

**RANGE CONDITION ASSESSMENT FIVE YEAR REVIEW**

**FOR**

**NAVAL SURFACE WARFARE CENTER,  
DAHLGREN RANGES**

**DAHLGREN, VIRGINIA**

**JUNE 2016**



Publication ID: NSWCCD-AP-16-00034

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## LIST OF ACRONYMS AND ABBREVIATIONS

AA	Anti-Aircraft
BMP	Best Management Practices
CA	Cost Analysis
CWAP	Comprehensive Work Approval Process
DoD	Department of Defense
EAP	Encroachment Action Plan
EE	Engineering Evaluation
EEA	Explosives Experimental Area
EE/CA	Engineering Evaluation/Cost Analysis
EIS	Environmental Impact Statement
EM	Electromagnetic
EMLF	Electromagnetic Launch Facility
EOD	Explosive Ordnance Disposal
EPCRA	Emergency Planning and Community Right-to-Know Act
FS	Feasibility Study
GPS	Groundwater Protection Standard
HMX	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
IC	Institutional Controls
INRMP	Integrated Natural Resources Management Plan
IR	Installation Restoration
JLUS	Joint Land Use Study
LTM	Long Term Management
MC	Military Constituents
MCOPC	Munition Constituents of Potential Concern
MEC	Munitions and Explosives of Concern
MNA	Monitored Natural Attenuation
NSASP	Naval Support Activity South Potomac
NSFDL	Naval Support Facility Dahlgren
NSWCDD	Naval Surface Warfare Center Dahlgren Division
OB/OD	Open Burn/Open Detonation
ORC	Operational Range Clearance
ORSM	Operational Range Site Model
POL	Petroleum, Oils, and Lubricants
PRTR	Potomac River Test Range
RCA	Range Condition Assessment
RCRA	Resource Conservation and Recovery Act
RDT&E	Research, Development, Test & Evaluation
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RI	Remedial Investigation
ROD	Record of Decision
RSEPA	Range Sustainability Environmental Program Assessment
SIA	Special Interest Area
TNT	2,4,6-Trinitrotoluene

## **EXECUTIVE SUMMARY**

The Range Sustainability Environmental Program Assessment (RSEPA) process was developed by the Chief of Naval Operations to meet the requirements of Department of Defense (DoD) Instruction 4715.14. The purpose of the RSEPA process is to assess and address the environmental condition of land-based operational ranges where munitions are used or were used. The first step in the RSEPA process is to conduct a Range Condition Assessment (RCA). The initial RCA for the Naval Surface Warfare Center Dahlgren Division (NSWCDD) was completed in September 2010. That assessment found that overall, Research, Development, Test & Evaluation (RDT&E) operations at NSWCDD-operated ranges were in compliance with applicable environmental program requirements, and there was no need to investigate any areas for potential off-range releases of Military Constituents (MCs) beyond investigations already planned.

[Click here to open the 2010 NSWCDD Range Condition Assessment](#)

Consistent with the RSEPA process, a RCA five-year review is required with the overall objective of the continued evaluation of potential environmental impacts of range activities. NSWCDD's five-year RCA review included evaluation of the two questions below, which are taken from Decision Point 1 in the U.S. Navy RSEPA Policy Implementation Manual (2006). Decision points are used to determine if further action or evaluation is warranted. As determined from the five-year review, both Decision Point 1 questions could be answered in the negative, which means the RCA is complete and no further action is required at this time.

### ***Question 1: Are Further Steps Required to Maintain Compliance?***

The data for the RCA five-year review indicate that NSWCDD-operated ranges are in compliance with appropriate management statutes and regulations. Detailed information regarding compliance for NSWCDD-operated ranges is listed in Section 3. Furthermore, no new regulations were identified that would compromise compliance. Therefore, protective measures already in place and listed in Section 4 will continue, but no additional steps are recommended to maintain compliance at any NSWCDD-operated range.

