

**DEPARTMENT OF DEFENSE  
DEPARTMENT OF THE NAVY**

**FINDING OF NO SIGNIFICANT IMPACT FOR UNITED STATES NAVY TESTING  
OF HYPERVELOCITY PROJECTILES AND AN ELECTROMAGNETIC RAILGUN AT  
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S WOLLOPS  
FLIGHT FACILITY, ACCOMACK COUNTY, VIRGINIA.**

**INTRODUCTION**

Pursuant to the Council on Environmental Quality regulations (Title 40 Code of Federal Regulations [C.F.R.] §§ 1500-1508) implementing the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C.] §§ 4321-4370h), Navy Regulations (32 C.F.R. § 775), and OPNAV M-5090.1, Environmental Readiness Program Manual of 10 January 2014, the Department of the Navy (Navy), with the National Aeronautics and Space Administration (NASA) as a cooperating agency, gives notice that an Environmental Assessment (EA) has been prepared and a Finding of No Significant Impact (FONSI) has been issued. The EA evaluates the potential environmental consequences of the Navy's Proposed Action to install a 5" powder gun and an electromagnetic (EM) railgun, test hypervelocity projectiles (HVPs), integrate HVPs with the EM railgun, and integrate the HVP/EM railgun weapon system with United States (U.S.) Navy combat systems on NASA's Wallops Flight Facility (WFF) on Wallops Island, Virginia.

**PURPOSE AND NEED**

The purpose of the Proposed Action is to advance HVP and EM railgun technology from research, development, test, and evaluation to an acquisition program designed to meet warfighting needs. The need for the Proposed Action is to enable the Navy to meet current and future mission-related warfare requirements of providing gunfire support for anti-air warfare, anti-surface missions, and naval surface fire support missions. The proposed HVP/EM railgun weapon system will extend naval surface fire support missions, such as amphibious landings and shore bombardments from the current 13-nautical mile range of the 5"/54 gun found on U.S. Navy ships today to 50 to 100 nautical miles. It will also meet the Innovative Naval Prototype Phase II Program objective to advance EM railgun system technology for transition to an acquisition program.

**FINDING OF NO SIGNIFICANT IMPACT FOR UNITED STATES NAVY TESTING OF HYPERVELOCITY PROJECTILES AND AN ELECTROMAGNETIC RAILGUN AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S WOLLOPS FLIGHT FACILITY, ACCOMACK COUNTY, VIRGINIA**

**DESCRIPTION OF THE PROPOSED ACTION**

The Proposed Action is to install a 5" powder gun and an EM railgun, test hypervelocity projectiles, integrate HVPs with the EM railgun, and integrate the HVP/EM railgun weapon system with combat systems equipment currently in use on U.S. Navy warships. The guns will fire into the Virginia Capes Range Complex in the Atlantic Ocean, which is used by the Navy for training and testing activities.

Two Navy guns will be installed near each other at the Naval Sea Systems Command's (NAVSEA's) Surface Combat Systems Center (SCSC) on WFF's Wallops Island: a 5" powder gun and an EM railgun currently under development. Supporting facilities, including a pulsed power system for the EM railgun, personnel command shelters, and a radar facility, will also be installed. Three types of projectiles will be tested: inert, which contain no explosives, will be used to test guidance and control; high-explosive variant, which contain  $\leq 2$  pounds of explosives and are intended to burst and fragment just prior to striking the target, will be used against water surface targets; and kinetic energy dispensing variant, which contain  $\leq 0.2$  pound of explosives to burst the casing of the projectile and dispense tungsten pellets, will be used against air targets. Underwater explosions are not planned and will only occur in abnormal or test failure conditions.

**ALTERNATIVES**

To transition the HVP program from a research, development, test, and evaluation program to an acquisition program, additional testing and systems integration of the HVP must be accomplished. Such testing must take place at sites compatible with testing both the future Navy railgun and current Navy Fleet gun systems. Equally important, the test site must have the ability to integrate the gun systems with existing Navy ship combat systems.

