DCN 3571
Coalition Correspondence

AHS INTERNATIONAL
The Vertical Flight Society
217 N. Washington Street, Alexandria, Virginia 22314-2538
Phone (703) 684-6777; Fax (703) 739-9279
E-Mail: staff@vtol.org; Website: www.vtol.org

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June 30, 2005 Fax. (703) 699-2735

The Hon. Anthony J. Principi, Chairman
2005 Defense Base Closure and Realignment Commission
2521 S. Clark Street, Suite 600
Arlington, VA 699-2950

BRAC Recommendation: Relocation of Army Research Laboratory Personnel from NASA Glenn and NASA Langley Research Centers To Aberdeen Proving Ground.

Dear Mr. Chairman:

On behalf of the U.S. rotorcraft industrial base, I am writing to request that the Commission reject the Department of Defense's recommendation published on May 13, 2005 to relocate approximately 95 highly-skilled, technical Army Research Laboratory ("ARL") personnel associated with the Vehicle Technology Directorate from NASA Glenn (Ohio) and NASA Langley (VA) Research Centers to the Aberdeen Proving Ground (MD).

As you know, the BRAC Commission has the authority to change the Department's recommendations, if it determines that the Secretary deviated substantially from the force structure plan and/or final selection criteria. I believe the Department of Defense has clearly deviated from the selection criteria for the following reasons:

(a) The proposed relocation would adversely impact current and future mission capabilities and reduce operational readiness of the total force of the Department of Defense, since Aberdeen lacks the specialized test facilities and equipment needed to perform the ARL Vehicle Technology Directorate's mission (*see* Final Selection Criteria #1 and #7);

(b) It would require duplication at Aberdeen of facilities currently made available by NASA to the Army at Glenn and Langley for little or no cost (*see* Final Selection Criteria #2 and #7); and, thus,

(c) It would substantially increase the Army's total cost of operations since the actual cost of replicating these facilities will exceed $1.152 billion (*see* Final Selection Criteria #4 and #5).

In short, relocation will provide no benefit to the Army in either the short or long term and indeed operational readiness will be negatively impacted since, absent access to specialized facilities and equipment, the Directorate will be unable to fulfill its mission. Instead of generating savings, the relocation will compel the Army to spend additional badly needed funds on replicating existing facilities and equipment now available to the Army at little or no cost. In the case of the Directorate continent at NASA Langley, a better alternative (but not as good as maintaining the status quo) would be to relocate Directorate personnel to the Army Aviation Technology Directorate at nearby Ft. Eustis, Virginia, where they would still have access to the NASA Langley facilities.

Background

In 1970, the Army established Aviation Directorates at NASA Langley Research Center and NASA Glenn (formerly Lewis) Research Center to leverage NASA facilities, skills, and research programs in rotorcraft structures, aeromechanics and propulsion. Since that time, Army researchers have enjoyed access to world-class NASA facilities and more than 2000 NASA Ph.D.s with similar backgrounds, technical skills, and training. In 1992, the directorates were realigned with ARL as the Vehicle Structures and Vehicle Propulsion Directorates with a broader mission of multi-customer research for all Army vehicles, both air and ground. Subsequently, in 1996 the Vehicle Structures Directorate and Vehicle Propulsion Directorate were combined to form the Vehicle Technology Center. The Army renamed the center in 1996 to become the "Vehicle Technology Directorate."

At the Vehicle Technology Directorate, four specialized divisions report to the director, Dr. Wolf Elber. These include the "Loads and Dynamics Division" (structural dynamics; rotorcraft loads and vibration); the "Structural Mechanics Division" (structural integrity; advanced design); the "Engine Components Division" (turbo-machinery; high-temperature structures; intelligent engine technology); and the "Engine and Transmission Systems Division" (engine systems interactions; drive system design).

The Army mission at NASA Glenn and NASA Langley is twofold:

- To conduct and manage basic and applied research programs in structures, propulsion and rotorcraft aeromechanics to support science and technology advancements of Defense Department vehicle systems; and

- To develop, maintain and extend the technology base for vehicle loads, dynamics, structural mechanics, aeroacoustics, and the systems associated with turbine and reciprocating engines, components and drive systems.

The ARL Vehicle Technology Directorate has executed these missions with NASA successfully, efficiently, and at low cost, jointly since 1970.

With emphasis on the Army's propulsion science and technology community at Glenn Research Center, its mission has been to provide the technologies to enable the Army to develop fuel-efficient, light-weight propulsion systems for air and ground vehicles. Research has focused on engine components, high temperature materials, power transmission, energy storage, and advanced engine/propulsion system concepts. The Army's decision to collocate this mission with NASA 35 years ago was based on two major considerations, both of which remain valid today: (1) the research and test facilities necessary to conduct the propulsion mission were already in existence at Glenn (then Lewis) Research Center, so it was not necessary for the Army to expend more than $1 billion developing a new aviation laboratory; and (2) the world class NASA scientific and engineering expertise already in place at Glenn would enable the Army to conduct the mission with a relatively small complement of people through leverage and collaboration in areas of mutual Army/NASA interest. In effect, the mission performed by 50 Army positions at Glenn is actually executed by up to 200 people.

