communicator. The HF Tracker and Communicator is government-developed and over twenty-five copies have been distributed throughout the Army to include units in Afghanistan and Iraq. The HF Communicator is a Graphical User Interface (GUI) used to send text messages from the ground via either the AN/PRC-138 or AN/PRC-150 Harris HF radios directly to an aircraft via the Control Display Unit AN/ARC-220 Aviation HF radio platform. The HF Tracker and HF Communicator systems are credited with helping to save lives in the field. We have received positive feedback on its use and were notified about the following message: "The 68 MED Operations NCO reported a MEDIVAC aircraft was returning from a remote site when the Operations Center learned two critical casualties had been brought to the air strip after the aircraft left. (Aircraft was BLOS from both ends of flight.) Using HF-Tracker and the ARC-220 HF system he was able to direct the pilots to return and pick up the casualties. The HF Communicator sent messages and pilots took required action and the casualties were saved."

Portable Emergency Broadband System (PEBS). The PEBS network is designed to facilitate digital access (i.e., IP voice, video, and data) for Warfighters, First Responders, and other emergency response personnel in disaster, combat, or underground areas. Through use of easily deployable wireless repeaters or Breadcrumbs (BC), rapid setup of a reliable multi-hopping network will be achieved. Breadcrumbs are small wireless meshing bridges and access points that allow stand-alone networks to quickly organize in places where there is no standing infrastructure. BC uses ad-hoc networking technology to create a self-healing network that will offer wireless connectivity to any client within range. S&TCD equipped 33 units, including 13 Supercrumbs, 8 Breadcrumbs and 12 Wearablecrumbs, under the Rapid Equipping Force (REF) Initiative to deploy with the 3rd Bde, 3rd ID to meet its operational needs in Iraq. These units were shipped to OIF units in December 2004.

Night Vision and Infrared. Team C4ISR has provided a variety of specialized Image Intensification and Thermal Infrared systems that augment the capabilities of existing, fielded equipment. New hand held and robot mounted thermal sensors have been used by Soldiers conducting combat operations in Afghanistan. Wide field of view, night vision goggles have also been fielded to ground and airborne for fighting during urban

operations. Team C4ISR has already deployed over 30 different prototype and limited quantity systems that are meeting the unique mission requirements in Iraq and Afghanistan.

Advanced Field Artillery Tactical Data System (AFATDS). The Advanced Field Artillery Tactical Data System (AFATDS) provides Army, Navy, and Marine Corps automated fire support command, control and communications. AFATDS pairs targets to weapons to provide optimum use of fire support assets. AFATDS automates the planning, coordinating and controlling of all fire support assets (field artillery, mortars, close air support, naval gunfire, attack helicopters and offensive electronic warfare). AFATDS will perform the fire support Command, Control, and Coordination requirements at all echelons of field artillery and maneuver, from Echelons above Corps to Battery or Platoon in support of all levels of conflict.

- AFATDS is the digitized sensor to shooter link providing automated technical and tactical fire direction solutions, fire asset management tools and decision support functionality. AFATDS functions from firing platoon through Echelon above Corps. AFATDS is the fire support node of ABCS. It enhances dominant maneuver, survivability and continuity of operations for Joint Force Commander.

- AFATDS system is deployed in support of Operation Iraq Freedom/Operation Enduring Freedom (OIF/OEF). There are over 120 AFATDS systems deployed with the SBCT 2, 173rd Bde, 3rd Army, XVIII C/A, and 42 ID, as well as Contractor Logistic Support in support of deployed systems. There are FIT personnel in country to assist in operational readiness of the AFATDS system. These personnel are contractor employees, managed through a time and material contract at PM Intel and Effects. Any degradation of contractor logistic support and/or fielding support will affect the readiness of the AFATDS system, resulting in inadequate fire support.

ABCS upgrades: Providing ABCS Synchronization and Compatibility. ABCS (Army Battle Command System) is a System of Systems that provides the critical command and control functions for the war fighter to use in support of his mission for all of the US Army. The Army could not communicate digitally between digitized and non-digitized forces without this support. Some divisions had been modernized with ABCS systems through normal modernization, and there were others who had no digitization at all. The Army was putting together a force of both equipped and non equipped units. We were able to bring all the deploying units onto a common operational software configuration and provide system of system and joint and coalition interoperability. We have fielded over 2,500 BFT (Blue Force Tracking) systems, various quantities of the other 11 ABCS systems, 13C2V's, 3LDOC's, and A2C2S which is the CDR's TOC in the Sky, and 13 Bradley BCV to provide on the move communications capability. "This is the success story of the war." In addition, we provided a DISA Collaboration Suite to for secure voice, whiteboard, chat, FTP, and VTC capabilities and have since moved on

to developing a windows based Tactical Business Enterprise System for web based unit reporting. This activity continues today as we provide synchronization to all OIF deployments and have merged it with the Army Transformation Plan to include Modularity, JNTC, and BFT.

Team C4ISR Special Projects Office.

- **SPO In Theater Support**. SPO manages and assigns technical representatives for every BFA to every deploying Division and separate BDE. Our tech reps are still in the AOR with their units. We manage the tech reps from a PEO FWD location in Doha that reports back to us here at Ft Monmouth. To date we have provided technical support to over 57 combat Brigades, 9 Divisions and 3 Corps in support of OIF/OEF. We currently have 254 personnel in theater supporting the Warfighter.
- **Joint Initiatives/GWOT.** Team C4ISR has coordinated, engineered, and provided direct engineering liaison to Joint Organizations including: Joint Forces Command, the Air Force Command & Control, Intelligence Surveillance Reconnaissance Center at Langley AFB, Army Training and Doctrine Command (TRADOC) at Ft Monroe & Ft Eustis, Supreme Allied Commander - NATO Europe, Fleet Forces Command (previously CINCLANTFLEET). These relationships and participation in experimentation and prototyping has facilitated technical advancement and improved interoperability that transfers directly to the war on terrorism. Recent activities include: Improved interoperability of collaborative systems that allow units to share information across theater, integration of Net Centric web-capabilities into coalition and interagency networks (Coalition Warrior Interoperability Demonstration '05), improved Joint Targeting using Service Orient Architecture approach (Joint Rapid Architecture Environment), and JFCOM's Joint Fires Initiative. This involvement between Joint organizations and the CECOM community speeds development of needed capability and insures timely procurement and delivery to the warfighter and first-responder alike. Only through this close involvement between the warfighter on the ground and the requirements development teams and the Army C4ISR Acquisition team can the cost savings, customer support, and rapid acquisition be realized.

Blue Force Tracking (BFT) Network Operations Cell. Over 1,800 BFT Platforms were installed and fielded to support OIE/OEF. Ft Monmouth SPO building 2707 is the network operations Cell for the OCONUS based BFT network. This Cell monitors the health and welfare of the network as well as managing the individual BFT platforms which includes software upgrades, troubleshooting of communications. There is no other facility like this in the world that provides this capability…one that would require duplication, certification, and a formal burn in period for transition.

Satellite Range Extension for deployed Units/Joint Network Nodes. Team C4ISR managed the design of several range extension projects, such as a satellite networking capability that allows the 3rd Brigade 2nd ID Stryker Brigade to operate with continuous

digital connectivity using commercial technology. One such effort provided CJTF-76-needed digital and voice service to isolated elements located throughout Afghanistan, while another project was for the 1st ID while that unit was deployed in Iraq. All of these range extension projects were initiated and met within 120 days of request. This specialized knowledge is helping the SPO with the Managed Range Extension Capability Assessment for Units of Action—a special study team that worked with TRADOC and DA to recommend an appropriate communications architecture to reorganize the Army into separate and self-sufficient Units of Action to support modularity. Critical to this task has been the engineering management support provided to our program manager for tactical radio communications systems in the development, testing and initial fielding effort of Joint Network Nodes to the 3rd ID, the first Army unit to be reorganized using the Unit of Action concept.

Life Cycle Sustainment. Team C4ISR provides support throughout the life cycle of equipment.