**Question 2: Is Further Analysis Required to Assess Risk of Potential Off-Range Release?**

The Environmental Impact Statement (EIS), “*Outdoor Research, Development, Test and Evaluation Activities*,” finalized in 2013, evaluated the impact of past, present, and future RDT&E operations on the environment at NSWCDD, including the Potomac River Test Range (PRTR). An appropriate list of ordnance-related Mmunition Constituents of Potential Concern (MCOPC) was selected for evaluation in the EIS, based on total mass (cumulative over the last 90 years), toxicity and US Navy guidance, including RSEPA guidance of 2006. The MCOPC included seven metals (Cd, Cr, Cu, Pb, Mn, Ni and Zn) and five explosive constituents [ammonium picrate, Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX), Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), Tetryl and 2,4,6-Trinitrotoluene (TNT)]. Potential exposure pathways were modeled for human health and ecological risk when compared to risk-based regional screening levels developed by the US Environmental Protection Agency (USEPA, 2012). Additionally, continuing monitoring requirements of the Installation Restoration (IR) Program and the Resource Conservation and Recovery Act (RCRA) Subpart X permitting requirements address any areas where there is a potential for any off-range release of MCs, including low levels of explosives (e.g., RDX) and perchlorate in shallow aquifer wells at Explosives Experimental Area (EEA). The groundwater underlying EEA is monitored to ensure MCOPC are not increasing in extent or concentration. Review of these program areas indicates there is no potential for off-range release at concentrations which exceed the USEPA Human Health and Ecological screening levels. Therefore, further analysis to assess risk of potential off-range release is not warranted at this time.

**1.0 INTRODUCTION**

The RCA five-year review was initiated in the summer of 2015. The review included site visits and interviews with NSWCDD and Naval Support Activity South Potomac (NSASP) personnel to support revisions to the environmental compliance assessment areas, where applicable. The review looked at the same six NSWCDD land-based ranges as in the original RCA (September 2010) where munitions operations are conducted: Anti-Aircraft (AA) Fuze Range, EEA, Machine Gun Range, Main Range, Missile Test Range, and Terminal Range. This review does not address

the PRTR, since water ranges are addressed by a separate Water RSEPA process.

## **1.1 PURPOSE**

The purpose of the RCA five-year review is to obtain and reevaluate information needed to assess and manage the present environmental condition of each land-based range under the Navy's control. This report includes evaluations and findings related to range operations that could affect compliance with environmental laws, regulations, or self-imposed military requirements, and assesses the risk of an off-range release. Knowledge of range specific environmental conditions also helps managers make informed decisions and reduces overall planning required for Navy operational activities.

## **1.2 RANGE BOUNDARY DEFINITION**

The Mainside Ranges are adjacent to each other, but otherwise, the range boundaries are represented by shoreline, Navy property line, and non-range land areas. The EEA Range boundary is represented by shoreline and Navy property line.

## **1.3 RCA FIVE-YEAR REVIEW PRIMARY ELEMENTS**

1. Document any changes from previous RCAs (e.g., new weapon systems, receptors);
2. Determine if further steps are necessary to maintain compliance (e.g., new regulations);
3. Evaluate the status and effectiveness of protective measures, if necessary;
4. Confirm the elements of the Operational Range Site Model (ORSM);
5. Verify the assumptions and inputs required for predictive modeling; and
6. Determine what, if any, revisions were made to the RSEPA Policy Implementation Manual since the previous RCA was completed and incorporate those changes into the review.

## **2.0 CHANGES IN OPERATIONAL AND ENVIRONMENTAL STATUS**

### **2.1 OPERATIONAL RANGE ACTIVITIES**

NSWCDD provides RDT&E, analysis, systems engineering, integration and certification of

complex naval warfare systems related to surface warfare, strategic systems, combat and weapons systems associated with surface warfare.

The RDT&E activities that take place on the ranges and associated weapons systems are described below:

- **Missile Test Range-** This range is used to conduct overland test and evaluation of vehicles and conventional and special weapon components against targets. The range includes suspended targets, fixed and portable facilities and analytical equipment. Experimental devices can be fired into the PRTR from this range. The Electromagnetic Launch Facility (EMLF) for railgun and hypervelocity projectile RDT&E is located on this range. This range also encompasses an EOD (Explosive Ordnance Disposal) training range for non-fragmenting energetic training operations.
- **Terminal Range-** This range supports RDT&E and production testing of weapon systems, components, and other ordnance material (specifically, experimental items). This range allows for tests requiring large quantities of explosives, ballistic evaluation of armor plates, penetration tests of projectiles, and high chamber pressures. A projectile recovery system is available to recover projectiles to study gun firing effects, especially for emerging-technology projectiles. Although most firings are aimed into butts or backstops, rounds can be fired into the PRTR.
- **Main Range-** This range is used for systems integration and testing with networked connectivity to most shipboard combat system elements. The Main Range includes thirty-nine gun emplacements plus test stands for proof-firing gun-mount oscillating assemblies and gun barrels located approximately 1,500 feet from the Potomac River. This range uses the PRTR for fuze and ballistic testing and as an over-the-water backstop. All acceptance testing of gun barrels and mounts are conducted at this range. The Search and Track Sensor Test Site houses radar systems used for gun fire control, systems integration, scanning the range, and controlling unmanned aerial vehicles.
- **AA Fuze Range-** This range is used for over-the-water testing of fuzes, proof tests, barrel

wear and heating tests, projectile ramming tests, new projectile design evaluation, and water-surface burst data at short and long firing distances. This range offers a large “safety zone” for fuze testing, since it is situated in close proximity to the Potomac River shoreline. The range includes temperature-conditioning equipment and propellant charge weighing and assembly equipment.

