

DEPARTMENT OF DEFENSE  
DEPARTMENT OF THE NAVY

FINDING OF NO SIGNIFICANT IMPACT (FONSI) FOR ELECTROMAGNETIC  
RAILGUN RESEARCH, DEVELOPMENT, TEST & EVALUATION (RDT&E)  
FACILITY CONSTRUCTION AND OPERATION ENVIRONMENTAL ASSESSMENT AT  
NAVAL SUPPORT FACILITY DAHLGREN, VIRGINIA

Pursuant to the Council on Environmental Quality regulations (40 Code of Federal Regulations (CFR) Parts 1500-1508) implementing the National Environmental Policy Act (NEPA), and Chief of Naval Operations Instruction 5090.1C, the Department of the Navy (Navy) gives notice that an Environmental Assessment (EA) has been prepared and an Environmental Impact Statement (EIS) is not required for the construction and operation of the Electromagnetic Railgun RDT&E Facility (MILCON P-306) at Naval Support Facility Dahlgren, in King George County, Virginia.

**Proposed Action:** The Navy proposes to construct and operate a facility for RDT&E of an electromagnetic (EM) railgun system capable of 64-megajoules (MJ) muzzle energy. The railgun system is comprised of a launcher, pulse forming network (PFN) modules (power supply) and a projectile recovery area. Implementation of the proposed action would facilitate the Navy's need to develop a full-scale, multiple shot EM railgun system capable of being used on Navy ships for indirect naval gunfire support. The proposed MILCON P-306 project would include the following structures:

- **Launch Building** - A 10,080 ft<sup>2</sup> (936 m<sup>2</sup>) high-bay addition to the southwest side of the existing Electromagnetic Launcher Facility (EMLF), Building 1410, that would house launchers being developed and tested, and PFN modules (large capacitor banks) needed to supply the launchers with sufficient pulsed power. This addition will make use of the existing Building 1410 overhead crane and other existing infrastructure and will add another 126 ft (38 m) of width to Building 1410.
- **Control and Instrumentation Building** - A 5,040 ft<sup>2</sup> (468 m<sup>2</sup>) stand-alone building that would provide a site operations area, a staging area, a test observation area, test and analysis laboratories, secure office spaces, instrumentation housing, and restrooms. The control building would be located 80 ft from the launch building.

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- **Projectile Range/Trajectory Control Structure** - A 656 ft (200 m) above-grade outdoor construct of open spaces interspersed with trajectory control devices made of thick 12 inch concrete between one inch thick steel plates. This construct allows the safe travel of the projectile from the railgun to the tactical catch chamber. Holes in the plates of the trajectory control devices will permit the travel of the projectile along a very controlled and narrow flight path (0.2 degree cone of travel from the muzzle to the targeted point of impact). Any deviation of flight would cause immediate deflection of the projectile downward into the ground by these heavily reinforced structures.
- **Slug Catch Chamber** - Early testing of the 64-megajoule launcher will use a slug rather than the aerodynamic projectile discussed above. The slugs will be captured near the midpoint of the Trajectory Control Structure in cubical containers of sand surrounded by an open-ended reinforced concrete structure 32 ft long by 16 ft wide by 10 ft high (9.8 m x 4.9 m x 3.0 m). The sand containers will be removed for the testing of aerodynamic projectiles that will be caught in the Tactical Catch Chamber. The concrete structure will remain to strip the sabot from the projectile as the projectile speeds through on its way to the Tactical Catch Chamber.
- **Tactical Catch Chamber** - A 200 ft (61 m) by 60 ft (18 m) concrete and steel structure with gravel in-fill and another 20 ft (6.1 m) of controlled fill surrounding the structure. Constructed above grade, the chamber would be reusable, and would safely terminate projectile flights. Lethality assessments would also occur within the tactical catch chamber.

**Existing Conditions:** NSF Dahlgren occupies 4,320 acres on the western bank of the Potomac River in King George County, Virginia. The property consists of two parcels of largely pervious, wooded and urban vegetated land (Mainside and Explosive Experimental Area) that are separated by Upper Machodoc Creek. The EMLF is located on Missile Test Range on Mainside. The existing EMLF building has only 8800 ft<sup>2</sup>, which is not enough space to accommodate a larger launcher and associated PFN modules. It also does not have the capability to capture and recover projectiles.

**Purpose and Need:** The purpose of the proposed action is to meet the Navy's requirement to develop a full-scale, multiple shot

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railgun system capable of generating 64-MJ muzzle energy. The Navy's need for this new weapon results from: the Navy's decision to make future surface combatant ships all electric; a requirement for long range, hypersonic (can travel at more than five times the speed of sound in air) weapons for attacking time critical targets; a requirement for efficient weapons that can match many of the attributes of the powerful, precise Tomahawk missile but at much less cost; and a requirement to improve shipboard logistics and safety, facilitating the design of future ships.