- **National Inventory Control Point and the National Maintenance Point** . Fort Monmouth is responsible for acquiring, stocking, inventory management and repair of nearly half of the Army's National Stock Numbered parts and systems. The total spares acquisition and hardware repair program for the current Fiscal Year 05 is $2.3B. *In total, in direct support of OEF/OIF since the start of the operations, they have handled nearly 600,000 requisitions from field units, both Army and other Services, and provided over $1.6B worth of parts across the entire spectrum of C4ISR systems.* They conduct Anticipatory Logistics, which means they work with units identified for deployments to help determine their status of systems and parts on-hand and what they will need while deployed, in order to better and more quickly satisfy their needs once deployed. Team C4ISR routinely does Readiness Analysis of C4ISR system's operational status with all field units across the Army. The sustainment support provided by the Team C4ISR is literally worldwide and from "factory to foxhole". *The scope of equipment touches essentially every weapon system platform in the Army.*
- **Reset Program.** It receives from returning units, systems that have been subjected to the severe conditions of deployment and combat environment, performs depot level maintenance and returns fully combat ready systems to those units ready for redeployments. This is typically done within 120 days. *Thus far for FY03 - 05, they have Reset over 70 different types of weapon systems, with over 5,100 incidents of system maintenance, involving about 180 Battalion level units across the Army.* This effort involves daily contact by the DA Civilian workforce with those field units, both electronically, and via on-site inspection and maintenance teams. The C4ISR systems Reset range from radios to satellite terminals, airborne sensors/countermeasure sets to Command and Control Vehicles, Radars to Generator Sets.
- **Electronic Sustainment Support Centers**. The Team C4ISR has deployed these centers with DA Civilian Managers to provide forward, in-theater maintenance in direct support of deployed forces. *There are currently 9 different sites in the theater, and they have handled nearly 71,000 repair work orders.* Equipment

supported includes not only Army and other Service Standard systems, but a wide variety of commercial automation, communication and electromechanical equipment brought to the OEF/OIF theater by deploying forces. In addition, they have forward stocked certain critical system's spare parts in theater, both Army and DLA, in order to be more responsive to unit demands for parts.

- **Logistics Assistance Support.** There have been over 400 Logistics Assistance Representative (LAR) deployment events involving over 200 DA Civilian LARs, with an average of 55 in the OEF/OIF theater at any time, providing direct hardware technical assistance on-site with units. Some LARs have deployed up to 5 times to the OEF/OIF theater. In addition, there have been 161 Field Software Engineer (FSE) deployments, with an average of 45 in the OEF/OIF theater at any time, providing direct software support on-site with units.
- **Aircraft Countermeasure Filters.** The AN/ALQ-144 Countermeasures Set protects Blackhawk, Apache and Kiowa Helicopters from hostile Infrared (IR) homing missiles by jamming the threat IR Missile System. Deployment of the helicopters to the severe desert environment resulted in dust and sand getting into the mechanical/optical sections of the transmitter and causing greatly premature failures of the system, grounding the helicopters until the system could be repaired. Team C4ISR rapidly developed, tested, and fielded over 2600 Air Filter Kits, greatly improving nearly 75 times the reliability of the AN/ALQ-144, and reducing the maintenance burden and downtime for the aircraft.

Information Assurance: Team C4ISR Information Assurance staff continually supports Information and Communications Security systems and operations. Their continuous attention has revealed some security vulnerabilities and they have applied corrective actions directly to field operations in Iraq and Afghanistan that resulted in preventing security compromises and loss of mission and life. Evaluation of IA Security Tools/Security Hardware used by Tactical Army - Problems encountered over a one year period average at approximately 75 problems/solutions resolved, as appropriate with vendor or NSA. Examples are In-Line Encryptors TACLANE, KG-250, GOTS Firewall Cloud shield, Secure GSM Phones, Tactical PKI, Secure PDA, Secure Wireless LAN, Secure Universal Purge Tool. Details are sensitive.

Software Release Summary. In support of over 200 operationally deployed C4ISR systems, we provide new software versions (i.e. capabilities) critical to the Warfighter as these releases provide necessary enhancements, improvements and corrections required for these systems. Over the last twelve months the Team C4ISR Software engineering deployed 49 software releases, eleven (11) of which were emergency releases, in support of Operation Iraqi Freedom/Operation Enduring Freedom. More than 1,200 Warfighter requirements were fulfilled with the releases of these versions. These software upgrades included critical enhancements and fixes in areas such as: force protection; navigational accuracy of aircraft; intelligence analysis capabilities to be used to combat terrorism; early strike warning capabilities for friendly troops under indirect fire and; faster and more secure satellite communications.

DCN:11619

United States Senate
COMMITTEE ON ARMED SERVICES
WASHINGTON, DC 20510-6050

July 29, 2005

Honorable Anthony J. Principi
Chairman, Base Closure and Realignment Commission
2521 South Clark Street, Suite 600
Arlington, Virginia 22202-3920

Dear Chairman Principi:

Section 2902 of the Defense Base Closure and Realignment Act of 1990, as amended, provides that "All the proceedings, information, and deliberations of the [Base Realignment and Closure] Commission shall be open, upon request" to the Chairman of the Subcommittee on Readiness and Management Support of the Committee on Armed Services and other named persons. By including this provision in the BRAC statute, Congress authorized my subcommittee to provide oversight on the Commission's activities. It is in my capacity as Chairman of the Subcommittee on Readiness and Management Support that I write to you regarding the performance of the Commission in carrying out its statutory duties. I have been asked to specifically look at whether Department of Defense officials, who were personally or substantially involved in the preparation of information and recommendations concerning the closure or realignment of military installations, provided members of the BRAC Commission *ex parte* or uncertified information that has not been made part of the public record to date by the BRAC Commission.

The Congress, in enacting the BRAC statute, was aware that the process of base closure is a highly controversial one, and that the deliberations of the Commission must be open and transparent. Therefore, the Congress included a provision in BRAC law which requires that Department of Defense officials, in submitting information to the Commission, "shall certify that such information is accurate and complete to the best of that person's knowledge and belief." (Section 2903) Other provisions in the BRAC law direct that all testimony at public hearings of the Commission be under oath and establish the requirements for open hearings and deliberations, site visits, separation of the Commission's staff from the Department of Defense, and other protections.

Moreover, insofar as the Administrative Procedure Act applies to the deliberations of the Commission, private conversations would appear to violate that Act's limitations on *ex parte* communications, as well as its fundamental requirement that decisions of agencies be made on the basis of evidence of record. Any deviation from these legal requirements clearly gives rise to potential litigation that could delay or

impede the BRAC process or result in a federal court taking action that could call into question the integrity of the entire process.

Apart from the potential legal ramifications is the risk of undermining the public's perception of the integrity and reliability of the BRAC process. We must remember that there inevitably will be the need for a future Secretary of Defense to initiate a BRAC process. We must simply have the support of the public and the Congress to enact that process.

Because of the vital importance of these matters, I therefore request that you allow my staff to meet with appropriate representatives of the 2005 BRAC Commission no later than August 3, 2005 and that all relevant documentation be produced by August 10, 2005, which will allow for examination of all records, materials, and other evidence relating to any *ex parte* communications and to assess, if in fact they occurred, whether these *ex parte* communications may have unduly or improperly influenced the Commission's actions to date.

I look forward to your prompt reply.

Sincerely,

John Ensign
Chairman
Subcommittee on Readiness and Management Support

cc: The Honorable Donald Rumsfeld

DCN:11619

UNITED STATES SENATOR

John Ensign

NEVADA

Washington D.C. 20510
Phone (202) 224-3244
Fax (202) 228-2193

To: Christine Principi (Christine Hill)

From: Senator Ensign

Re: BRAC Concerns

Date: 29 July 2005

Number of pages: 3

(703) 699-2775

NOTES:

Senator Ensign has tried to reach Mr. Principi today without success.

-D. Grisier

CONFIDENTTIALITY NOTICE:

Congress of the United States

House of Representatives

Washington, DC 20515

July 14, 2005

Mr. Philip E. Coyle III
Commissioner
Base Realignment and Closure Commission
2521 South Clark Street, Suit 600
Arlington, VA 22202

Dear Commissioner Coyle:

It was good seeing you at the Regional Hearing in Baltimore, Maryland, on July 8. I hope you found New Jersey's presentations about Fort Monmouth helpful and informative. I want to take this opportunity to follow-up on the questions you raised at the hearing, but also want to reiterate our argument that C4ISR capability would be diminished greatly, immediately, and for at least a decade by the proposed closure and move. This is independent of cost and payback calculations.

