Secretary of Defense Environmental Award FY2010
Naval Station Norfolk
Environmental Restoration—Installation

Introduction

Naval Station Norfolk (NSN) is the world's largest Naval Installation. It consists of more than 4,000 buildings, 20 piers, and an active airfield, all spread throughout 4,631 acres. It is the hub for Navy logistics support for the Caribbean and the European and Central Command theaters of operation.

The facility is bounded by Willoughby Bay to the north, the confluence of the Elizabeth and James rivers to the west, and by the city of Norfolk to the south and east. A portion of the facility boundary (to the east) is formed by Masons Creek. Residential and recreational areas also border the facility to the south, east, and northeast.

NSN is located on what was originally the site of the Jamestown Exposition of 1907, and was purchased by the Navy immediately after the United States entered World War I in April 1917. During the late thirties and early forties, much construction took place at NOB and the Naval Air Station (NAS). To support the large airplanes and seaplanes flown by the Navy in World War II, new buildings and piers, and new runways, hangars, and ramps were constructed. Today, in addition to being the home for the Navy's largest concentration of naval forces, NSN also hosts personnel from the Marine Corps, Army, Air Force, and Coast Guard, and supports significant joint missions.

The Naval Support Activity Norfolk (NSAN) Headquarters Complex is located adjacent to NSN to the south. This installation is home to over 6,000 personnel and has the largest concentration of fleet headquarters administrative and communication facilities outside of Washington, D.C. Due to the size of NSAN and its close proximity to NSN, all IR sites located at the installation are managed as part of the NSN restoration program. Documentation for the IR sites has and continues to only reference NSN.

NSN is one of 66 DoD installations located within the Chesapeake Bay watershed, the nation's largest estuary. Recreation and commercial fishing are vital industries within the Bay.

Background

NSN was proposed for inclusion on the National Priorities List (NPL) in 1996 and was added to the NPL in April 1997. NSN was classified as a "Federal Facility" on the NPL, meaning that the Navy would be the lead agency for conducting response actions at the base. A Federal Facilities Agreement (FFA) between U.S. Environmental Protection Agency (USEPA) Region III and NSN was finalized in February 1999. Following the FFA, 170 environmental sites were investigated at NSN and were addressed as follows:

- 18 Installation Restoration (IR) sites (10 required clean up and 8 were addressed with institutional controls)
- 5 Site Screening Areas
- 15 Areas of Concern
- 132 sites requiring no further action (NFA)

Program management for the environmental restoration program at NSN is provided through the Naval Facilities Engineering Command, Mid-Atlantic (NAVFAC MIDLANT). Mr. Christopher Murray, the Remedial Project Manager, is supported by technical, acquisition, and legal professionals across the NAVFAC MIDLANT organization.

Collaborative management of the restoration program is carried out by a multi-agency NSN Restoration Partnering Team (the Team). Formed in October 1996, the Team consists of personnel from NAVFAC MIDLANT, the USEPA Mid-Atlantic Regional Office (Region III), the Virginia Department of Environmental Quality (VDEQ), and the environmental consultants who support these organizations. Since its inception, the mission of the Team has been:

… *to protect human health and the environment, and streamline the cleanup of Naval Station Norfolk, Virginia, through the use of innovative, consensus-based site management strategies.*

During FY2008, the Team set a highly ambitious goal for itself—attaining a Remedy in Place (RIP) for all remaining program IR sites while completing all Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) documentation for multiple additional sites, while also focusing on quickly making properties available for operational re-use. The Team also set out to achieve the preeminent USEPA milestone of installation Construction Completion prior to the end of FY2010. This goal was accomplished without any extra funding to support the environmental program, and no additional personnel resources were provided.

The *Department of the Navy's Environmental Restoration Program Manual* (August 2006), defines RIP as follows:

Remedy in Place (RIP): *This milestone is achieved when the construction of a long-term remedy is complete and the remedy is operating as planned to meet project remedial action objectives in the future, or a short-term remedy has been successfully implemented and the final documentation is being prepared.*

To achieve this goal, the Team developed and implemented streamlined and innovative approaches to expedite site investigation and remediation, including a streamlined review process to ensure timely completion of all program decision documents and other required documentation. The team used all options available under Navy guidance and CERCLA to minimize duration and administrative processes which resulted in remarkably efficient cleanup actions and unparalleled partnering team cooperation.