- **Machine Gun Range-** This range includes four indoor firing bays, and an outdoor test area with multiple gun emplacements. It also includes two indoor/outdoor bays that use the river range for penetration tests of light-armor materials. Testing 40-mm and smaller guns and ammunition is performed at this range. This range has temperature conditioning chambers and a charge assembly room. The range is also used to evaluate the effectiveness of windshields and protective armor against representative small arms threats, such as improvised explosive devices and other non-conventional threats. The range is equipped to record data such as firing stresses and strains, shock waves, projectile pressure, temperature, position, velocity, and acceleration. The Navy Directed Energy Center is located on this range.
- **EEA-** This range supports performance, lethality, safety, and insensitive-munitions testing on full-scale weapon systems and components containing explosives, propellants, and inert materials. Although the EEA mainly supports RDT&E and safety testing for ordnance weapon systems, such as rocket-propelled grenades, rockets, and restrained missiles, this complex also supports RDT&E of lasers, Electromagnetic (EM) energy, and chemical and biological simulants. The EEA is extensively instrumented for conducting explosive tests such as blast measurements, target vulnerability, arena testing, and live-fire tests. Safety testing of ordnance (munitions) includes temperature and humidity cycling, shock, vibration, and a 40-foot drop. Insensitive-munitions tests include fast cook-off, slow cook-off, fragment impact, shaped charge/jet impact, sympathetic detonation, and bullet-impact testing. The Counter Explosive Test Facility, the Naval Ordnance Transient Electromagnetic Simulator facility, and two ranges – Churchill and Harris – are located within the EEA. The Open Burn/Open Detonation (OB/OD) permitted treatment area is located on Churchill range.

There have been no changes in operational procedures or any use of new or different live fire weapon munition constituents since the 2010 RCA to impact environmental compliance status.

## **2.2 SENSITIVE ENVIRONMENTAL RECEPTORS AND ECOSYSTEMS**

Active bald eagle nesting sites are found at Naval Support Facility Dahlgren (NSFDL). The bald eagle was removed from the federal threatened and endangered species list by the federal government in 2007 and by the State of Virginia in 2013; however, special protections still apply to the bald eagle under the Bald and Golden Eagle Protection Act (1940). Annual bald eagle nesting surveys are conducted by the College of William and Mary in cooperation with the Virginia Department of Game and Inland Fisheries.

Although potential habitat exists for several rare plant species, at this time, no rare, threatened, or endangered plant species have been found on NSFDL. There is currently no federally designated critical habitat for endangered or threatened species on NSFDL. A recent proposal by the National Oceanic and Atmospheric Administration to designate the Potomac River as critical habitat for the federally endangered Atlantic Sturgeon will not impact this assessment of land ranges, (nor should it impact the PRTR since section 4(a)(3)(B) of the Endangered Species Act provides that DoD facilities with an approved Integrated Natural Resources Management Plan (INRMP) that overlaps with a proposed critical habitat unit will not be part of the designated critical habitat unit). A survey for sensitive joint vetch has been funded and will take place in the near future.

The northern long-eared bat was listed as threatened in May 2015. An acoustical survey was conducted in 2014 did not detect the bat at NSFDL. An additional survey was conducted in 2015, but the results from that survey are not yet available. If the bat is detected acoustically, additional surveys to include mist netting will be conducted. Other bat species experiencing population declines due to fungal disease (i.e., white nose syndrome) have been detected onsite. Potential impacts to mission accomplishment are unknown at this time.

As reported in the 2010 RCA, there are five special interest areas (SIAs) which represent areas with unique ecological characteristics and/or high-quality habitat for rare species; two on Mainside and three at EEA. The Gambo Creek SIA is the only one to include a portion of an active range.

These sensitive ecological receptors and areas continue to be monitored through the INRMP and IR programs; there has been no change in status since the 2010 RCA.

### **3.0 ENVIRONMENTAL REGULATORY COMPLIANCE ASSESSMENT**

The following sections discuss the environmental compliance status of the environmental and operational areas that were assessed at NSWCDD operational ranges. During the RCA five-year review, information initially collected about the possible impacts of range operations on the environment was reviewed and analyzed for continuing environmental regulatory applicability and to address any compliance deficiencies. Efforts focused on munitions usage on land-based components of NSWCDD operational ranges. The review found that RDT&E operations at NSWCDD operated ranges are in compliance with applicable environmental program regulations and requirements.