You are correct that the Department of Defense (DOD) failed to account fully for workforce transition costs, and we have attempted to capture the significant cost of recruiting and training a potential new workforce at Aberdeen Proving Ground (APG). However, in the data made available to us, the salary cost savings from closing Fort Monmouth and the salaries added for new people at Aberdeen are considered in the same manner, and not included in COBRA runs (with the exception of positions eliminated, and the pay differential that results).

Our analytical team, led by Vice Admiral (ret.) Paul Gaffney II, conducted a thorough analysis of the recruitment and training costs for reconstituting a workforce at Aberdeen. A summary of our calculations is attached. In every case, we have been conservative in our assumptions.

When we submitted our report to the BRAC Commission on July 8, we calculated the payback period to be 21 years using a "constant dollar" payback period. However, all BRAC recommendations use a "net present value" payback period. Using the "net present value" data, the payback period for moving Fort Monmouth would be 33 years. (A correction was submitted to Chairman Principi by VADM Gaffney on July 12.) As you will see, the payback period expands to 44 years when costs for reconstituting a new workforce are included.

Attached you will find a short summary of our calculations for recruitment and training costs, including our sources, assumptions, and methodology. Also attached is a more complete answer to your second question, which sought a listing of programs in use in Iraq that would be disrupted by a closure of Fort Monmouth. A complete, more digestible version will follow next week.

I hope this information is useful to you. Please do not hesitate to contact me if I can be of further assistance.

Sincerely,

Rush Holt

Rush Holt
Member of Congress

Workforce Models

There are extensive studies available in the body of pertinent literature that analyze and describe recruitment, training, and lost productivity costs when an employee must be hired to backfill the "leaver," i.e., the employee who must be replaced. For example:

- "Private Sector Downsizing: Implications for DoD" by Michael L. Marshall and J. Eric Hazell (published in The Acquisition Review Quarterly, Spring 2000) listed several parameters that apply to replacing personnel, including advertising and marketing; recruitment, hiring, and training; overtime to personnel taking up the slack; productivity losses; and lost training for departed workers. The article concludes, "Regardless of the exact number of businesses, there is widespread agreement that ***turnover costs are somewhere between high and Olympian.***"

- "The Business Cost and Impact of Employee Turnover" by William Bliss of Bliss & Associates (2000) concludes that the cost of employee turnover is at least 150% of the leaver's annual salary.

- A Price Water-House Saratoga Institute workforce replacement model cited in "It's Costly to Lose Good Employees" by J. Fitz-enz (1997) estimates that the total cost of turnover ranges from 100 to 200% of the leaver's pay and benefits.

- A workforce replacement study conducted by Kwasha Lipton (referenced in The Acquisition Review Quarterly Spring 2000) concludes that replacing exempt workers costs 150% of the leaver's salary, and for non-exempt workers, it costs 175% of the leaver's salary.

Assumptions

- DoD's analysis reflects a transfer of 3,879 civilians from Fort Monmouth and 767 from Fort Belvoir to APG for a total of 4,646 civilian personnel. Of this total, history and recent polling suggest that a maximum of 20% of employees are expected to transfer to their new location. The remaining 80% (3,717 employees) would have to be hired at APG. The bulk of these employees are scientists, engineers, and highly special technical experts.

- For purposes of this analysis, 15% of the 3,717 employees are considered administrative/clerical (and therefore have lower base salaries).

- Given the differences of the functional knowledge required to develop, acquire, test and field C4ISR systems and equipments, the professional skills domain is split into two subsets; Scientists/Engineers (SE) and Acquisition/Logistics (AL).

- COBRA used a civilian salary of $59,959, an unrealistic figure for recruiting and training senior and journey-person SE and AL personnel. Using the Bliss study as the model, we have used the salary of a GS-14/Step 5 as representative of senior employees. For journey-person (JP) employees (GS-13 and below), we have used the salary of a GS-12/Step 5. In all cases, 28.9% is applied for cost of benefits.

- We have conservatively included lost productivity costs only during the period of time the new employees are being trained. Also, we have not included any productivity impacts likely to result from an immature workforce, such as program disruptions.

Conclusions

High End of the Cost Spectrum.

1. Recruiting Cost Factors. The Bliss study percentage of full salary (150%) was applied for senior SEs and adjusted down for JP SEs (75%), Senior AL (100%), and JP AL (75%) positions.
2. Recruiting Calculations.
   a. 160 SE x $ 129,096 SALARY x 150% = $30,983,000
   b. 1200 JP SE x $ 91,866 SALARY x 75% = $82,680,000
   c. 211 AL x $ 129,096 SALARY x 100% = $ 27,239,000
   d. 1588 JP AL x $ 91,866 SALARY x 50% = $ 72,942,000
   e. Subtotal = $214 M
3. Training Costs Factors. Training is conservatively estimated to be required for at least a three-year period. The assumption is that the newly hired SE employee will be in a training environment for three months of each year for three years, and for an AL employee, two months per year for three years. That is the time considered necessary to bring the newly hired individuals to a level where they are able to perform and contribute commensurately with the individuals they are replacing. Training costs are calculated as a percentage of full salary, on the assumption that training time is non-productive in the year of training.
4. Training Calculations
   a. 160 SE x $129,096 x .25 x 3 = $15,492,000
   b. 1200 JP SE x $91,866 x .25 x 3 = $82,679,000
   c. 211 AL x $129,096 x .167 x 3 = $13,647,000
   d. 1588 JP AL x $91,866 x .167 x 3 = $73, 087,000
   e. Subtotal = $185 M
5. **Bottom Line. Based on the set of assumptions above, the high end recruiting and training cost is $399M ($214M for recruiting, $185M for training).**

Low End of the Cost Spectrum

1. Recruiting Cost Factors. Drawing on other conclusions from other studies, the Bliss study percentage of full salary was adjusted significantly downward to establish a lower bounding for the range: senior SEs (75%); JP SEs (50%); senior AL (50%); JP AL (30%)
2. Recruiting Calculations.
   a. 160 SE x $ 129,096 SALARY x 75% = $15,492,000
   b. 1200 JP SE x $ 91,866 SALARY x 50% = $55,120,000
   c. 211 AL) x $ 129,096 SALARY x 50% = $13,620,000
   d. 1588 JP AL x $ 91,866 SALARY x 30% = $43,765,000
   e. Subtotal = $128 M
3. Training Costs Factors. Again, training is conservatively estimated to be required for at least a three year period. The assumption is that the newly hired SE/AL employee will be in a training environment one month of each year for three years to bring the newly hired individuals to a level where they are able to perform and contribute commensurately with the individuals they are replacing. Training costs are calculated as a percentage of full salary, on the assumption training time is non-productive in the year of training.
4. Training Calculations
   a. 160 SE x $129,096 Salary x .083 x 3 = $5,143,000
   b. 1200 JP SE x $91,866 Salary x .083 x 3 = $27,450,000
   c. 211 AL x $129,096 Salary x .083 x 3 = $6,783,000
   d. 1588 JP AL x $91,866 Salary x .083 x 3 = $36,325,000
   e. Subtotal = $76 M
5. **Bottom Line. Based on the set of assumptions above, the low end recruiting and training cost is $204M ($128M for recruiting, $76M for training).**

Return on Investment (ROI)

Taking the midpoint between the high estimate and low estimate, the amount of $300M factored into the COBRA formula yields an ROI (payback) of 44 years.

Current Fort Monmouth and Team C4ISR Support to Operation Iraqi Freedom

Quick Response: Aircraft Survivability. This Team C4ISR effort provides aviators from Army and the other military services with life-saving systems. Team C4ISR develops, fields and sustains the radar warning receivers and missile warning systems found on Army, Navy, Marine Corps, Air Force, and Presidential Fleet helicopters. These systems rely on software that contains current threat information tailored to specific regions of the world. Just prior to the outbreak of hostilities in Iraq, Team C4ISR updated that software, in record time, with new threat information for Southwest Asia. The team also adapted the systems to operate better in the harsh desert environment.