Based on the HVP program test objectives, a land-based test location where the following four criteria are met is required: situated adjacent to a Department of Defense-controlled sea range capable of supporting projectile flight distances of at least 100 nautical miles; supports projectile firings from fleet-relevant gun systems, including 5" guns and EM railguns; incorporates a fire control radar capable of SPY-1 systems operations, enabling the immediate acquisition (tracking) of the

**FINDING OF NO SIGNIFICANT IMPACT FOR UNITED STATES NAVY TESTING OF HYPERVELOCITY PROJECTILES AND AN ELECTROMAGNETIC RAILGUN AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S WALLOPS FLIGHT FACILITY, ACCOMACK COUNTY, VIRGINIA**

projectile upon leaving the gun barrel and capable of integrating alternative fire control sensor systems for projectile acquisition and tracking purposes; and accommodates current fleet-relevant combat systems interfaces with existing MK 160 Gun Fire Control Systems. The only installation that met all of the criteria listed above was NASA's WFF at Wallops Island, Virginia.

**Alternatives Analyzed.** The EA analyzed a Preferred Alternative site at Pad 5 and two site alternatives at Pad 4 and the Elevated Road on WFF's Wallops Island amidst NAVSEA's SCSC, as well as a No Action Alternative.

**Alternative to be Implemented.** Acquisition (tracking) of the projectile would be slowest at Pad 4. Gun tests at the Elevated Road site would cause traffic delays during test events. Pad 5 allows for quick acquisition of the projectile and has no traffic problems associated with it. Therefore, Pad 5 is selected for implementation of the Proposed Action since it is the alternative that best meets the purpose and need of the Proposed Action. Implementation of the Proposed Action would have no significant impacts to the human or natural environment.

**ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION**

Direct, indirect, and cumulative environmental impacts occurring with implementation of the Proposed Action at any of the sites under Navy analysis will result in no significant impacts to the human environment. Therefore, the preparation of an Environmental Impact Statement (EIS) is not required.

**Land use, plans and coastal zone management.** The Proposed Action will not result in significant impacts to land use plans, or coastal zone management at WFF Wallops Island or in Accomack County. The Proposed Action will be implemented in an area designated as an Operations Range on the Existing and Future Land Use Maps in the NASA Goddard Space Flight Center Master Plan. The operations will be similar to and will not conflict with other operations occurring at NAVSEA's SCSC, and they will be consistent with the intent of the Operations Range designation. The site alternatives will not encroach upon, conflict with, or require the re-designation of land uses outside the boundaries of WFF, nor will their implementation prevent the fulfillment of the goals and objectives of the 2008 Accomack County Comprehensive Plan.

**FINDING OF NO SIGNIFICANT IMPACT FOR UNITED STATES NAVY TESTING OF HYPERVELOCITY PROJECTILES AND AN ELECTROMAGNETIC RAILGUN AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S WOLLOPS FLIGHT FACILITY, ACCOMACK COUNTY, VIRGINIA**

The Navy's Federal Coastal Consistency Determination concluded that the Proposed Action will have less than significant effects on land and water uses and natural resources of the Commonwealth of Virginia's coastal zone and is consistent to the maximum extent practicable with the enforceable policies of the Virginia Coastal Zone Management Program. The Virginia Department of Environmental Quality concurred with this assessment provided that all applicable permits and approvals are obtained as described in their response. The Navy will obtain all applicable permits and approvals. Therefore, impacts on coastal zone resources and uses will be less than significant and consistent with the Virginia Coastal Zone Management Program's enforceable policies.

**Range operations.** The site alternatives will not result in significant impacts to general and civil aviation or to commercial and recreational vessel operations. The increased use of NASA-controlled restricted area R-6604A will have negligible effects on non-military airspace users because gun firing typically will occur within blocks of time otherwise scheduled by WFF. The effects of increased activation of the Atlantic Ocean Danger Zone around Wallops Island and Chincoteague Inlet will be minimized by the following actions: NASA will work with the public to avoid major boating corridors and fishing areas, information on the time and duration of each test will be made available in advance, gun firing will be intermittent and will include long periods during which vessels may be allowed to pass under controlled conditions through the hazard area, and activation of only parts of the danger zones will allow vessels to move freely in the unrestricted part.