**Alternatives Analyzed:** The EA only analyzes the Proposed Action (Preferred Alternative) and the No Action Alternative. The Navy considered alternative locations, including Kirkland, Scotland; the University of Texas; and Aberdeen Proving Ground, Maryland to construct, develop, and test a full scale EM railgun system; however, facilities at these locations do not have sufficient real estate and/or infrastructure capacity to upgrade to 64-MJ EM railgun system.

In addition, Dahlgren has continually conducted pulsed-power research and has existing EM testing capabilities, this being one of Dahlgren's core capabilities. The proposed full-scale EM railgun system could be integrated into Dahlgren's existing research. The ONR and the Navy already relies on the knowledge of Dahlgren's resident scientists and technicians, who are among the nation's foremost experts in combat and weapons systems, and would continue to rely on them for RDT&E of a 64-MJ EM railgun system. Operational personnel would be existing personnel at Dahlgren. Therefore, these alternative locations were eliminated from further consideration in this EA.

The Navy considered other locations within Dahlgren to construct the railgun facilities. Sites within the Explosives Experimental Area and Mainside were evaluated, but none (except for the selected site) met the siting criteria, which included:

- Enough land area to accommodate, up to 4,900 ft (1500 m), a projectile terminal range, catch chamber and associated projectile safety hazard zone.
- Enough land area outside any explosive safety arcs such that some proposed railgun operations could occur concurrently with other Dahlgren activities.
- Operations on an existing range.

The proposed location is the only site that meets the above criteria and features enough available land to support all

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structures of the proposed facility and associated projectile safety hazard zone.

Modifying the existing EMLF rather than building an addition was also evaluated. While this has the potential to minimize construction costs, it would stop all testing with the existing EMLF (since construction personnel are not allowed inside during testing), causing an unacceptable delay in the overall EM railgun program. In addition, this would involve substantial impacts to wetlands during the construction of the projectile terminal range and catch chamber. (These impacts are not present in the preferred alternative to build an addition to the southwest side of the existing EMLF.) For these reasons, this alternative was eliminated from further consideration in this EA.

Under a No Action Alternative, existing facilities would not permit the Navy to develop a full-scale EM railgun system to 64-MJ. Thus, under the No Action Alternative, the Office of Naval Research (ONR) and the Navy would be unable to achieve its mission of developing the demonstration for a full-scale EM railgun system.

**Environmental Effects:** The Proposed Action would have a negligible impact on the coastal zone, cultural resources, noise levels, and Health and Safety. The methodical and deliberate scaling-up process over several years, leading to and including a full scale demonstration would allow the Navy to develop measures to ensure that impacts remain negligible.

No significant impacts would be expected to the natural and human environment. Minor impacts expected would include soil disturbance, a potential for increased stormwater runoff, increased noise during construction and operation, and utility relocations and extensions. Implementation of Standard Operating Procedures would ensure that impacts to human health and safety would be negligible. Best management practices would be employed to reduce any potential adverse impacts. No formal mitigation measures are necessary. The cumulative effects to NSF Dahlgren or the surrounding communities of the preferred alternative are not be expected to be significant.

**Finding:** Based on the analysis presented in the EA and coordination with the Commonwealth of Virginia Departments of Historic Resources, Conservation and Recreation and Game and Inland Fisheries, and the United States Fish and Wildlife Service, the Navy finds that implementation of the proposed

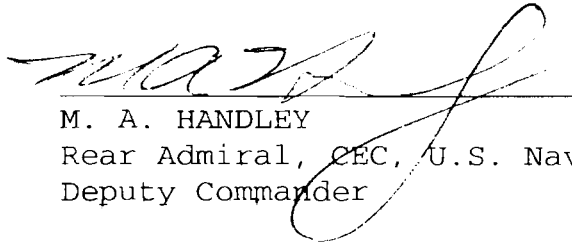
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action would not significantly impact the quality of the human  
or natural environment or generate significant controversy.

The EA prepared by the Navy addressing this action is on file  
and interested parties may obtain a copy from: Public Affairs  
Officer (Attn: Mr. Gary Wagner), 6509 Sampson Road, Naval  
Support Activity South Potomac, Naval Support Facility Dahlgren,  
Dahlgren, Virginia 22448-5106.

07 April 2007

Date



M. A. HANDLEY  
Rear Admiral, CEC, U.S. Navy  
Deputy Commander