For this reason, even if all of the propulsion test facilities needed for this mission were replicated at Aberdeen (at a cost of more than $1 billion), the 50 Army Research Laboratory researchers now at NASA Glenn would be grossly insufficient to conduct a propulsion mission approaching the scope of the one in place now at Glenn. The competency set available at Aberdeen does not include the core competencies resident in the Army and NASA personnel in place at Glenn. These competencies include (1) Computational Fluid Mechanics, the technical foundation of our engine component and combustion science research; (2) Computational Structural Mechanics, mainly focused on very high temperature material phenomena almost uniquely relevant to propulsion; (3) Mechanical Components and Lubrication, essential for gear, bearing and power transmission research; (4) Instrumentation and Controls, the basis for newly emerging "intelligent propulsion" concepts and for diagnostic/prognostic research; and (5) Advanced Propulsion Concepts, e.g., the competency to conceive and analyze advanced engine cycles, propulsion systems and

power transmission concepts, including electric and hybrid. To adequately address these five broad, essential competency areas and conduct the Army's propulsion mission would require at least a complement of 200 people – not the 50 that the Army requires to do the mission at NASA Glenn.

Access to NASA Facilities

To perform its mission, the ARL Vehicle Technology Directorate researchers require access to specialized facilities and equipment located only at NASA Langley and NASA Glenn.

At Langley, NASA maintains and operates eight facilities important to the Army mission. These include the following:

- Impact Dynamics Research Facility
- Acoustic Research Lab
- Structures & Materials Labs (Fatigue & Fracture Lab)
- Structural Dynamics Research Lab
- NDE Research Labs
- 14 X 22 Foot Subsonic Tunnel (14 X 22 Hover Cell)
- Army Office
- Transonic Dynamics Tunnel (TDT), including the Tiltrotor Hover Cell and the Helicopter Hover Cell.

All facilities are provided by NASA free of charge, with the exception of the 14 X 22 Foot Subsonic Tunnel and the Transonic Dynamics Tunnel.

At Glenn, NASA maintains and operates six facilities important to the Army mission. These include the following:

- Mechanical Components Research Facilities
- Engine Components Research Facilities
- Structures and Materials Labs
- Small Engine Research Facility
- Icing Research Tunnel
- Army Office.

All facilities located at NASA Glenn are provided by NASA free of charge - without exception.

As noted earlier, the costs of replicating the facilities used by the Army at NASA Langley and NASA Glenn will exceed $1.152 billion. *See* attachment #1.

In addition, the Army has free access to specialized equipment located at both facilities, including numerous test rigs, high performance computing equipment, the wing and rotor aeroelastic testing system (WRATS), the nondestructive evaluation testing complex and the aeroelastic rotor experimental system (ARES). The replacement costs for this equipment will exceed $104.2 million. *See* attachment #2.

Finally, the Army benefits by access to NASA research personnel. Collocation of Army and NASA researchers generates strong synergies benefiting the Army. As previously noted, NASA Glenn has core competencies in propulsion and drive trains. NASA Langley, by comparison, hosts core competencies in materials, structures, aerodynamics (CFD), acoustics, flight controls and aeronautics. Relocation of the Army research communities at Langley and Glenn to the Aberdeen Proving Ground would terminate the Army's longtime partnership with NASA, including access to those specialized science and technology communities which directly and indirectly support Army missions at no additional cost. Since the receiving community at Aberdeen Proving Ground lacks the necessary infrastructure to support the Vehicle Technology Directorate's forces, mission and personnel, the BRAC recommendation to relocate the directorate to Aberdeen should be rejected.

Conclusion

Looming on the near horizon is an evolving requirement for Joint Heavy Lift – a vertical-take-off-and-landing air vehicle capable of transporting a payload of 24 tons more than 500 kilometers. Joint Heavy Lift will facilitate the Army's transformation to become a more agile, mobile, lethal fighting force. Joint Heavy Lift will also serve as the air connector for "sea-basing." It will be capable of deploying the Army's Future Combat System (FCS) to tactical locations on the battleground quickly and efficiently when needed. The current technical capability of the national rotorcraft industrial base, under hot-high conditions, is less than 50% of this requirement. ARL Vehicle Technology Directorate scientists and researchers located at NASA Glenn and NASA Langley will play an essential role in developing this new and ~~Hon~~.

revolutionary capability. But, if relocated to Aberdeen, they will be unable to The perform this vital mission in a timely manner at a reasonable cost. In reality, many of these highly skilled scientists and researchers will choose not to relocate, thus leaving the Army without the skill-base needed to accomplish the directorate's mission.