**Noise.** With protective measures in place to mitigate noise impacts to personnel working nearby, the Proposed Action will not result in significant impacts. The noise levels generated by the powder gun and railgun are within the noise envelope covered in previous NASA NEPA documentation. Standard operating procedures and protective measures will be followed during firing of the powder gun and EM railgun to ensure that no Navy or WFF personnel within the project area are outside of building structures without hearing protection during the proposed gun tests.

**FINDING OF NO SIGNIFICANT IMPACT FOR UNITED STATES NAVY TESTING OF HYPERVELOCITY PROJECTILES AND AN ELECTROMAGNETIC RAILGUN AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S WOLLOPS FLIGHT FACILITY, ACCOMACK COUNTY, VIRGINIA**

The Proposed Action will not result in significant vibration impacts to nearby buildings. Although these buildings may be subject to airborne vibration during the firing event, the levels will be well below the potential structural damage threshold of 175 peak decibels.

**Air quality.** Wallops Island is located in a region in air quality attainment and therefore the Clean Air Act General Conformity Rule (40 C.F.R. §§ 51 and 93) does not apply. None of the site alternatives will result in significant impacts to air quality. The emissions generated from construction activities, including emissions from construction equipment and from fugitive dust, will not be significant. Although the firing of the powder gun will use small quantities of propellant, the propellant will be almost completely expended - more than 99.99 percent - during firing and will not add measurably to current emissions. Firing of railgun projectiles generates small quantities of aluminum oxide in the immediate vicinity of firing; however, the quantity and form of aluminum oxide that will be emitted is not considered toxic and will not require any additional safety measures. Greenhouse gas emissions from construction and operations will be minimal and will not add substantially to WFF's greenhouse gas emissions, which are well below the reporting threshold.

**Socioeconomics.** The Proposed Action will not result in significant impacts to population, employment and income, housing, maritime transport and recreational boating, commercial and recreational fishing, environmental justice, or children. Although construction activities may increase employment opportunities for the construction workforce and increase revenues for local businesses and government generated from construction activities and workers, any increase will be temporary, lasting only as long as the construction. A test using the powder gun will require a minimum of 8 to 11 personnel and a test using the railgun will require a minimum of 12 to 15 personnel. The HVP/EM railgun program personnel will be at WFF for about five days per test event. While at WFF, personnel will stay in Navy lodging at the facility or in motels in the Town of Chincoteague where they may purchase food, supplies, and lodging.

To support HVP testing, WFF will close all or part of the danger zone for approximately 80 hours annually in the first and second

**FINDING OF NO SIGNIFICANT IMPACT FOR UNITED STATES NAVY TESTING OF HYPERVELOCITY PROJECTILES AND AN ELECTROMAGNETIC RAILGUN AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S WALLOPS FLIGHT FACILITY, ACCOMACK COUNTY, VIRGINIA**

years of operation, approximately 120 hours annually in the third and fourth years, and approximately 190 hours in the fifth year. The effects of increased activation of the danger zone will be minimized by the measures described in the above Range Operations paragraph.

Implementation of the site alternatives will comply fully with Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. The alternatives will have no disproportionately high and adverse human health or environmental effects on minority populations and low-income populations, and will not pose disproportionate environmental health or safety risks to children.

**Cultural resources.** The Proposed Action will have no effect on cultural resources. A National Register-eligible Coast Guard Station and associated tower located approximately 2.0 miles from the site alternatives is far enough from the guns that neither airborne nor ground-borne vibration from gun firing will affect the property. Because the site alternatives are located in an area of Wallops Island with low potential to have unknown prehistoric and historic archaeological sites, it is unlikely that unknown archaeological resources will be found. The Virginia State Historic Preservation Office concurred that no further historic property identification efforts are warranted and that no historic property will be affected by the project. Should unidentified historic properties be discovered during implementation of the project, work will stop immediately and the NASA Facility Preservation Officer will be notified. The NASA Facility Preservation Officer will then notify the Virginia State Historic Preservation Officer.

**Health and safety.** Based on the standard operating procedures that will be followed to ensure safe operation of the powder gun, EM railgun, and associated HVPs, the site alternatives will not result in significant impacts to human health and safety or to hazardous wastes or materials. Activities will be conducted in accordance with federal and state regulations, stringent Department of Defense and NASA policies, and carefully-conceived management controls and standard operating procedures.