Accomplishments

The Team accomplished its goal of establishing RIP at the four remaining sites in FY 2009. The Team continued working on optimization measures to increase efficiency and reduce operational costs for sites having operating RIPs (Sites 1, 3, and 20). The NSN team achieved the USEPA Construction Completion milestone in FY2010, becoming the first federal facility in the Commonwealth of Virginia to achieve this milestone. The Preliminary Closeout Report (PCOR) was signed at EPA Headquarters on September 14, 2010. The team was formally recognized for this accomplishment by The Honorable Jackalyne Pfannenstiel *Assistant Secretary of the Navy (Energy, Installations and Environment)* at a celebratory event where she issued each of the team members her personalized coin. The installations were also formally recognized by the USEPA Deputy Administrator Bob Perciacepe who acted as one of the key note speakers during this event.

Fast-track Cleanup

Close coordination, trust, and commitment within the Team allowed for innovation and schedule acceleration in order to achieve RIP with Non-time-critical Removal Actions (NTCRAs) at four sites by the end of FY 2009. During this period, the Team also worked closely with base operations personnel and infrastructure planners to identify optimal reuses for properties subject to the IR process. This combination of creative collaboration with the regulators and active, ongoing coordination with operational planners resulted in remedies that support the Navy's mission while being protective of human health and the environment. The timeframe for completing the documentation and subsequent activities to achieve RIP was the end of FY2009.

The sites and the corresponding team objectives for the end of FY 2009 were as follows:

- **Site 23, Building LP-20 Plating Shop (NSN)—**Removal action with capping and implementation of land-use controls to provide approximately 9,500 ft^2 of high-grade warehouse space. This action eliminated an environmental liability from an area that was formerly strictly access controlled and created

a useable area that supports the mission of the NSN.

- **Solid Waste Management Unit (SWMU) 14, Q-Area Satellite Accumulation Area (NSN)—**Removal action to construct an approximate 14-acre asphalt cover, using innovative stormwater management and treatment to provide additional, much needed, parking spaces near the planned site of a new pier. There was no viable alternate location in the vicinity of the new pier.
- **Upper Reaches of Bousch Creek associated with Site 1 (NSAN/NSN)—**Removal action to excavate sediments within the creek that were identified as posing potential ecological risk, restore the site, and document that NFA or monitoring is required. Removal and restoration activities were conducted to have no operational impact, including a portion of the area adjacent to the NSN flight line.
- **Site 18, Former Naval Magazine Waste Storage Area (NSN)—**Removal action to complete *in situ* injection to treat groundwater contamination. There is no operational re-use for Site 18 following RIP; however, because the site is adjacent to the naval magazine, site activities were conducted in coordination with the naval magazine detachment to minimize disruption to operations and restore the site to pre-removal action conditions.

Optimization of Existing Treatment Systems

Optimization measures continue to be evaluated and implemented by the Team for NSN sites that have RIPs:

- **Site 1, Camp Allen Landfill (NSAN)—**Continued optimization measures to evaluate the operation of shallow and deep groundwater extraction systems through a detailed groundwater model as well as targeted investigations of the shallow groundwater to potentially reduce operating portions and associated cost.
- **Site 3, Q-Area Drum Storage Yard (NSN)—**Continued optimizing the monitoring well network to reduce the number of wells to be monitored semiannually based on results demonstrating consistent concentrations below the cleanup goals.
- **Site 20, Building LP-20 (NSN)—**Developed a "Tiger Team" with technical support from the Navy, USEPA, and VDEQ to identify potential optimization measures for operating groundwater treatment system remedy at Site 20. After evaluating over 10 different alternative site management strategies with this "Tiger Team", the Team focused on having a small scale pump and treat system design approved with the facilities personnel and NAVFAC Headquarters, and constructed to assist the selected remedy in expediting source zone clean up at the site. Remarkably, the Team was able to have this plan conceptualized, designed and constructed within a 3 month time frame over the summer of FY2010. This effort really was the lynch pin that allowed the Team to achieve the Construction Completion milestone by the end of FY2010. Another unique optimization effort at this site involved an expedited site characterization approach to the Vapor Intrusion (VI) investigation of the site. This entailed utilizing the USEPA Emergency Response Team Target Analyte Gas Analyzer (TAGA) bus in early 2010 to conduct a real time vapor intrusion investigation and survey of this site which indicated no VI at Site 20.

