PORTSMOUTH NAVAL SHIPYARD

KITTERY, MAINE

INTRODUCTION

PRIMARY MISSION

The primary mission of the Portsmouth Naval Shipyard (PNSY) is to overhaul, repair, and modernize the U.S. Navy's nuclear-powered submarine fleet and to complete the work in a safe, timely, and affordable manner. PNSY is only one of four remaining naval shipyards in the nation. PNSY has three dry docks capable of docking all active classes of submarines, including the *Los Angeles*, *Trident*, and *Virginia*.

SHIPYARD, MILITARY, & TENANT POPULATIONS

Approximately 5,250 civilian employees currently work at PNSY, along with 1,050 active duty military personnel (including estimated rotating sub crews). Although PNSY functions primarily as an industrial facility for the overhauling of submarines, it also provides support facilities for the U.S. Navy Survival, Evasion, Resistance, & Escape (SERE) School, the Naval Branch Health Clinic Portsmouth, the U.S. Army Recruiting Battalion, the Defense Logistics Agency, and the U.S. Coast Guard. PNSY also supports military personnel with on-base berthing, family-oriented programs, and recreational opportunities.

FACILITY LOCATION & DESCRIPTION

PNSY is located in the Town of Kittery, Maine at the southernmost tip of the state, approximately 50 miles north of Boston, Massachusetts. PNSY fully encompasses Seavey Island, which is situated at the mouth of the Piscataqua River. The Piscataqua River is a tidal estuary that forms a natural boundary between Maine (ME) and New Hampshire (NH). This federally-owned island is located across the harbor from Portsmouth, NH, with access to the mainland via two bridges connected to Kittery, ME. The main base of PNSY is approximately 288 acres in size, over 62 acres of which is managed as the Controlled Industrial Area (CIA). Industrial activities are concentrated at the western portion of the base within the tightly-controlled CIA, which includes all dry docks, vessel berths, and numerous buildings that house trade shops supporting maintenance activities. Areas outside the CIA generally include additional trade shops, administration offices, officers' residences, vehicle parking, and recreational facilities.

INSTALLATION HISTORY

PNSY was officially established as a Federal facility in 1800. The facility's primary mission at that time was to build and repair Navy warships. The first government-built submarine, the "*L-8*", was designed and constructed at PNSY in 1917 during World War I. PNSY continued to build submarines until 1969 when the mission was realigned to function exclusively as a submarine overhaul facility. Today, PNSY services some of the most technologically advanced nuclear-powered submarines in the world.

RESTORATION BACKGROUND

REGULATORY HISTORY

Prior to Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) regulations, years of shipbuilding and submarine repair work at PNSY resulted in hazardous substances being released into the soil, groundwater, surface water, and sediment on and around the installation. In 1983, an Initial Assessment Study (IAS) identified 28 potentially contaminated sites at PNSY requiring further investigation. Following this investigation, 15 of the 28 original sites were eliminated from the study. The 13 remaining sites were grouped together based upon similar contaminants and/or locations into seven distinct Operable Units (OUs) and a single Site Screening Area (SSA). The Navy formally established the Installation Restoration (IR) Program in 1986 to address the remaining sites identified during the IAS. PNSY was placed on the National Priorities List (NPL) in May 1994. In September 1999, a Federal Facility Agreement (FFA) was signed by the Navy and U.S. Environmental Protection Agency (EPA). The State of Maine Department of Environmental Protection (MEDEP) elected not to be a party to the FFA at that time, but to maintain a participatory role under CERCLA.

PNSY INSTALLATION RESTORATION OBJECTIVES

The PNSY IR Program has been successful in maintaining and promoting environmental stewardship, while never losing focus on the overall mission of PNSY – the support of Navy Warfighters. Specific program objectives include: 1) Cleanup and closure of remaining active sites; 2) Optimizing existing remediation systems and long-term monitoring plans; 3) Enhancing community relations and stakeholder partnerships; and 4) Providing more effective and efficient program management to ensure that all remediation obligations will be met in a timely manner. The IR Program is committed to successful remediation that will ensure the protection and preservation of human health and the environment. This is being accomplished in part through the direct partnership between the Navy and its regulatory stakeholders, along with collaboration with local municipalities and community residents through an engaged Restoration Advisory Board (RAB).