**FINDING OF NO SIGNIFICANT IMPACT FOR UNITED STATES NAVY TESTING OF HYPERVELOCITY PROJECTILES AND AN ELECTROMAGNETIC RAILGUN AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S WALLOPS FLIGHT FACILITY, ACCOMACK COUNTY, VIRGINIA**

**Geomorphology, soils, sediments, and water resources.** The site alternatives will not result in significant impacts to geology, topography, soils, floodplains, bathymetry, sediments, surface or subsurface waters, or marine waters. The construction contractor will be required to prepare a sediment and erosion control plan, and, if the project disturbs one acre or more of land, the contractor will also obtain a General Permit for Discharges of Stormwater from Construction Activities and prepare a stormwater pollution prevention plan. Adherence to the requirements of the erosion and sediment control plan, the General Permit, and the stormwater pollution prevention plan will minimize construction-related impacts on soils. Construction will result in negligible new impervious surface; and operations will not generate any runoff that will impact surface water, marine waters, stormwater, or groundwater. With an average number of 250 projectiles fired a year over a large firing range, expended materials will not cause excessive sediment disturbance nor create excessive turbidity.

There is no practicable alternative to building and operating the project in the 100-year floodplain because the facilities must be located near the SPY-1 radar within the SCSC on Wallops Island, which is within the 100-year floodplain. Accordingly, the Navy and NASA will ensure that the project complies with EO 11988, Floodplain Management, and NASA will comply with 14 C.F.R. Subpart 1216.2 (NASA Regulations on Floodplain and Wetland Management) to the maximum extent possible. Functionality of the floodplain will not be measurably affected by the Proposed Action because most structures will be on pilings.

**Terrestrial biological resources.** The site alternatives will not result in significant impacts to vegetation, invertebrate, amphibian, reptile, bird, or mammal species. The sites are mainly concrete and disturbed soils, with limited vegetation, and do not contain habitat to attract animals. Disturbances during site construction will result in negligible impacts on biological resources. No wetlands will be disturbed. There will be no exposure of vegetation or wildlife to elevated electromagnetic fields, and the likelihood of a bird's flying in front of the railgun and being hit by a projectile at the precise moment of firing is negligible. Animals in the line of fire may be temporarily disturbed by firing, but resident wildlife is frequently exposed to loud noise associated with

**FINDING OF NO SIGNIFICANT IMPACT FOR UNITED STATES NAVY TESTING OF HYPERVELOCITY PROJECTILES AND AN ELECTROMAGNETIC RAILGUN AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S WALLOPS FLIGHT FACILITY, ACCOMACK COUNTY, VIRGINIA**

current activities, some at much higher levels (e.g., rocket launches). Noise effects will be temporary, and only a limited number of projectiles will be fired each test day.

**Aquatic biological resources.** The site alternatives will not result in significant impacts to aquatic biological resources. Although expended military materials could strike fish or other aquatic life, most fish and aquatic life will have ample time to detect and avoid expended material falling through the water column. Expended materials hitting the water could result in an extremely unlikely strike of an individual fish, or more likely in a short-term and local displacement of fish in the water column; however, these behavioral reactions are not expected to result in significant changes to an individual's fitness, species recruitment, or population-level impacts. The firing of a maximum average of 250 shots a year will have a negligible impact on soft and hard substrates and the biological resources associated with them. Potential water and sediment quality impacts will be insignificant.

**Protected species.** The site alternatives will not result in significant impacts to plant and animal species protected under the Endangered Species Act (ESA) or the Marine Mammal Protection Act (MMPA).

Suitable habitat exists for seabeach amaranth in a narrow strip of the beaches on WFF, but not in the project area. Seabeach amaranth has not been observed in annual surveys of Wallops Island. The Proposed Action will have no effect on seabeach amaranth.

Military expended material falling into the water will not substantially adversely affect essential fish habitat, as the resulting changes to essential fish habitat and its ecological functions will be relatively small and insignificant. The Navy has completed consultation with NMFS under the Magnuson-Stevens Fisheries Conservation and Management Act and has received concurrence with this determination.