Expedited IR Sites

Site 18 Background. Site 18 is the former Naval Magazine Waste Storage Area in the southeastern corner of NSN. The site was used from 1975 to 1979 to store drums through July 1979. A one-time landfill permit was obtained to allow the contaminated soil to remain in place. The area was re-graded and seeded to establish a vegetative cover. Follow-on monitoring occurred at the site for over 4 years. In 1985, monitoring requirements were eliminated. In 2001, the Team began investigating groundwater at the site. The Final Site Investigation report was completed by the team in November 2007. Groundwater was identified as posing a potential risk to future receptors.

NTCRA Objective. The Site 18 NTCRA objective was to implement measures to mitigate potential unacceptable human health risk associated with exposure to volatile organic compounds (VOCs) in groundwater. Enhanced

Reductive Dechlorination (ERD) was selected as the preferred alternative.

ERD was implemented to reduce contaminant concentrations at identified hot spot areas to below federal action levels. The NTCRA involved injecting 27 locations with a mix of Edible Oil Substrate® (EOS®) and potable water to cover the estimated area of the plume (approximately 11,000 ft^2).

Site 23

Background. Site 23, the Building LP-20 Plating Shop, is on the west side of Building LP-20. The Plating Shop occupies approximately 9,500 ft^2 of the building, or approximately one quarter of the total area of LP-20. Currently, Building LP-20 is used as a motor pool and office space. Use of the site will continue to be industrial for the foreseeable future.

Site 23 was investigated and managed in the Navy's Resource Conservation and Recovery Act (RCRA) program from 1989 until July 2003, when the Team moved the site into the CERCLA program. The Plating Shop contained seven process pits that extended beneath the concrete slab floor and were used for cleaning, stripping, and plating engine parts. The concrete floor of the shop and the pits were lined with corrosion-resistant brick tiles. The process tanks and equipment, also located in pits, were removed during a partial closure completed under the RCRA program.

Groundwater beneath Site 23 was investigated and is being addressed as part of the groundwater remedy for IR Site 20.

NTCRA, Proposed Plan, and Record of Decision. The objective of the NTCRA was to prevent exposure to the former plating shop floor, process pits, and soil beneath the pits. Installation of a concrete cover to prevent exposure to contaminants in soil beneath the former process pits was chosen as the preferred alternative. The site activities were completed in November 2007. Following completion of the construction completion report in 2008 by the Navy's contractor, the Team completed the Proposed Plan and Record of Decision (ROD) in 2008. The Proposed Plan and ROD provided for land-use controls to be implemented to limit use of and restrict exposure to soil beneath the Plating Shop that poses a potential unacceptable risk to human health. The site is now available to the Navy for use as warehouse space.

SWMU 14

Background. SWMU 14 is in the northeast corner of Sewell's Point at NSN. Sewell's Point is a man-made landmass peninsula formed from dredge material during the 1950s and construction debris during the 1970s. SWMU 14 consisted of a concrete storage pad surrounded by a grass-covered field that was used as a temporary parking lot when the adjacent lots were full. Site 9, a former nonhazardous construction debris landfill, is co-located with SWMU 14 and defines the site boundary.

NTCRA Objective. The SWMU 14 NTCRA objective was to mitigate potential unacceptable human health risk from exposure to site contamination. An asphalt cover (parking lot) was selected as the preferred alternative.

The design of the 14-acre asphalt parking lot, completed in less than 6 months, provided additional parking for approximately 1,400 vehicles in the Q-Area, which is adjacent to and serves as parking for the aircraft carriers when in port at NSN. Additionally, the stormwater runoff management system for the site was designed as 13 Low Impact Development (LID) bioretention areas to filter and treat site runoff before discharge to the adjacent Willoughby Bay. New parking lot lighting was installed and potable water and electric supplies to the recreational fishing pier on the north boundary of the site were upgraded. The perimeter access road and parking spaces were placed to maintain the popular exercise trail around the east and north site perimeters along the waterfront.

Upper Reaches of Bousch Creek

Background. While Bousch Creek was not identified as an IR site during initial environmental investigations at NSN, it was determined to have potentially been affected by IR Site 1 (Camp Allen Landfill), Site 22 (Camp Allen Salvage Yard), and Site 6 (CD Landfill). The Ecological Risk Assessment (ERA) for the upper reaches of Bousch Creek was completed in November of 2006.