Quick Response: Guardrail Common Sensor System. Guardrail is a theater-level airborne signals intelligence collector system. Due to geopolitical boundaries and restrictions, it was not able to function as designed in Operation Iraqi Freedom. Team C4ISR field software engineers, deployed with the system, assessed the problem and reported it to Team C4ISR at Fort Monmouth. Our engineers developed a solution and fielded it in less than a week allowing Guardrail to collect the actionable intelligence that was vital to our military success. Bottom line here is that our forces need Guardrail to locate threats so they can neutralize them. By fielding our software solution, we saved warfighter lives.

- **GUARDIAN EAGLE** is a Quick Reaction Capability (QRC) to insert into the Guardrail/Common Sensor (GR/CS) Fleet of aircraft the ability to Detect, ID and locate LPI communications. GR/CS was the only Army Tactical Airborne asset in OIF with this capability. The two battalions equipped with this capability provided unique essential information on High Value Targets in the months leading up to hostilities as well as during the actual conflict. Team C4ISR continues to work with the units to provide constant updates to this capability. This QRC was accomplished on the first two systems four months after receipt of funds. We were uniquely equipped to accomplish this because of extensive technical expertise with all the GR/CS systems gained over twenty years of designing, building and fielding these systems. Other factors that contributed to our success were our flight activity at Lakehurst NAEC and our unique location that affords us the quiet zone in the warning areas over the Atlantic for calibration, and our ability to acquire the TCDL link located on the roof of building 600 and bring the data into our labs for analysis.

Lightweight Counter Mortar Radar Support. The LCMR detects and locates enemy mortar firing positions rapidly and with deadly accuracy so that coalition forces can instantly destroy them. Team C4ISR managed the accelerated development of LCMR to meet urgent warfighter needs. Team C4ISR helps field the LCMR to units, provides training on its use to soldiers throughout the theater and will work to keep it running around the clock.

FireFinder Radar System. Firefinder tracks and locates the source of incoming mortars and rockets. The Radar rapidly became an extremely critical system in the OEF/OIF

theater, with a demand for the deployed systems to essentially be available 100% of the time to provide troop protection. Since the onset of hostilities several new capabilities have been added to the Firefinder system, through a series of new software packages. These enhanced capabilities come in direct response to the ongoing and developing threat in Iraq and Afghanistan. For example, the ability to detect mortar fire was improved by 25 percent. Of note is the new capability to provide an "early warning capability" as well as an intercept capability. Team C4ISR community has taken extraordinary measures to support the deployed systems, and to get returning systems ready for re-deployments. Daily contact with the units in theater is maintained, spare parts and maintainers have been positioned forward and intensive transportation and tracking has been implemented. Additional LARs have been sent forward, and a Telemaintenance Capability has been established to assist unit maintainers and operators in areas where transportation to the radar sites is difficult, dangerous and LAR support may be delayed. Performance of the Radars in the harsh conditions of OEF/OIF has been exceptional, thanks to the dedicated support provided by the Fort Monmouth community.

AN/PPS-5D Man-Portable Battlefield Surveillance Radar. PPS-5D is the US Army's Man-Portable Battlefield Surveillance Radar system used to target enemy personnel and vehicles. This Radar system played an essential role in the protection of U.S. forces at the beginning of Operation Iraqi Freedom when it was the only system available that could penetrate through a sandstorm and successfully target approaching Iraqi tanks, leading to their destruction. It was successfully used throughout Operation Iraqi Freedom (OIF) by the 82nd Airborne Division (Ft. Bragg), the 103rd MI Battalion (Ft. Stewart), the 101st Airborne Division (Ft. Campbell) and the 312th MI Battalion (Ft. Hood). The radar was an essential system used to target enemy personnel and vehicles. During the sand storm early on in the conflict, the Army was forced to remain stationary, making them vulnerable to enemy attack. The AN/PPS-5D radar proved to be the only system available that could penetrate the wind driven sand and dust to locate enemy targets. Through the sand and dust, the radar successfully targeted approaching Iraqi T-72 tanks at nearly 20km, leading to their destruction. The radar was also used for force protection and perimeter surveillance, once the coalition entered Baghdad.

TROJAN Special Purpose Integrated Remote Intelligence Terminal (SPIRIT). More than 20 TROJAN Special Purpose Integrated Remote Intelligence Terminal (SPIRIT) systems were deployed to U.S. Army and U.S. Marine Corps units and operational in support of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). Both the AN/TSQ-190(V) TROJAN SPIRIT II and the AN/TSQ-226(V) TROJAN SPIRIT LITE variants have been utilized to provide crucial secure communications reachback capabilities, to include near-real-time data, Unmanned Aerial Video (UAV) video, and other video, into national networks and databases to support Military Intelligence (MI), force protection, and other requirements. Over 20 systems were deployed by the US Army and US Marine Corps during height of OIF and remained operational availability rates of over 95 percent. The TROJAN Program is managed by Team C4ISR, TROJAN Systems Integration and Fielding Office (SIFO), Fort Monmouth, NJ.

Counter-Radio Controlled Improvised Explosive Device (C-RCIED) System (WARLOCK). Beginning in FY03, existing Shortstop Electronic Protection System (SEPS) technology was modified by Team C4ISR into several variants of an Electronic Countermeasures (ECM) system to protect convoys, warfighters, engineers, Unexploded Ordnance (UXO) squads, and VIPs from various RCIEDs. This program, a Quick Reaction effort in response to multiple Operational Needs Statements from MNC-I and CFLCC, was conducted jointly with Team C4ISR and the US Army Rapid Equipping Force (REF), and fielded nearly a thousand units within nine months in direct support of OEF/OIF. To date 1000+ systems, of varying capability and target set have been fielded and are protecting troops today.

Improvised Explosive Device Characterization Lab. The Lab began operation during 1QFY04 to identify the performance characteristics of remote controlled triggers used to activate improvised explosive devices. Analyses conducted by this lab identify deficiencies in existing or emerging coalition systems and are provided to Team C4ISR Countermeasures and IED detection programs for immediate action. I2WD also worked closely with the FBI's Terrorist Explosive Device Analysis Center (TEDAC) and has on site personnel at the TEDAC facility. These technicians conduct preliminary evaluations of incoming devices and prioritize the devices for analysis by the Characterization Lab.

SIGINT Support. Team C4ISR has provided extensive expertise in the area of Signals Intelligence (SIGINT) supporting the National Security Agency (NSA) Army Cryptologic Operations Office (ACO) and the Intelligence and Security Command (INSCOM). Team C4ISR personnel have provided specialized technical, operational, logistical and maintenance support for both OEF and OIF. We have developed and provided technology solutions known as Quick Reaction Capabilities (QRC's) in response to requests for assistance from the field to acquire, identify, collect and exploit signals of interest. Team C4ISR personnel have deployed to the field to assist with training and operation of SIGINT equipment fielded as a result of these QRCs to answer critical SIGINT needs. Personnel possessing extensive knowledge and experience in SIGINT technology and the application of this technology directly supported the Combined Forces Land Component Command and served as SIGINT Operations Officers in the Joint SIGINT/Electronic Warfare Coordination Cell.

- **Prophet**. Prophet detects, collects, and exploits conventional and modern military emitters. A secondary mission will be Electronic Warfare against selected enemy emitters to interrupt, spoof, disrupt, and/or disable target command and control nodes. Prophet is mounted on a High Mobility Multipurpose Wheeled Vehicle (HMMWV), with a quick-erect seven-meter antenna mast. Prophet also has a dismounted man-pack version, which supports airborne, early entry, and urban operations. Both configurations provide intelligence support to a division, Stryker/heavy/light brigade, regiment, UA or task force. This intelligence support provides indications, warning, location, tracking, and identification of threat emitters. Prophet will cross-cue other battlefield sensors (e.g. tactical unmanned aerial vehicles, PBS2 radars, etc.) as

well as provide additional data that may confirm indications and detections from the other manned and unmanned battlefield sensors. Testimonials to PROPHET include:

- "Long-haul communication capability and data downlink need to be added to the Prophet."
- "Lack of TACSAT bandwidth for SIGINT hindered the ability to communicate at TS/SCI level with ground collectors." -10th MTN OEF IBOS AAR
- "The Prophet Hammer was the preferred SIGINT collection system available to the 4th ID." - 4ID IBOS Way Ahead Recommendations to LTG Alexander Army G2 - 11 May '04
- 101st CG states: "Prophet is invaluable"

- **PROPHET HAMMER.** Team C4ISR developed this specialized Signals Intelligence (SIGINT) and provides support to the Intelligence and Security Command (INSCOM) during Operation Iraqi Freedom by fielding PROPHET HAMMER systems, training, and providing post-deployment support to MI units. Team C4ISR engineers and intelligence specialists are still in Iraq with the same MI units providing long-term sustainment support and sustainment training.