#### **3.1 RCA COMPLIANCE AREAS OF INTEREST**

The RCA five-year review assessed federal, state, and local regulations and DoD/Navy requirements applying to the NSWCDD Ranges in the following areas:

- Air Quality
- Storm Water/Wastewater
- Military Munitions/Solid Waste/Hazardous Materials/Hazardous Waste
- Cultural Resources
- Natural Resources
- Emergency Planning and Community Right-to-Know Act (EPCRA)
- Environmental Planning

- Range Environmental and Explosives Safety Management
- Installation Restoration / Munitions Response
- Storage Tank and Petroleum, Oils, and Lubricants (POL) Management
- Safe Drinking Water, and
- Range Encroachment.

Detailed information and a discussion of the following RCA areas of interest are fully described below.

### **3.1.1 Air Quality**

No deficiencies were observed through reviews of records or during interviews conducted with NSASP personnel. The ranges are in compliance with all applicable air quality regulations.

Currently, the Virginia Department of Environmental Quality is not regulating outdoor stationary weapon firing or open field fugitive emission sources since they cannot be practically controlled through the air permitting process. For those sources that can be controlled, emissions are calculated monthly, as the sum of each consecutive 12-month period, to ensure there are no exceedances of operating limits as defined by the June 2016 *Stationary Source Permit to Construct and Operate*, issued by the Virginia Department of Environmental Quality.

### **3.1.2 Storm Water/Wastewater**

The Mainside and EEA Ranges are in compliance with applicable water/wastewater program requirements. NSASP updated the Storm Water Pollution Prevention Plan Operations and Maintenance Manual in March 2012 to meet the Virginia Pollutant Discharge Elimination System industrial storm water permit conditions.

The 2010 RCA recommended the use of Operational Range Clearance (ORC) Best Management Practices (BMPs) to address the subsurface munitions at the Missile Test Range to prevent potential releases to the PRTR and reduce potential risks to human health and/or the

environment.

Although exposed munitions would not constitute an off-range release, MCs potentially released to the Potomac River could be regulated under the Code of Maryland Regulations 26.08.01 and 26.08.01.02. Qualified ordnance personnel continue to periodically sweep the shoreline, especially after storm events, to identify any suspect Munitions and Explosives of Concern (MECs) that may have been exposed due to erosion or other processes. Additionally, the Shoreline Stabilization and Restoration Environmental Assessment, completed in March 2014, calls out a four-phased stabilization approach that provides priority to the most severe sections of shoreline, including those where MCs could potentially be released into the Potomac River. The project is currently in Phase I initiative planning stage.

### **3.1.3 Military Munitions/Solid Waste/Hazardous Waste**

The Mainside and EEA Ranges are in compliance with hazardous waste management laws and regulations. As indicated above, and in the 2010 RCA, qualified ordnance personnel continue to periodically sweep the shoreline, especially after storm events, to identify any suspect MECs that may have been exposed due to erosion or other processes. “Danger Unexploded Ordnance -No Wading Do not Anchor ” signs are in place strategically along the entire Mainside shoreline to prevent unauthorized access by the boating public to all NSWCDD-operated Mainside ranges, including the Old Plate Battery Test Area of the Missile Test Range. Additionally, it is noted in the Code of Federal Regulations (33 CFR334.230), that “...due to hazards of unexploded ordnance, no person or craft (other than law enforcement agencies) in the Middle Danger Zone shall approach closer than 100 yards to the shoreline of Naval Surface Warfare Center, Dahlgren, previously known as the Naval Surface Weapons Center.”

Waste munitions and munition components are treated at the RCRA-permitted OB/OD units.

### **3.1.4 Cultural Resources**

The Mainside and EEA Ranges are in compliance with applicable cultural resource program requirements. NSASP released an Integrated Cultural Resources Management Plan in

September 2014. This plan identifies historic properties on the facility and recommends strategies for preservation. These strategies include Section 106 review in compliance with the National Historic Preservation Act prior to building demolition, rehabilitation/repair, maintenance, removal of historic equipment, ground disturbance or new construction. Such actions follow a local Comprehensive Work Approval Process (CWAP) that allows all Navy stakeholders the opportunity to evaluate the intended action for potential adverse effects and offer mitigations prior to start of work.

### **3.1.5 Natural Resources**

The Mainside and EEA Ranges continue to be in compliance with applicable natural resource program requirements as outlined in the latest version of the INRMP (INRMP, October 2013). Actions follow a local CWAP that allows all Navy stakeholders the opportunity to evaluate the intended action for potential adverse effects and offer mitigations prior to start of work. The effectiveness of the INRMP is monitored, evaluated and documented through annual reviews.