In summary, as pointed out to BRAC commissioner General Lloyd D. "Fig" Newton (USAF, Ret.) during a recent visit to NASA Glenn, relocation to government facilities at Aberdeen Proving Ground or commercial facilities will result in greater costs for the Army and a negative impact on the directorate's operational readiness to support current and future mission capabilities and the total force of the Department of Defense. Joint Heavy Lift will be delayed, and certainly the science and technology costs to develop JHL capabilities will be far greater than currently anticipated.

For these reasons, AHS International – the world's leading professional technical society for the advancement of vertical flight technology – does not consider it to be in the Army's nor in the country's best interest to implement the recommended BRAC realignment calling for transfer of the Army's Vehicle Technology Directorate mission from NASA Glenn and Langley Research Centers to Aberdeen.

Very truly yours,

M.E. Rhett Flater

M.E. Rhett Flater
AHS Executive Director

Cc: Senator John W. Warner
Senator George Allen
Senator Mike DeWine
Senator George V. Voinovich
Rep. Dennis J. Kucinich
Rep. Marcy Kaptur
Rep. Jo Ann S. Davis

In short, relocation will provide no benefit to the Army in either the short or long term and indeed operational readiness will be negatively impacted since, absent access to specialized facilities and equipment, the Directorate will be unable to fulfill its mission. Instead of generating savings, the relocation will compel the Army to spend additional badly needed funds on replicating existing facilities and equipment now available to the Army at little or no cost. In the case of the Directorate continent at NASA Langley, a better alternative (but not as good as maintaining the status quo) would be to relocate Directorate personnel to the Army Aviation Technology Directorate at nearby Ft. Eustis, Virginia, where they would still have access to the NASA Langley facilities.

Background

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Facility Replacement Costs
Army Access

Center	Facility Name	Replacement Cost ($M)	Usage Charge
GRC	Propulsion Materials Research Facility	$75M	No
GRC	Engine Research Building	$250M	No
GRC	Propulsion Systems Laboratory	$150M	No
GRC	Icing Research Tunnel	$150M	No
GRC	Engine Components Research Laboratory (ECRL-26)	$25M	No
LaRC	Transonic Dynamics Tunnel	$138M	Yes
LaRC	Structures & Materials Research Laboratory	$29M	No
LaRC	Materials Research & Light Alloy Laboratory	$16M	No
LaRC	Nondestructive Evaluation Laboratory	$3M	No
LaRC	Technology Applications & Structures Complex	$16M	No
LaRC	14' x 22' Tunnel	$300M	Yes
Total		$1,152M	

ATTACHMENT #1

Equipment Replacement Costs
Army Access

Center	Equipment Name	Replacement Cost ($M)	Usage Charge
GRC	Mechanical Components, Gears and Drivetrain Test Rigs	$15M	No
GRC	Magnetic Bearing Test Rigs	$5M	No
GRC	Structural Mechanics Test Rigs	$10M	No
GRC	Turbomachinery Test Rigs	$25M	No
GRC	Turbine Engine Seals Test Rigs	$5M	No
GRC	Barrier Coating Test Rigs	$5M	No
GRC	Oil-Free Foil Air Bearing Test Rigs	$7M	No
GRC	Aero High Performance Computing Equipment	$1.2M	No
LaRC	Wing & Rotor Aeroelastic Testing System (WRATS)	$5M	No
LaRC	Fatigue & Fracture Testing Complex	$18M	No
LaRC	Nondestructive Evaluation Testing Complex	$4M	No
LaRC	Aeroelastic Rotor Experimental System (ARES)	$4M	No
Total		$104.2M	

ATTACHMENT # 2

ATTACHMENT #3

Final Selection Criteria
Department of Defense Base Closure and Realignment

In selecting military installations for closure or realignment, the Department of Defense, giving priority consideration tot military value (the first four criteria below), will consider:

Military Value

1. The current and future mission capabilities and the impact on operational readiness of the total force of the Department of Defense, including the impact on joint warfighting, training, and readiness.

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

3. The ability to accommodate contingency, mobilization, surge, and future total force requirements at both existing and potential receiving locations to support operations and training.

4. The cost of operations and the manpower implications.

Other Considerations

5. The extent and timing of potential costs and savings, including the number of years, beginning with the date of completion of the closure or realignment, for the savings to exceed the costs.

6. The economic impact on existing communities in the vicinity of military installations.

7. The ability of the infrastructure of both the existing and potential receiving communities to support forces, missions, and personnel.

8. The environmental impact, including the impact of costs related to potential environmental restoration, waste management, and environmental compliance activities.