STARGRAZER. This provides a previously unavailable Special Purpose Electronic Attack (SPEA) capability specifically developed and deployed in under 9 months as a Quick Reaction Capability for OEF and OIF forces. The system is composed of an "Extreme" ruggedized PC fitted with specially developed PCI based system capabilities. Additional components include multiple antenna options, an external power amplifier, and a complete power subsystem allowing the system to operate with a BB-390 battery pack, HMMWV, commercial vehicle or 110/220V AC power. Initially, Team C4ISR delivered ten (10) units to CFLCC/MNC-I OIF/OEF. The STARGRAZER system has gone through two subsequent capability upgrades to include additional capability for OEF/OIF deployed forces as well as other Team C4ISR customers supporting the Global War on Terrorism (GWOT). In addition, five (5) of these systems were recently transitioned to the Naval Central Command (NAVCENT) in support of counter narcotics patrolling. Team C4ISR continues to support STARGRAZER users by providing all necessary training and system support.

SANDPIPER (SP). SP is a "Leave Behind" Quick Reaction Capability (QRC) prototype consisting of a HMMWV with an Electronic Warfare (EW) system shelter, support vehicle with generator, and multiple antenna configurations.

COUNTER ROCKET, ARTILLERY, MORTAR (C-RAM). C-RAM utilizes the Lightweight Counter Mortar Radar (LCMR) to provide initial cueing for C-RAM "Sense and Warn" and as the first line sensor providing incoming target track to C-RAM Command and Control (C2) net for active engagement and interception.

LYNX SYNTHETIC APERTURE RADAR. Team C4ISR engineers have been providing technical support and training in the operation and use of the Lynx Synthetic

Aperture Radar as deployed on an IGNAT UAV by Team C4ISR. Development of techniques in change detection for the detection of small targets has been ongoing and is being utilized in the field. Complementary efforts in Change Detection are ongoing with other agencies.

Joint Users Interoperability Communications Exercise (JUICE). Team C4ISR received reports from Kuwait regarding the inability to make secure wireless calls through the local wireless provider. Technically, the data portion of the call (i.e. the port needed to go secure), would not work. Based upon the experience and expertise of software engineers stationed at Fort Monmouth, experimentation began immediately with several wireless systems that might provide a solution. Team C4ISR software engineers began a dialogue with the wireless provider in theater to better understand the local conditions and the exact nature of the problem. Combining the engineering expertise along with the test bed capabilities at Fort Monmouth enabled the software engineers to recreate the problem and develop and deliver the required capability. The solution enables secure wireless calls in the theater of operations to be placed; thereby enabling command and control among deployed forces.

Combined Arms Planning and Execution Monitoring System (CAPES). CAPES was provided to the 4th Infantry Division for use in Operation Iraqi Freedom. This unique system automates the development of detailed battle planning and provides visual situational awareness of operations during execution of battle plans. CAPES was named one of the top ten technologies in the US Army Material Command Greatest Inventions Program for 2002.

Joint Satellite Communications Engineering Center (JSEC). The JSEC has provided hotline and on site support to the troops in Iran and Afghanistan by responding to numerous requests for technical support.

- Over the last year the JSEC Strategic Systems Lab has responded to 75 requests for assistance from the Teleport/ STEP sites at Landstuhl & Ramstein Germany, Bahrain, Wahiawa, Hawaii, and Ft Buckner, Japan. These sites provide most of the communications to and from our troops in that area of the world. An example of the kind of response by Team C4ISR was the development of procedures and assistance in restoral of critical satcom network control.

- The JSEC Tactical Systems Lab (TSL) has provided extensive support to warfighters in both Afghanistan and Iraq. The TSL provides 24/7 Help Desk support to SMART-T and SCAMP EHF satellite communications terminals users in the field. During FY04 the Help Desks responded to approximately 200 calls and emails from users in both Afghanistan and Iraq. This level of support continues in FY05 and is expected to continue for the foreseeable future. The nature of the support includes troubleshooting issues with the operation of the terminals, communications planning, logistics and upgrades to terminals software. The TSL also assists units scheduled to deploy with equipment preparations and terminal training.

- The JSEC TSL has conducted an upgrade of software and hardware to 82 SMART-Ts deployed to SWA. The TSL has also conducted the upgrade on 23 SMART-T returned from SWA and redeployed.

- The JSEC TSL also supported urgent materiel releases of the military satellite communications Global Broadcast System (GBS) receive suites for the 101st AB, 10th Mountain Division, Stryker Brigade Combat Team (SBCT) 3and V Corp, who are all deploying to Iraq.

- A representative from the JSEC TSL also provided on site field support to the 3rd and 5th Special Forces Group and AF Special Operations Command in Afghanistan, Uzbekistan, Oman, Pakistan and Kuwait from Feb to Apr 2002. Support provided users with Internet Protocol communications over the military satcom system known as Low Data Rate Milstar, as well as communications planning to the Region Satellite Support Center.

Joint Network Node Capability Spiral 1 (JNTC-S). The Joint Network Node Capability (JNTC) Spiral 1) has been fielded to the 3ID currently deployed in Iraq and will be fielded to all other Army Divisions rotating into theater. The JNTC is the main communications backbone for the deployed Warfighters. The JNTC is composed of Unit Hubs, Joint Network Nodes (JNNs), Battalion Command Post Nodes (BnCPN) and associated SATCOM KU Band Trailers. Team C4ISR Engineers directly support these systems prior to and during deployment. Team C4ISR Engineers develop initial system configurations and are on call 24/7 to help the deployed units with troubleshooting or reconfiguration. Team C4ISR engineers deploy to OEF/OIF with JNTC equipped units to assist in initial setup and configuration.

Stryker Brigade Combat Team Systems. Brigade Subscriber Nodes (BSNs), Network Operations Center – Vehicles (NOC-Vs) and Battlefield Video Teleconference Systems (BVTCs) have been fielded to SBCT 1, 2 and 3 and are currently deployed in Iraq with SBCT-2. Team C4ISR Engineers directly support these systems prior to and during deployment. Team C4ISR engineers designed, developed, integrated, and fabricated these systems while providing 24/7 technical support to assist with troubleshooting.

- The BSN provides secure and non-secure backbone IP switching and network services with RF data rates of up to 8 Mbps and reachback capability over Secure Mobile Anti-jam Reliable Tactical Terminal (SMART-T) and legacy satellite systems. It incorporates a legacy gatekeeper to allow one seamless global numbering plan for all subscribers whether connected to BSN or Mobile Subscriber Equipment (MSE).

- The NOC-V provides the S6 with an operational facility and an integrated means to plan, manage, monitor and control tactical systems and networks within their management domain. The NOC-V contains a Force XXI Battle Command Brigade and Below (FBCB2) suite for battlefield Situational Awareness (SA) message traffic, a Tactical Internet (TI) Manager for the Internet and TOC management, a Global

Broadcasting System (GBS) for watching worldwide news and the Armed Forces Network in the field, and radio links via Single Channel Ground and Airborne Radio System (SINCGARS), Enhanced Position Location Reporting System (EPLRS), and Near Term Digital Radio (NTDR).

- The BVTC provides support to the TOC's at all echelons down to Brigade. Despite being separated by many kilometers, the BVTC capability gives the commander and his staff the tools to plan face-to-face and coordinate activities far more effectively and quickly than before. BVTC was chosen as a critical component for the STRYKER BCTs, the JNTC-S 3rd Infantry Division (ID) effort, and the Baseband Node (BBN) program.