### **3.1.6 Emergency Planning and Community Right-to-Know Act**

The Mainside and EEA Ranges continue to be in compliance with EPCRA requirements. No issues affecting range sustainability were identified at any of the ranges.

### **3.1.7 Environmental Planning**

The Mainside and EEA Ranges continue to be in compliance with applicable environmental planning requirements. The NSWCDD EIS "*Outdoor Research, Development, Test and Evaluation Activities*" was finalized June 2013 and the Record of Decision (ROD) was signed October 2013. The EIS expanded the activities within the Mainside and EEA Ranges in the areas of:

- Ordnance Expended
- Electromagnetic Energy
- High-energy Lasers

- Chemical and Biological Simulants

The growing population in the area surrounding NSFDL continues to potentially impact range sustainability because of Navy-generated off-range noise. In response to issues such as noise, NSWCDD has proactively addressed the public's concerns by:

- Implementing a command Instruction, NSWCDDINST 5100.6A, Outdoor Noise Management Process (Jul 2013),
- Publishing Noise and Vibration Measurements at Six Historic Structures (Aug 2010),
- Operating a toll-free phone line for noise complaints per the Community Relations Plan (Jul 2013),
- Announcing the range schedule for expected loud gun firings on a public website (weekly),
- Participating in NSASP Community Relations meetings and presentations with local communities, and
- Participating in development of the NSASP, NSFDL Encroachment Action Plan (EAP, Oct 15).

The EAP is designed to:

- Prevent encroachment challenges and encumbrances that affect the facility's mission;
- Minimize these challenges where mission impacts are occurring or could occur in the future; and
- Engage internal and external stakeholders to promote encroachment management partnerships.

Specific suggested management actions are found in the EAP and will be evaluated for implementation based on effectiveness, acceptability, cost, difficulty and funding. An example of a low cost, low difficulty action already in place is "to track new permitting requirements through legislative and regulatory monitoring."

### **3.1.8 Range Environmental and Explosives Safety Management**

The Mainside and EEA Ranges continue to be in compliance with range environmental and explosives safety requirements. Munitions from past range operations continue to be handled per the Operational Range Clearance Plan and are removed by qualified ordnance personnel to reduce potential risks to human health and/or the environment. Waste munitions and munition components are treated at the RCRA-permitted OB/OD units.

In addition to the EAP outlined in section 3.1.7, and to further safeguard the sustainability of range management, a 2015 Naval Support Facility Dahlgren Joint Land Use Study (JLUS) was completed to establish and encourage a working relationship and collaborative planning process between the military, local jurisdictions, including King George, Westmoreland, and Colonial Beach in Virginia and Charles and St. Mary's Counties in Maryland and various other stakeholders. Among other issues, the JLUS addresses communications, encroachment and noise issues to ensure compatibility of current and future military mission expansion and local economic growth. Notable strategies for NSFDL include seeking Defense Readiness and Environmental Protection Integration funds to acquire environmentally important lands that, if developed, would remove important habitat and impact military mission (adjacent to the base and range station property), continuing the partnership with the Dahlgren Heritage Museum to generate public awareness of the base and its beneficial impacts to the community and the Navy, and expanding outreach to the boating community to increase awareness and cooperation with PRTR clearance during testing.

### **3.1.9 Installation Restoration/Munitions Response**

NSASP is the point of contact for all Munitions Response and IR sites on NSFDL. NSASP also receives requests for munitions response assistance from the local community for which EOD Mobile Unit 12; Detachment Dahlgren provides off-station support in accordance with a Memorandum of Understanding between NSWCDD, NSASP, and King George County. NSWCDD is responsible for the recovery, handling, transportation, storage, and final disposition of munitions and explosives of concern, unexploded ordnance, and discarded

military munitions within and outside its operational ranges.

Community relations activities are proactive and ongoing throughout the IR process at NSFDL. Table 3-1 summarizes the size and status of each IR site located on the operational ranges and sites with MCs.