Although the Atlantic sturgeon is found in coastal waters off WFF, the probability of potential impacts of military expended material strikes will be extremely low, short-term (seconds), and localized. Such disturbances of the water surface are not expected to yield any behavioral changes or lasting effects on

**FINDING OF NO SIGNIFICANT IMPACT FOR UNITED STATES NAVY TESTING OF HYPERVELOCITY PROJECTILES AND AN ELECTROMAGNETIC RAILGUN AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S WOLLOPS FLIGHT FACILITY, ACCOMACK COUNTY, VIRGINIA**

the survival, growth, recruitment, or reproduction at the population level. Potential water and sediment quality impacts will be insignificant. Under ESA Section 7, the Proposed Action may affect, but is not likely to adversely affect, the Atlantic sturgeon. The Navy has completed informal consultation with NMFS, under Section 7 of the ESA, and has received concurrence with this determination.

Under Section 7 of the ESA, federally listed species of sea turtles considered during the consultation process with USFWS include the loggerhead sea turtle, Kemp's ridley sea turtle, Atlantic green sea turtle, and leatherback sea turtle. Hereafter these will be referred to collectively as sea turtles. Likewise, under section 7 of the ESA, federally listed in water species of marine mammals considered during the consultation process with NMFS include the humpback whale, fin whale, and North Atlantic right whale.

For both sea turtles at sea and marine mammals disturbance or strike from military expended material as it falls through the water column is extremely unlikely. The potential impacts of any strikes will be short-term (seconds) and localized. Such disturbances of the water surface are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction at the population level. Sea turtles and marine mammals will not be indirectly impacted by metals in the water column or sediments, as, given the small number and size of expended materials, any input from decay of these materials into water and/or sediment will be insignificant. The Proposed Action may affect, but is not likely to adversely affect, ESA-listed sea turtle and marine mammals. The Navy has completed informal consultation with NMFS under ESA Section 7 and has received concurrence with these determinations.

In accordance with its obligations under the MMPA, the Navy considered the potential effects of its action on all other marine mammals, including non-ESA listed species (Section 3.12.3.5 of the EA), and determined that the Proposed Action would not result in the takes of any such species.

Construction would only occur during daylight hours and as such will have no effect on sea turtles, as nesting sea turtles and hatchlings will not be present during daylight hours. During

**FINDING OF NO SIGNIFICANT IMPACT FOR UNITED STATES NAVY TESTING OF HYPERVELOCITY PROJECTILES AND AN ELECTROMAGNETIC RAILGUN AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S WALLOPS FLIGHT FACILITY, ACCOMACK COUNTY, VIRGINIA**

operations, if sea turtles were to nest in front of the guns, firing could potentially affect nesting turtles or hatchlings; however, potential effects of testing activities on nesting sea turtles will be negligible. Through informal consultation with USFWS service under Section 7 of the ESA, the Navy has developed mitigation measures if sea turtles nest in front of the guns. These mitigation measures include avoiding firing at night during the hatching window, using turtle-friendly site lighting, and keeping the site dark when not testing at night. Based on these measures, the Proposed Action may affect, but is not likely to adversely affect sea turtles on land. The Navy has completed informal consultation with the US Fish and Wildlife Service (USFWS) under ESA Section 7 and has received concurrence with this determination.

EM fields generated by railgun firing will have no effect on piping plovers or red knots as fields will drop to background levels 120 feet from the firing point. There will be no direct strikes because the firing line is checked prior to firing and, if any birds are sighted, testing will be delayed until they are absent.

Gun firing noise may startle piping plovers or red knots nesting and foraging on the beach in front of the guns. Through informal Section 7 consultation under the ESA with USFWS, the Navy has developed mitigation measures for piping plovers and red knots. If piping plovers nest in a 1,000-foot (300-meter) band on beach in front of guns, mitigation will include avoiding firing until hatching takes place or it is determined that the nest has failed. If piping plovers or red knots forage in a 300-foot (100-meter) band on the beach in front of the guns, mitigation will include avoiding firing until they vacate the area. Based on these measures, the Proposed Action may affect, but is not likely to adversely affect piping plovers and red knots. The Navy has completed informal consultation with USFWS under Section 7 of the ESA and has received concurrence with this determination.