High Frequency Tracker & Communicator. The HF Tracker and Communicator is government-developed and over twenty-five copies have been distributed throughout the Army to include units in Afghanistan and Iraq. The HF Communicator is a Graphical User Interface (GUI) used to send text messages from the ground via either the AN/PRC-138 or AN/PRC-150 Harris HF radios directly to an aircraft via the Control Display Unit AN/ARC-220 Aviation HF radio platform. The HF Tracker and HF Communicator systems are credited with helping to save lives in the field. We have received positive feedback on its use and were notified about the following message: "The 68 MED Operations NCO reported a MEDIVAC aircraft was returning from a remote site when the Operations Center learned two critical casualties had been brought to the air strip after the aircraft left. (Aircraft was BLOS from both ends of flight.) Using HF-Tracker and the ARC-220 HF system he was able to direct the pilots to return and pick up the casualties. The HF Communicator sent messages and pilots took required action and the casualties were saved."

Portable Emergency Broadband System (PEBS). The PEBS network is designed to facilitate digital access (i.e., IP voice, video, and data) for Warfighters, First Responders, and other emergency response personnel in disaster, combat, or underground areas. Through use of easily deployable wireless repeaters or Breadcrumbs (BC), rapid setup of a reliable multi-hopping network will be achieved. Breadcrumbs are small wireless meshing bridges and access points that allow stand-alone networks to quickly organize in places where there is no standing infrastructure. BC uses ad-hoc networking technology to create a self-healing network that will offer wireless connectivity to any client within range. S&TCD equipped 33 units, including 13 Supercrumbs, 8 Breadcrumbs and 12 Wearablecrumbs, under the Rapid Equipping Force (REF) Initiative to deploy with the 3rd Bde, 3rd ID to meet its operational needs in Iraq. These units were shipped to OIF units in December 2004.

Night Vision and Infrared. Team C4ISR has provided a variety of specialized Image Intensification and Thermal Infrared systems that augment the capabilities of existing, fielded equipment. New hand held and robot mounted thermal sensors have been used by Soldiers conducting combat operations in Afghanistan. Wide field of view, night vision goggles have also been fielded to ground and airborne for fighting during urban

operations. Team C4ISR has already deployed over 30 different prototype and limited quantity systems that are meeting the unique mission requirements in Iraq and Afghanistan.

Advanced Field Artillery Tactical Data System (AFATDS). The Advanced Field Artillery Tactical Data System (AFATDS) provides Army, Navy, and Marine Corps automated fire support command, control and communications. AFATDS pairs targets to weapons to provide optimum use of fire support assets. AFATDS automates the planning, coordinating and controlling of all fire support assets (field artillery, mortars, close air support, naval gunfire, attack helicopters and offensive electronic warfare). AFATDS will perform the fire support Command, Control, and Coordination requirements at all echelons of field artillery and maneuver, from Echelons above Corps to Battery or Platoon in support of all levels of conflict.

- AFATDS is the digitized sensor to shooter link providing automated technical and tactical fire direction solutions, fire asset management tools and decision support functionality. AFATDS functions from firing platoon through Echelon above Corps. AFATDS is the fire support node of ABCS. It enhances dominant maneuver, survivability and continuity of operations for Joint Force Commander.

- AFATDS system is deployed in support of Operation Iraq Freedom/Operation Enduring Freedom (OIF/OEF). There are over 120 AFATDS systems deployed with the SBCT 2, 173rd Bde, 3rd Army, XVIII C/A, and 42 ID, as well as Contractor Logistic Support in support of deployed systems. There are FIT personnel in country to assist in operational readiness of the AFATDS system. These personnel are contractor employees, managed through a time and material contract at PM Intel and Effects. Any degradation of contractor logistic support and/or fielding support will affect the readiness of the AFATDS system, resulting in inadequate fire support.

ABCS upgrades: Providing ABCS Synchronization and Compatibility. ABCS (Army Battle Command System) is a System of Systems that provides the critical command and control functions for the war fighter to use in support of his mission for all of the US Army. The Army could not communicate digitally between digitized and non-digitized forces without this support. Some divisions had been modernized with ABCS systems through normal modernization, and there were others who had no digitization at all. The Army was putting together a force of both equipped and non equipped units. We were able to bring all the deploying units onto a common operational software configuration and provide system of system and joint and coalition interoperability. We have fielded over 2,500 BFT (Blue Force Tracking) systems, various quantities of the other 11 ABCS systems, 13C2V's, 3LDOC's, and A2C2S which is the CDR's TOC in the Sky, and 13 Bradley BCV to provide on the move communications capability. "This is the success story of the war." In addition, we provided a DISA Collaboration Suite to for secure voice, whiteboard, chat, FTP, and VTC capabilities and have since moved on

to developing a windows based Tactical Business Enterprise System for web based unit reporting. This activity continues today as we provide synchronization to all OIF deployments and have merged it with the Army Transformation Plan to include Modularity, JNTC, and BFT.

Team C4ISR Special Projects Office.

- **SPO In Theater Support**. SPO manages and assigns technical representatives for every BFA to every deploying Division and separate BDE. Our tech reps are still in the AOR with their units. We manage the tech reps from a PEO FWD location in Doha that reports back to us here at Ft Monmouth. To date we have provided technical support to over 57 combat Brigades, 9 Divisions and 3 Corps in support of OIF/OEF. We currently have 254 personnel in theater supporting the Warfighter.
- **Joint Initiatives/GWOT.** Team C4ISR has coordinated, engineered, and provided direct engineering liaison to Joint Organizations including: Joint Forces Command, the Air Force Command & Control, Intelligence Surveillance Reconnaissance Center at Langley AFB, Army Training and Doctrine Command (TRADOC) at Ft Monroe & Ft Eustis, Supreme Allied Commander - NATO Europe, Fleet Forces Command (previously CINCLANTFLEET). These relationships and participation in experimentation and prototyping has facilitated technical advancement and improved interoperability that transfers directly to the war on terrorism. Recent activities include: Improved interoperability of collaborative systems that allow units to share information across theater, integration of Net Centric web-capabilities into coalition and interagency networks (Coalition Warrior Interoperability Demonstration '05), improved Joint Targeting using Service Orient Architecture approach (Joint Rapid Architecture Environment), and JFCOM's Joint Fires Initiative. This involvement between Joint organizations and the CECOM community speeds development of needed capability and insures timely procurement and delivery to the warfighter and first-responder alike. Only through this close involvement between the warfighter on the ground and the requirements development teams and the Army C4ISR Acquisition team can the cost savings, customer support, and rapid acquisition be realized.

Blue Force Tracking (BFT) Network Operations Cell. Over 1,800 BFT Platforms were installed and fielded to support OIE/OEF. Ft Monmouth SPO building 2707 is the network operations Cell for the OCONUS based BFT network. This Cell monitors the health and welfare of the network as well as managing the individual BFT platforms which includes software upgrades, troubleshooting of communications. There is no other facility like this in the world that provides this capability…one that would require duplication, certification, and a formal burn in period for transition.

Satellite Range Extension for deployed Units/Joint Network Nodes. Team C4ISR managed the design of several range extension projects, such as a satellite networking capability that allows the 3rd Brigade 2nd ID Stryker Brigade to operate with continuous

digital connectivity using commercial technology. One such effort provided CJTF-76-needed digital and voice service to isolated elements located throughout Afghanistan, while another project was for the 1st ID while that unit was deployed in Iraq. All of these range extension projects were initiated and met within 120 days of request. This specialized knowledge is helping the SPO with the Managed Range Extension Capability Assessment for Units of Action—a special study team that worked with TRADOC and DA to recommend an appropriate communications architecture to reorganize the Army into separate and self-sufficient Units of Action to support modularity. Critical to this task has been the engineering management support provided to our program manager for tactical radio communications systems in the development, testing and initial fielding effort of Joint Network Nodes to the 3rd ID, the first Army unit to be reorganized using the Unit of Action concept.

Life Cycle Sustainment. Team C4ISR provides support throughout the life cycle of equipment.