Table 3-1/ Summary of NSFDL IR Sites (As of June 09, 2016)  
(Progress/Status updates since 2010 are shown in RED)

Site	Range Location	Area (acres)	Site	Status*
IR Site 1	Missile Test Range	253.96	Old Bombing Range	Deferred Action Until Range Closure
IR Site 2	Missile Test Range	4.70	Fenced Ordnance Burial Area	ROD- Remedial Action Complete; Long-Term Monitoring (LTM) Underway Institutional Controls (ICs) Implemented
IR Site 3	Mainside	0.021	Ordnance Burn Structure	Removal Action Completed ROD – No Further Action
IR Site 4	Mainside	2.54	Case Storage Area	Engineering Evaluation (EE)/Cost Analysis (CA) Completed Removal Action Completed Ecological Risk Evaluation Underway
IR Site 5	Terminal Range	0.82	Projectile Disposal Area	Deferred Action Until Range Closure
IR Site 6	Mainside	2.34	Terminal Range Airplane Dump	ROD – Remedial Action Completed Monitoring
IR Site 9	Mainside	7.91	Disposal/Burn Area	ROD – Remedial Action Completed LTM Underway
IR Site 10	Missile Test Range	12.49	Hideaway Pond	ROD – LTM Underway ICs Implemented
IR Site 12	Mainside	0.18	Chemical Burn Pit	ROD - Selected Remedial Action Completed LTM Underway ICs Implemented
IR Site 13	Mainside	0.41	Gambo Creek Truck Wash Area	Removal Action Completed Decision Document – No Further Action
IR Site 14	Mainside	0.38	Chemical Warfare (CW) Evaporation Pond	EE/CA Completed Removal Action Completed Groundwater Monitoring underway Remedial Investigation (RI)/Focused Feasibility Study (FS)/Proposed Remedial Action Plan Completed Ecological Risk Evaluation Underway
IR Site 15	Mainside	2.45	Scrap Metal Storage Area	EE/CA Completed Removal Action Completed Ecological Risk Evaluation Underway

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IR Site 17	Mainside	7.58	1400 Area Landfill	ROD - Remedial Action Completed LTM Underway ICs Implemented
IR Site 25	AA Fuze Range	6.62	Pesticide Rinse Area	Removal Action Completed ROD - No Further Action
IR Site 31	EEA	1.59	Airplane Park Dump	Removal Action Completed ROD - No Further Action
IR Site 32	EEA	1.10	Fast Cook-Off Pit and Pond	RI/ FS Completed ROD - No Further Action
IR Site 33	EEA	0.32	Otto Fuel Spill	Closed
IR Site 36 (also AOC	EEA	0.27	Depleted Uranium (DU) Mound EEA Mixed Waste	Removal Action Completed ROD – No Further Action
IR Site 37	Machine Gun Range	4.19	Lead Contamination Area	ROD Amendment Completed ICs Implemented
IR Site 39	Main Range	1.16	Open Storage Area Main Battery	Closed
IR Site 43	Missile Test Range	0.39	Higley Road Land Application	Removal Action Completed Decision Document – No Further Action
IR Site 44	Mainside	0.03	Rocket Motor Pit	Removal Action Completed ROD – No Further Action
IR Site 45	Mainside	2.14	Landfill B	Removal Action Completed Decision Document – No Further Action
IR Site 46	Missile Test Range	1.87	Landfill A: Stump Dump Road	ROD – Remedial Action Completed
IR Site 47A	Missile Test Range	0.63	World War I Munitions Mound	EE/CA Completed Removal Action Completed Closeout Report – No Further Action
IR Site 47B	Missile Test Range	0.01	Barbette/DU Contamination	EE/CA Completed Removal Action Completed Closeout Report – No Further Action
IR Site 49 (also AOC C4)	Machine Gun Range	0.06	Building 200 DU	Removal Action Completed ROD – No Further Action
IR Site 50	EEA	4.55	Fill Areas Northeast EEA (Objects)	Removal Action Completed Decision Document – No Further Action
IR Site 57	Mainside	1.87	Shell House Dump	Decision Document – No Further Action

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IR Site 58	Mainside	1.01	Building 1350 Landfill	ROD- Remedial Action complete
IR Site 59	EEA	0.09	Octagon Pad Dump	Closed
IR Site 61A	Mainside	2.13	Gambo Creek Ash Dump	RI Completed Pilot Study/Removal Action Completed Risk Evaluation Underway
IR Site 61B	Terminal	0.18	Gambo Creek Projectile Disposal	Closed
IR Site 62	Mainside	0.04	Building 396	RI/FS Completed Removal Action Completed ROD – No Further Action
AOC Q	PRTR	1305.65	Upper Machodoc Creek	Closed
Other Units C3	Main Range	1.58	Scar at Phalanx Test Area	Closed
IR Site 60	EEA	0.012	Building 455 Star Gauge Loading	Closed
Located on Active Range	Terminal Range	0.04	Terminal Range Building 109	Closed
AOC P	Missile Test Range	224.23	Gambo Creek	Under Investigation

\* The terms No Further Action and Closed are interchangeable. No additional characterization, assessment, or responses are required for closed sites or sites listed with No Further Action as the status.