NAVY PNSY INSTALLATION RESTORATION STAFF

Navy personnel responsible for PNSY IR Program management include:

» The Remedial Project Manager (RPM) with Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic (MIDLANT) Integrated Project Team (IPT) is the lead for the Navy with regards to regulatory collaboration, technical review, environmental contractor management, funding and budgeting requirements, and overall program management.

» The PNSY IR Program Coordinator with NAVFAC Public Works Department Maine (PWD-ME) Environmental (EV) Division provides installation support for the RPM and serves as the local technical representative for all IR-related issues at PNSY. The PNSY IR Program Coordinator also enforces compliance for PNSY and contractors conducting work within or near IR sites.

» The PWD-ME EV Division Director provides installation IR support and serves as the Navy Restoration Advisory Board (RAB) Co-chair.

Regional and local support is received from various departments across NAVFAC MIDLANT and PWD-ME, including Environmental, Construction, Engineering, Planning, and Acquisition. Command support is provided by the Commanding Officer (CO) and Public Affairs Office (PAO).

RESTORATION ADVISORY BOARD

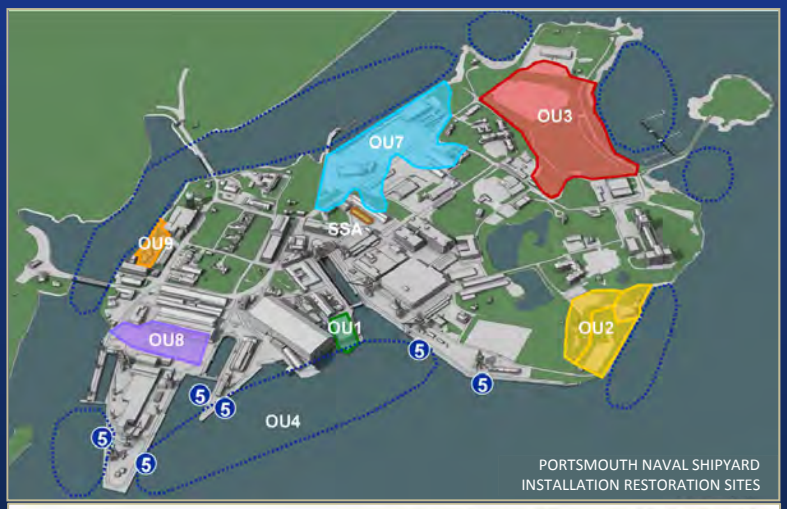
The Navy, EPA, MEDEP, and representatives of local communities from Kittery, ME, and Portsmouth, NH, meet quarterly at the Kittery Town Hall as part of the RAB. New Hampshire Department of Environmental Services (NHDES) representatives also participate. The public is represented in the IR process by local citizens as well as the Seacoast Anti-Pollution League (SAPL), a local citizen's group supported by EPA's Technical Assistance Grant (TAG). Evolving from the Technical Review Committee (TRC) formed in 1987, the RAB was established in 1995 and has maintained a formal charter to provide an open forum between the Navy, regulatory agencies, and local community members to discuss PNSY IR investigation and cleanup activities. The participation of local community members has proven vital to the success of the IR Program, especially given the common bond of the Piscataqua River. PNSY is situated at the center of the river, located directly between both municipalities. The extraordinary diversity of river usage, from recreational sailing and boating to commercial fishing and lobstering, creates a unique environment for local stakeholder interest. Many residential homes, historic and recreational parks, marinas, commercial businesses, and industrial facilities are situated along both sides of the Piscataqua River. The Navy along with its regulatory team continues to welcome the opportunity to share proposed investigation and cleanup activities, analytical data results, program schedules, and cleanup goals with the local community members who have direct personal interest in, and respect for, the health of the Piscataqua River.