- **National Inventory Control Point and the National Maintenance Point** . Fort Monmouth is responsible for acquiring, stocking, inventory management and repair of nearly half of the Army's National Stock Numbered parts and systems. The total spares acquisition and hardware repair program for the current Fiscal Year 05 is $2.3B. *In total, in direct support of OEF/OIF since the start of the operations, they have handled nearly 600,000 requisitions from field units, both Army and other Services, and provided over $1.6B worth of parts across the entire spectrum of C4ISR systems.* They conduct Anticipatory Logistics, which means they work with units identified for deployments to help determine their status of systems and parts on-hand and what they will need while deployed, in order to better and more quickly satisfy their needs once deployed. Team C4ISR routinely does Readiness Analysis of C4ISR system's operational status with all field units across the Army. The sustainment support provided by the Team C4ISR is literally worldwide and from "factory to foxhole". *The scope of equipment touches essentially every weapon system platform in the Army.*
- **Reset Program.** It receives from returning units, systems that have been subjected to the severe conditions of deployment and combat environment, performs depot level maintenance and returns fully combat ready systems to those units ready for redeployments. This is typically done within 120 days. *Thus far for FY03 - 05, they have Reset over 70 different types of weapon systems, with over 5,100 incidents of system maintenance, involving about 180 Battalion level units across the Army.* This effort involves daily contact by the DA Civilian workforce with those field units, both electronically, and via on-site inspection and maintenance teams. The C4ISR systems Reset range from radios to satellite terminals, airborne sensors/countermeasure sets to Command and Control Vehicles, Radars to Generator Sets.
- **Electronic Sustainment Support Centers**. The Team C4ISR has deployed these centers with DA Civilian Managers to provide forward, in-theater maintenance in direct support of deployed forces. *There are currently 9 different sites in the theater, and they have handled nearly 71,000 repair work orders.* Equipment

supported includes not only Army and other Service Standard systems, but a wide variety of commercial automation, communication and electromechanical equipment brought to the OEF/OIF theater by deploying forces. In addition, they have forward stocked certain critical system's spare parts in theater, both Army and DLA, in order to be more responsive to unit demands for parts.

- **Logistics Assistance Support.** There have been over 400 Logistics Assistance Representative (LAR) deployment events involving over 200 DA Civilian LARs, with an average of 55 in the OEF/OIF theater at any time, providing direct hardware technical assistance on-site with units. Some LARs have deployed up to 5 times to the OEF/OIF theater. In addition, there have been 161 Field Software Engineer (FSE) deployments, with an average of 45 in the OEF/OIF theater at any time, providing direct software support on-site with units.
- **Aircraft Countermeasure Filters.** The AN/ALQ-144 Countermeasures Set protects Blackhawk, Apache and Kiowa Helicopters from hostile Infrared (IR) homing missiles by jamming the threat IR Missile System. Deployment of the helicopters to the severe desert environment resulted in dust and sand getting into the mechanical/optical sections of the transmitter and causing greatly premature failures of the system, grounding the helicopters until the system could be repaired. Team C4ISR rapidly developed, tested, and fielded over 2600 Air Filter Kits, greatly improving nearly 75 times the reliability of the AN/ALQ-144, and reducing the maintenance burden and downtime for the aircraft.

Information Assurance: Team C4ISR Information Assurance staff continually supports Information and Communications Security systems and operations. Their continuous attention has revealed some security vulnerabilities and they have applied corrective actions directly to field operations in Iraq and Afghanistan that resulted in preventing security compromises and loss of mission and life. Evaluation of IA Security Tools/Security Hardware used by Tactical Army - Problems encountered over a one year period average at approximately 75 problems/solutions resolved, as appropriate with vendor or NSA. Examples are In-Line Encryptors TACLANE, KG-250, GOTS Firewall Cloud shield, Secure GSM Phones, Tactical PKI, Secure PDA, Secure Wireless LAN, Secure Universal Purge Tool. Details are sensitive.

Software Release Summary. In support of over 200 operationally deployed C4ISR systems, we provide new software versions (i.e. capabilities) critical to the Warfighter as these releases provide necessary enhancements, improvements and corrections required for these systems. Over the last twelve months the Team C4ISR Software engineering deployed 49 software releases, eleven (11) of which were emergency releases, in support of Operation Iraqi Freedom/Operation Enduring Freedom. More than 1,200 Warfighter requirements were fulfilled with the releases of these versions. These software upgrades included critical enhancements and fixes in areas such as: force protection; navigational accuracy of aircraft; intelligence analysis capabilities to be used to combat terrorism; early strike warning capabilities for friendly troops under indirect fire and; faster and more secure satellite communications.

DCN:11619

Differences Between COBRA Database and CERDEC NVESD Facility Replacement Cost Estimates

SUMMARY: The COBRA cost estimate for the ARMY CERDEC NVESD facility replacement costs is approximately $91M. This figure significantly understates the Laboratories own estimate of approximately $197M by $96M. The major portion of this difference is based on three factors:

1. The growth of facilities from FY 2003 baseline used in the COBRA data base,
2. Night Vision facilities that were not included at all in the data base and
3. Differences in general administrative estimates.

The COBRA realignment summary report (COBRA V6.0), "Option package name: Close Monmouth C4ISR (less Adelphi) at APG" dated 05/04/2005 includes total facility replacement costs of $91,244,135 for CERDEC NVESD and 219,584 square feet of facility space. The CERDEC NVESD facility replacement cost in the COBRA data base is derived by adding the Fort Belvoir laboratory facility costs ($80,000,000) found on page 67 paragraph 3 to the admin space costs ($11,244,135) included in the table on page 67 under FAC 6100 prorated for the 732 FTEs. CERDEC NVESD estimates its actual facility replacement costs to be $187,239,700 requiring 429,237 square feet of facility space. This results in a $95,995,565 cost delta and 209,653 square foot space delta between the COBRA database and the CERDEC NVESD replacement estimates. It appears that the majority of this difference comes from the fact that the DA Data Call for COBRA data limited input to only unique facilities as they existed in FY03 and also assumed that existing facilities at the new location, Aberdeen Proving Ground (APG), could be renovated. The specifics details of these differences are discussed below with the specific CERDEC NVESD estimate shown in the attached table. It is important to note that the CERDEC NVESD cost estimate does not include shipping laboratory equipment and office furniture from Fort Belvoir to APG. The Fort Belvoir Garrison BRAC Team is just now beginning to work the shipping cost estimation for moving equipment and furniture.

Also included in the CERDEC NVESD Briefing Chart "NVESD Relocation Costs" is approximately $60M for PCS moving of the current CERDEC NVESD employees which when added to the $187M of facility replacement costs yields the briefing chart total of approximately $245M to rebuild, refit an relocate NVESD. This cost will grow above the $245 M when the Fort Belvoir Garrison calculation for the shipping costs associated with the laboratory equipment and office furniture is finished and added.

Growth of Facilities Included in the COBRA Database: The request for COBRA data was limited to facilities as they existed in FY03. The COBRA database included $80,000,000 as plant replacement value for 17 facilities requiring 101,000 square feet of facility space that existed in FY 2003 that would meet the "Major & Unique RDTE&A Facilities" in accordance with the DA BRAC Data Call criteria. Those 17 facilities are identified with asterisks in the attached table. Since FY03, through growth and investment, the replacements costs have increased to $95,431,610 (an increase of 19.29%) and the facility space has increased to 120,286 square feet (an increase of 19.10%). The complete CERDEC NVESD estimated replacements costs and required facility space summarized in the attached table depicts by note 5 where the specific growth has occurred.

CERDEC NVESD Facilities Not in the COBRA Database: The attached table includes 29 facilities that were not in the COBRA database. The replacement cost for these 29 facilities is estimated at $70,808,090 requiring 158,951 square feet of facility space. There are four reasons why each of these 29 facilities was not included in the COBRA data:

1) The facility was built subsequent to FY03.
2) The facility was below the BRAC $ 3M dollar value reporting threshold.
3) Fort Belvoir would not report CERDEC NVESD facilities at nearby Fort A.P. Hill.
4) Five facilities did not meet the criteria for "Major & Unique RDTE&A Facilities."