### **3.1.10 Storage Tank and Petroleum, Oils, and Lubricants Management**

Tank and POL management on the active, land-based test ranges on Mainside and EEA are in compliance with applicable regulatory requirements. The Spill Prevention Control and Countermeasures Plan was updated in June 2015. The Oil Discharge Contingency Plan has been updated and was sent to Virginia Department of Environmental Quality for review and approval in November 2014.

### **3.1.11 Safe Drinking Water**

The Mainside and EEA potable water systems are in compliance with applicable safe drinking water requirements. Naval Facilities Engineering Command updated the Operations and Maintenance Plans for Mainside and EEA in 2013 to reflect then-current water distribution maps and well locations. The Operations and Maintenance Plan for Mainside is planned to incorporate construction of a new water tower and demolition of two old towers.

No munitions constituents have been detected in the drinking water source for Mainside or EEA. However, perchlorate and RDX continue to be detected in levels above Groundwater Protection Standards (GPSs) at EEA in the surficial aquifer, approximately 2 to 20 feet below land surface. The contamination is being closely monitored by NSWCDD as required by the RCRA Permit for the Thermal Treatment of Hazardous Waste by OB/OD. Based on the current groundwater flow model, which was updated in 2015, the trends of steady or attenuating contaminant concentrations, and the lack of plume migration, it appears that monitored natural attenuation (MNA) is effective in mitigating any increases in the extent or concentration of the contamination in the shallow groundwater underlying the OB and OD units at EEA.

To monitor RDX and perchlorate in the surface water at EEA, numerous surface water samples have been collected from multiple locations within Black Marsh, approximately 5000 feet upstream from the Navy property boundary on the Potomac River. The samples show concentrations of RDX above the facility-specific GPS, although no surface water quality

standards exist for Virginia state waters for RDX. The maximum RDX concentration is also below the screening benchmarks that have been published by various Environmental Protection Agency regions. The perchlorate concentrations in the surface water are all below the GPS. RDX and perchlorate levels continue to be closely monitored by NSWCDD and samples to date have shown no increase in either RDX or perchlorate concentration since surface water sampling was initiated in 2011.

### **3.1.12 Range Encroachment**

NSASP and NSWCDD are working together to identify challenges that threaten the ability to conduct RDT&E operations, sustain core capabilities, and execute the mission. The 2015 EAP designates actions and encroachment management programs to minimize impediments to operations and maintain the capability to perform the mission as outlined in section 3.1.7.

## **3.2 MONITORING AND TRAINING**

New laws and regulations are monitored continuously for applicability to NSWCDD ranges and RDT&E programs. In addition, all personnel are required to take Environmental Awareness Training which covers such topics such as compliance with water and storm water, air, and solid and hazardous waste regulations. Personnel whose job duties impact specific RCA areas of interest also take training directly related to compliance and awareness, often on an annual basis.

## **4.0 EVALUATION AND STATUS OF PROTECTIVE MEASURES**

The following protective measures have been identified in order to maintain compliance with environmental and munitions management requirements and ensure future RDT&E mission success on existing ranges:

- Storm Water/Wastewater- When munitions from range operations are exposed via erosion or other processes, ORC BMPs will be followed to reduce potential risks to human health and the environment. Range personnel will continue to inspect the shoreline at the Old Plate Battery Test area periodically and after storm events. Any munitions or debris

that are exposed at the Old Plate Battery Test Area will be properly managed. NSWCDD will also continue to monitor the progress of NSASP's shoreline stabilization project that is currently in Phase I initiative planning stage.

- Military Munitions/Solid Waste/Hazardous Materials/Hazardous Waste- When munitions from range operations are exposed via erosion or other processes, ORC BMPs will be followed to reduce potential risks to human health and/or the environment. Range personnel will continue to inspect the shoreline at the Old Plate Battery Test area periodically and after storm events. Any munitions or debris that are exposed at the Old Plate Battery Test Area will be properly managed.
- Environmental Planning- NSWCDD will continue proactive communication between the military, local jurisdictions, and various stakeholders through operating a toll-free phone line for noise complaints, announcing the range schedule for expected loud gun firings on a public website, participating in NSASP Community Relations meetings and presentations with local communities, and participating in development and implementation of the NSASP, NSFD Encroachment Action Plan.
- Range Environmental and Explosives Safety Management- When munitions from range operations are exposed via erosion or other processes, ORC BMPs will be followed to reduce potential risks to human health and the environment. Range personnel will continue to sweep the shoreline at the Old Plate Battery Test area periodically and after storm events. NSWCDD will also continue to monitor the progress of NSASP's shoreline stabilization project that is currently in Phase I initiative planning stage.
- Safe Drinking Water- NSWCDD will continue to closely monitor RDX and perchlorate in both groundwater and surface waters at EEA and stay up to date on any proposed Maximum Concentration Guidelines.
- Range Encroachment- In addition to the EAP, NSWCDD engages in proactive communication activities between the military, local jurisdictions, and various stakeholders through the COMREL, JLUS and other outreach programs.