The ERA identified potential risk in two areas. The primary area in the upper reaches of the creek was affected by sediment containing metals from historical site operations at the Camp Allen

Landfill. The secondary area, in the upper-middle reaches of the creek adjacent to I-564 and the NSN airfield runway, was affected by polycyclic aromatic hydrocarbon (PAH) contamination not associated with Site 1.

The Team agreed on November 2, 2006, to proceed with removing the affected sediment in the primary area. In addition, the Navy committed to remove the PAH-contaminated sediment in the secondary area as part of this effort.

NTCRA Objective. The objective for the interim action was to implement measures at Bousch Creek that would reduce or eliminate potential ecological risk drivers. This was accomplished through an NTCRA of sediment with no confirmation sampling or long-term monitoring. Following successful sediment removal and restoration, the Navy, USEPA, and VDEQ agreed that Bousch Creek would present no unacceptable ecological risk.

Innovative Technology Demonstration/ Validation and Implementation

As noted earlier, Site 18 involved the innovative injection of EOS® to address groundwater contaminants**,** which caused only temporary site disturbance. Upon completion of site activities, the site was restored to its original condition. Groundwater monitoring is continuing, to evaluate the efficacy of the injection, and aid in determining the long-term site management strategy.

The original plans for Site 23 included a glass-fiber reinforced concrete to serve as a thin protective layer over the former plating shop pits (once filled) and floor that would be suitable for light traffic and storage. However, the NTCRA innovatively provided an approximate 6-inch-thick reinforced concrete floor upon which a forklift or similar equipment could be used. This solution increased the usefulness of the site by allowing heavier equipment to operate and providing for storage of heavier items than originally anticipated.

The Team also utilized the USEPA Emergency Response Team TAGA bus to conduct a real time vapor intrusion investigation and survey of this site. This allowed the team to get real time feedback that VI was not occuring at this site. The team also confirmed and verified these results with summa cannister samples at an independent laboratory.

SWMU 14 received an asphalt cover over a former landfill area that can be used as a much-needed parking lot. The use of bioretention areas at SWMU 14 reduces runoff volume through infiltration and detention. For water quality control, the 13 bioretention facilities combine physical filtering and adsorption with biological processes.

The Chesapeake Bay Executive Directive No. 01-1 (*Managing Storm Water on State, Federal, and District-Owned Lands and Facilities*) requires a reduction of chemicals of concern found in stormwater runoff from public lands in the three toxic regions of concern, one of which is the Elizabeth River. The directive requires the retrofit buildings, rooftops, parking lots, and roadways to enhance infiltration of stormwater runoff, control sources of pollution on these lands and facilities, and treat polluted runoff before it enters the Bay.

Navy installations, such as NSN, in urbanized areas are required to obtain and comply with National Pollutant and Discharge Elimination System (NPDES) permits for small municipal separate storm sewers. The permits require implementation of six minimum control measures, one of which is post construction storm water runoff control. Low Impact Development projects, such as the use of bioretention for stormwater runoff management, help naval installations comply with this minimum measure.

Because NSN generates storm water discharges associated with industrial activity are also required to obtain and comply with NPDES permits for these discharges. These permits require preparation of Storm Water Pollution Prevention Plans, which are required to include baseline and site specific best management practices (BMPs). One of the baseline BMPs is management of stormwater runoff to reduce the amount of pollutants leaving the site. Installation of LID projects helps reduce metals concentrations in runoff.

Partnerships between DoD and Other Entities for Addressing Environmental Cleanup Issues

The NSN Restoration Partnering Team has a 13-plus-year history of working closely together to manage the environmental restoration program for the facility. In the final two years pushing toward the installation RIP and Construction competion milestones, the team really came together to the point that is seemed as if it really was one organizational unit. The trust fostered over this time period allowed for real time on board