**Utilities.** The implementation of any of the site alternatives will not result in significant impacts to utility systems or demand. The use of a pulsed power system for the railgun will ensure that the electrical distribution system at WFF will not be adversely affected by surges or sudden increased demand resulting from the firing of the railgun. The two 3-megawatt

**FINDING OF NO SIGNIFICANT IMPACT FOR UNITED STATES NAVY TESTING OF HYPERVELOCITY PROJECTILES AND AN ELECTROMAGNETIC RAILGUN AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S WALLOPS FLIGHT FACILITY, ACCOMACK COUNTY, VIRGINIA**

generators WFF added in March 2013 will further ensure that the power supply is adequate and that the island's other activities will not suffer brownouts from the firing of the railgun.

**Cumulative impacts.** Based on a review of past, present, and reasonably foreseeable actions on Wallops Island and its surrounding area, numerous actions were considered when analyzing the potential cumulative impacts. These include the recent expansion of the WFF launch range, the ongoing shoreline restoration and infrastructure protection program, the completed Wallops Island post-Hurricane Sandy shoreline repair, the construction and operation of a new unmanned aerial systems airstrip on the north end of Wallops Island, and NASA's reasonably foreseeable institutional support projects and operational missions and activities at WFF detailed in their master plan. Based on the analysis in the EA, the Proposed Action will not have significant cumulative impacts on any resource area when considered with these other actions.

**PUBLIC OUTREACH**

A notice was published in the Eastern Shore News and the Chincoteague Beacon newspapers announcing that the EA was available for public review for 30 days. Copies of the EA were placed in the NASA WFF Visitor Center, the Chincoteague Island Library, and the Eastern Shore Public Library, and were available upon request. Notification of the availability of the EA/OEA was sent to NASA's mailing list of interested parties. The EA was available for download at:  
[http://www.navsea.navy.mil/nswc/dahlgren/RANGE/Railgun\\_Environmental\\_Assessment.pdf](http://www.navsea.navy.mil/nswc/dahlgren/RANGE/Railgun_Environmental_Assessment.pdf)

The Navy and NASA received eight comments from two individuals, one organization, and one municipality. Responses to the comments can be found in an appendix to the EA. The comments received did not result in any changes to the EA.

**FINDING**

After review of the EA, prepared in accordance with the requirements of NEPA, U.S. Navy procedures for implementing NEPA (32 C.F.R. Part 775), coordination with the Commonwealth of Virginia and the State Historic Preservation Officer, and informal consultation with USFWS and NMFS, the Navy finds that implementation of the Proposed Action (by the means identified in the Preferred Alternative) will not significantly affect the



**FINDING OF NO SIGNIFICANT IMPACT FOR UNITED STATES NAVY TESTING OF HYPERVELOCITY PROJECTILES AND AN ELECTROMAGNETIC RAILGUN AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S WALLOPS FLIGHT FACILITY, ACCOMACK COUNTY, VIRGINIA**

quality of the human environment. Therefore, the preparation of an EIS is not required.

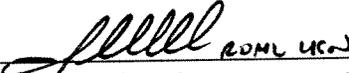
Likewise, in accordance with its NEPA policy and procedures (14 C.F.R Subpart 1216.3), NASA has reviewed the contents of the Navy's Final EA and concludes that the EA adequately describes its proposed action, the potential environmental effects of its action, and in all other respects meets its requirements for an EA. Accordingly, by way of the signature below, NASA hereby adopts the HVP-Railgun EA as its own and also finds that preparation of an EIS is not required.

A copy of the EA, including this FONSI, can be obtained from:

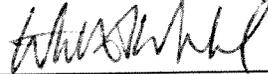
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or downloaded from the identified website.

20 JAN 2015  
Date

  
Rear Admiral Jon A. Hill  
Program Executive Officer  
Integrated Warfare Systems

24 NOVEMBER 2014  
Date

  
William A. Wrobel  
Director  
Wallops Flight Facility