## **5.0 OPERATIONAL RANGE SITE MODEL ELEMENTS**

The 2010 RCA combined the five land-based ranges on Mainside into one ORSM and another

for EEA that includes Churchill and Harris Ranges and the OB/OD units. The PRTR is not addressed, as it is a water-based range and therefore covered under a different assessment.

In the 2010 RCA, the ORSMs developed summarized operational, environmental, and land use conditions that continue to be used to support conclusions and recommendations concerning the potential for off-range migration of MCs. MCs are defined in the RSEPA Policy Implementation Manual as materials originating from military munitions, including explosive and nonexplosive materials, and the emissions, degradation, or breakdown products of such munitions, potentially including, but not limited to, the following:

- 2-Amino-4,6-dinitrotoluene (2-A-4,6-DNT)
- 4-Amino-2,6-dinitrotoluene (4-A-2,6-DNT)
- 1,3-Dinitrobenzene (1,3-DNB)
- 2,4-Dinitrotoluene (2,4-DNT)
- 2,6-Dinitrotoluene (2,6-DNT)
- RDX
- Methyl-2,4,6-trinitrophenylnitramine (Tetryl)
- Nitrobenzene
- Nitroglycerin
- 2-Nitrotoluene
- 3-Nitrotoluene
- 4-Nitrotoluene
- HMX
- Perchlorate
- 1,3,5-Trinitrobenzene (1,3,5-TNB)
- TNT, and
- Metals (e.g., aluminum, arsenic, lead, and mercury).

The inputs to the 2010 ORSMs for both the Mainside and EEA ranges are still applicable. Current military operations, described in Section 2.1 apply. Future work includes anticipated increases in laser operations, EM testing, projectile testing, chemical and biological simulants

testing, and radio frequency operations. These RDT&E areas were fully explored in the EIS and it is not expected that there will be an increase in the likelihood of an MC migrating off the range.

Inputs to the environmental and land use elements have not changed since 2010.

## **6.0 PREDICTIVE MODELING**

Predictive modeling is used to estimate potential concentrations and the migration rates of MCs moving through the environment (air, overland surface flow, subsurface soil, and groundwater migration) when the ORSM demonstrates that the environmental media are potentially impacted. Predictive modeling was not conducted for the Mainside or EEA Ranges due to the extensive sampling and analysis for MCs under the IR Program, RCRA, and Virginia Pollutant Discharge Elimination System permit requirements.

## **7.0 REVISIONS TO THE RSEPA POLICY IMPLEMENTATION MANUAL**

There have been no revisions or updates to the RSEPA policy implementation manual since the 2010 RCA was finalized. NSWCDD will continue to monitor the manual for applicable updates and make changes to the RCA if warranted.

## **8.0 CONCLUSION**

The ultimate purpose of the RCA five-year review is to ensure compliance is met or maintained and the risk of potential off-range release is appropriately analyzed.

### **8.1 STEPS NECESSARY TO MAINTAIN COMPLIANCE**

After evaluation of the applicable RCA areas of interest, the question *“Are Further Steps Required to Maintain Compliance?”* must be answered. NSWCDD has current environmental and natural resource management programs and processes in place that ensure compliance with all applicable laws and regulations.

The data reviewed for the RCA five-year review indicate that NSWCDD is in compliance with appropriate management statutes and regulations for the RCA areas of interest listed in

### Section 3.1.

Protective measures initially implemented in the 2010 RCA enhance range sustainment and provide for a more secure operational environment. Details of the protective measures are discussed in Section 4. No further steps are required to maintain environmental compliance of NSWCDD Ranges.

## **8.2 POTENTIAL OF OFF-RANGE RELEASES**

The second question that must be answered *“Is Further Analysis Required to Assess Risk of Potential Off-Range Release?”* The EIS, finalized in 2013, evaluated the impact of past, present, and future RDT&E operations on the environment at NSWCDD. Additionally, there is extensive multi-media sampling and monitoring associated with both the IR Program and the Subpart X permitting requirements required by RCRA. These programs address any areas where there is a potential for any off-range release of MCs.

Analytical data for soil and groundwater samples collected as part of these programs indicate there is no significant potential for off-range releases at NSWCDD at concentrations which exceed screening levels. Further analysis to assess risk of potential off-range release at this time is not warranted.

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