document reviews, joint onsite coordination of field events, and an extremely productive partnering relationship. This put the cap stone on a program spanning 27 years of investigation and cleanup. EPA and VDEQ were involved formally for 13 of those years working hand in hand with the Navy. Together the Team studied more than 170 locations suspected to be contaminated. And where the Team found an unacceptable risk to human health or the environment, the Team took action. Having addressed both the immediate and long-term threats in all areas once considered as hazardous waste sites, the Team celebrated the Construction Completion milestone. Reaching this milestone at any Superfund site is a significant accomplishment – but at a federal facility this size, it's an extraordinary achievement. Another great example of partnership included IR Site 22, the Camp Allen Salvage Yard which was transformed to provide for the beneficial reuse of the 22 acre site as a park including a picnic area, volleyball courts, soccer fields and softball fields. This was done in direct coordination with the Virginia Department of Transportation (VDOT). The Navy needed to relocate a portion of the Navy Fleet Rec Park as a result of a road expansion project to construct an intermodal connector from the highway to the port facility adjacent to NSN that required the area occupied by the previously existing Navy fields. This intermodal connector will help alleviate the heavy local traffic associated with the port and adjacent naval installations. Site 22 encompasses approximately 22 acres and was formerly covered with soil and vegetation. Land use controls were implemented to minimize future use of the site that would penetrate the soil cover. The Team previously developed construction requirements for VDOT for the handling of soil and groundwater, as well as site infrastructure (lighting and utilities). VDOT Construction activities were initiated in late FY 2008 and were completed in early FY 2010, providing for 22 acres of recreational re-use of this site.

Restoration Advisory Board

The Team has worked closely with the NSN Restoration Advisory Board (RAB) since its inception in 1994.

The RAB is chaired by the Navy's Remedial Project Manager, Mr. Christopher Murray. The community co-chair was recognized by the NSN Captain for his support of the RAB as well as efforts to increase RAB participation by community members.

The RAB meets semiannually to review technical documents and discuss cleanup actions and alternatives. All RAB meetings are open to the public and are advertised in local newspapers.

The Team has provided RAB members with environmental training so they can effectively help disseminate information to the rest of the community. The RAB focuses on developing a strong relationship with the local residents and environmental groups. These relationships are the foundation for fostering trust and creating an effective environmental community relations program. The RAB members were also invited to the Construction Completion ceremony in FY2010 to recognize their contribution to this achievement.

Summary

The Navy completed approximately $300,000 in design and $5 million in construction activities to execute the NTCRAs at four sites through FY2009. Commitment from the regulatory agencies was provided by adhering to the tight review and comment timeframes to keep on schedule for document preparation.

As indicated in Table 1, SWMU 14 (approximately 1,400 additional parking spaces on 14 acres) and Site 23 (9,500 ft^2 of warehouse space) are available for beneficial reuse by the Navy with the implementation of land use controls. Site 22 was transformed into approximately 22 acres of ball fields for use by the Navy in direct support of the NAVFAC mission. The NTCRA for the Upper Reaches of Bousch Creek provides for the completion of all IR sites that have historically potentially contributed to contaminants within the creek because remedies have been implemented for Site 1, Site 6, and Site 22 that prevent further releases.

Table 1: **IR Site Beneficial Re-Use Summary**

IR Site	Site Re-Use by Installation	Usable Area
Site 23	Storage/warehouse space	9,500 ft^2
Site 22	Recreational Ball Fields	22 acres
SWMU 14	Parking lot (~1,400 spaces)	14 acres

Groundwater monitoring was conducted quarterly for 12 months following the NTCRA/ injection at

Site 18 to determine if the initial injection will require additional injections. Data indicates that the NTCRA was effective in reducing groundwater contaminant concentrations, and an additional injection was completed to supplement the initial injection in FY 2010. These actions were documented in a basewide Proposed Plan and ROD for Site 18 and all of the pre-NPL Navy only decision document program sites (Sites 1, 3 and 20). In FY 2010 alone, this team completed 5 site RODs (Sites 1, 3, 18, 20 and SWMU 14), five Remedial Action Completion Reports, 3 LUC RDs, the design/construction of a pump and treat system, an injection project and all of the routine site management work that occurs on any given year. As a result of these innovative approaches and heavily expedited timeframes, NSN achieved RIP in FY 2009, which provided the first step in reaching USEPA's goal of completing the Preliminary Closeout Report (PCOR). Completion of the PCOR was a goal accomplished in FY 2010 by the Team. An event was held to celebrate this extraordinary partnering team which included the Deputy Administrator of USEPA, Virginia Secretary of Natural Resources, the Assistant Secretary of the Navy, the VDEQ Director, the NSN Commanding Officer, the NSAN Commanding Officer, and the CNRMA Commanding Officer. Utilizing trust and open real time communication, the Team partnership achieved great things and overcame every obstacle presented over the 2009 – 2010 time frame.