However, they are still considered essential to the CERDEC NVESD mission and would have to be replaced if CERDEC NVESD is relocated.

The specific rationale for each laboratory/facility not being included in the COBRA data is noted on the attached table.

Differences in General Admin Estimates: The COBRA estimates the required general admin requirements to be 118,584 square feet for 732 FTEs (514 Civ/15 Mil/203 Contractor) at a cost of $11,244,135. CERDEC NVESD estimates the required general admin requirements to be 150,000 square feet for 750 FTEs (516 Civ/15 Mil/219 Contractor) at a cost of $21,000,000. The specific reasons for the differences are as follows:

1) Growth in the number of FTEs from 732 in FY03 to 750 as of May 05.
2) CERDEC NVESD used a rate of $140 per square foot new construction based on general-contractor estimates whereas the COBRA database used a rate of $94.82 based on the assumption that the general admin space would be renovated excess space at APG, not new (that assumption was dismissed by Mr. David Carter, P.E., Chief of the APG Engineering and Construction Division, during an onsite review of CERDEC NVESD facilities on 14 Jun 05 when he concluded that APG didn't have any existing buildings that could accommodate CERDEC NVESD's labs or unique facilities, that new buildings would have to be constructed for the labs and unique facilities, and that people working in the labs and unique facilities would require their general admin space to be located with the labs and unique facilities).
3) The COBRA database used a standard of 162 square feet per person. Initial APG facility guidance was to use 226 square feet per person. CERDEC NVESD used the standard of 200 square foot general admin space per person based on guidance received from CERDEC.

DCN:11619

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

Notes	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
4	ANSD	Aviation R&D Sensors Test & Evaluation Facility	29,700	$6,831,000	$0	$6,831,000
1	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
3	CMD	Airborne Minefield Detection Test Range (5.35 Acres)	360	$82,800	$527,606	$610,406
1	CMD	Countermine Systems Laboratory	5,200	$1,196,000	$40,000	$1,236,000
1	CMD	Humanitarian Demining Laboratory	10,000	$2,300,000	$79,500	$2,379,500
3	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
5	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
5	MSD	*Advanced Sensor Evaluation Facility (ASEF)	2,612	$600,760	$1,795,400	$2,396,160
2	MSD	Distributed Sensors Integration Facility (DSIF)	1,000	$230,000	$2,367,500	$2,597,500
2	MSD	Human Test and Perception Laboratory	760	$174,800	$787,000	$961,800
2	MSD	Image Evaluation Facility	2,612	$600,760	$1,723,500	$2,324,260
5	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	$0	$448,000
2	OPSD	Industrial Hygiene & Material Hazardous Waste Storage and Processing Labs	480	$110,400	$200,000	$310,400
4	OPSD	Networking Facility	11,500	$2,645,000	$5,993,097	$8,638,097
4	OPSD	Woodworking Shop	11,846	$2,724,580	$1,518,000	$4,242,580
		OPSD Subtotal	23,826	$5,479,980	$7,711,097	$13,191,077

*Facility in the COBRA Database

Notes:

1 - Facility built since FY03
2 - Facility below BRAC reporting dollar value
3 - NVESD facility located at Fort A. P. Hill
4 - Does not meet "Unique RDTE&A Facility" but is essential to mission
5 - Facility growth since FY03

DCN:11619

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

Notes	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
4	SPPD	Building 305 High Bay Integration Facility/Night Vision Device Repair Facility	8,200	$1,886,000	$1,878,000	$3,764,000
5	SPPD	*Building 331 Fabrication and Integration Facilities	56,750	$13,052,500	$10,735,000	$23,787,500
2	SPPD	Building 380 Sensitive Compartmented Information Facility (SCIF)	1,200	$276,000	$186,000	$462,000
3	SPPD	Drop Zone Observation Range (3 Acre Compound/350 Acre Range)	17,700	$4,071,000	$2,180,000	$6,251,000
4	SPPD	Indoor Firing/Photometric Range	8,000	$1,840,000	$2,260,000	$4,100,000
3	SPPD	Laser Range (258.5 Acres)	6,750	$1,552,500	$3,848,000	$5,400,500
2	SPPD	SAP Facility	3,440	$791,200	$150,000	$941,200
2	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
5	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
1	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
5	STD	*Detector Fabrication Cleanroom Facility	2,000	$460,000	$5,733,000	$6,193,000
5	STD	*Display and Image Fusion Laboratory	1,500	$345,000	$3,244,000	$3,589,000
2	STD	Electronics and Glass Laboratories	1,000	$230,000	$1,566,700	$1,796,700
5	STD	*Image Intensifier Test Facility	1,343	$308,890	$3,840,000	$4,148,890
2	STD	Imaging Technology Environmental Test Facility	500	$115,000	$340,000	$455,000
5	STD	*IR Detector Semiconductor Microfactory	3,200	$736,000	$19,624,000	$20,360,000
5	STD	*Laser Laboratories	5,239	$1,204,970	$5,160,000	$6,364,970
2	STD	Laser Test Tunnel	2,000	$460,000	$857,000	$1,317,000
5	STD	*Mine Lanes Facility	14,000	$3,220,000	$2,459,000	$5,679,000
1	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
2	STD	Optical Improvement Laboratory	2,000	$460,000	$965,000	$1,425,000
5	STD	*Optics Laboratory	2,500	$575,000	$2,663,000	$3,238,000
2	STD	Processor Development Laboratory	1,000	$230,000	$702,452	$932,452
5	STD	*Prototype IR FPA & IR Characterization Lab	2,000	$460,000	$1,055,000	$1,515,000
2	STD	Readout Integrated Circuit (ROIC) Laboratory	2,000	$460,000	$365,000	$825,000
2	STD	S&T Rooftop Testing Facility	900	$207,000	$0	$207,000
2	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	397,237	$80,744,510	$102,015,190	$182,759,700

*Facility in the COBRA Database

Notes:

1 - Facility built since FY03
2 - Facility below BRAC reporting dollar value
3 - NVESD facility located at Fort A. P. Hill
4 - Does not meet "Unique RDTE&A Facility" but is essential to mission
5 - Facility growth since FY03

TAB 4 - Capacity for Research, Development, and Acquisition, and Test and Evaluation Functions

Facility Name	Current Capacity SqFt	Current Usage SqFt	Max Potential Capacity SqFt	Capacity Available to Surge SqFt	Required to Surge SqFt	Excess Capacity SqFt
SOLDIER SYSTEMS CENTER	150,511	205,538	150,511	(55,027)	226,092	(75,581)
FORT MONMOUTH	**1,092,988**	**589,466**	**1,092,988**	**503,522**	**648,413**	**444,575**
ADELPHI LABORATORY CENTER	**343,645**	**199,721**	**343,645**	**143,924**	**219,693**	**123,952**
WALTER REED ARMY MEDICAL CENTER	**147,158**	**19,840**	**147,158**	**127,318**	**21,824**	**125,334**
ABERDEEN PROVING GROUND	**9,714,389**	**1,142,141**	**9,714,389**	**8,572,249**	**1,256,355**	**8,458,035**
FORT DETRICK	431,550	370,948	431,550	60,602	408,042	23,508
FORT BELVOIR	**589,570**	**270,043**	**589,570**	**319,527**	**297,048**	**292,523**
USA_4_Arlington	**175,669**	**21,440**	**175,669**	**154,229**	**23,584**	**152,085**
FT GORDON	197,994	53,440	197,994	144,554	58,784	139,210
USA_3_Orlando	225,871	116,928	225,871	108,943	128,621	97,250
REDSTONE ARSENAL	**1,817,021**	**1,840,958**	**1,817,021**	**(23,937)**	**2,025,054**	**(208,033)**
FORT RUCKER	167,903	69,531	167,903	98,372	76,484	91,419
DETROIT ARSENAL	425,784	476,640	425,784	(50,856)	524,304	(98,520)
FT HOOD	481,813	83,787	481,813	398,026	92,165	389,648
FORT HUACHUCA	84,321	86,994	84,321	(2,673)	95,693	(11,372)
FORT MONMOUTH San Diego	441,460	96,693	441,460	344,767	106,363	335,097

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