The Navy is fortunate to have such an engaged group of members, who bring diverse backgrounds and expertise to the RAB. PNSY has continually received positive feedback from local community members during RAB events. Community outreach was evident in August 2011 when PNSY hosted public meetings for the Proposed Remedial Action Plan (PRAP) associated with OU2 Former DRMO Storage Yard and Former Teepee Incinerator Sites. The meeting was held at Kittery Town Hall and began with a public informational session, immediately followed by a public comment period. The event proved to be successful with thoughtful public comments received.

In February 2012, PNSY was successful in finalizing an update to its IR Community Involvement Plan (CIP). The interviews conducted with federal, state, municipal, and community stakeholders were beneficial in documenting and assessing the quality and quantity of community outreach with regards to the PNSY IR Program. Insight gained from public feedback has been invaluable to PNSY in its goal of achieving enhanced partnerships with all stakeholders and other interested parties.

SITE MANAGEMENT PLAN (SMP)

The IR investigation and cleanup schedules are established and updated annually as part of the Site Management Plan (SMP). The SMP serves as a management tool for planning, reviewing, and setting priorities for investigative and remedial IR activities at PNSY. The summary table below shows the aggressive schedule the Navy is committed to in expediting final remedy/closure at each IR site. In brief, the schedule lists all final remedies to be in place by FY14, a plan intended to streamline the cleanup process at PNSY. This ambitious goal has been sustained with the completion of two Records of Decisions (RODs) and a Draft No Further Action (NFA) decision document during FY11-FY12.



Operable Unit	Site Designation	Site Discovery	Preliminary Investigation	Remedial Investigation	Feasibility Study	Record of Decision	Remedial Design	Remedial Action or Interim Removal Action	Remedy in Place
OU1	Site 10: Former Battery Acid Tank No. 24	•	•	•	•	•	•	•	•
OU2	Site 6: DRMO Storage Yard & DRMO Impact Area Site 29: Former Teepee Incinerator Site	•	•	•	•	•	•	FY13	FY14
OU3	Site 8: Jamaica Island Land Fill Site 9: Former Mercury Burial Sites Site 11: Former Waste Oil Tanks No. 6 & 7	•	•	•	•	•	•	•	•
OU4	Site 5: Former Industrial Waste Outfalls	•	•	•	•	FY13	FY13	FY14	FY14
OU7	Site 32: Topeka Pier Site	•	•	•	FY13	FY13	FY13	FY14	FY14
OU8	Site 31: West Timber Basin	•	•	FY13	FY13	FY14	FY14	FY14	FY14
OU9	Site 34: Former Oil Gasification Plant	•	•	•	FY13	FY13	FY13	FY14	FY14
Site Screening Area	Site 30: Galvanizing Plant, Building 184	•	•	N/A	N/A	N/A	N/A	•	•

Installation Restoration Investigation / Cleanup schedule
• = Complete; FY__ = Anticipated Completion Date

ENVIRONMENTAL RESTORATION CHALLENGES

CHALLENGES SPECIFIC TO PNSY

Coordination and communication are critical to ensuring program success at this unique installation. Outlined below are only some of the challenges considered while implementing the IR Program at PNSY.

» Original Island Assemblage: The Shipyard was built on a combination of five islands historically connected by over 90 acres of fill material. The heterogeneous composition of the fill makes investigation, delineation, and cleanup of IR sites exceedingly challenging.

» Past Processes: PNSY is a 212 year-old facility with a long industrial history involving the manufacturing, processing, handling, and disposal of various hazardous and non-hazardous materials used in shipbuilding. Many of these materials had been managed in accordance with procedures accepted at that time, but unfortunately resulted in the contamination of soils, groundwater, and sediments at the installation.

» Historical/Archaeological Significance: The PNSY National Register Eligible Historic District (NREHD) encompasses over 200 of the 288 acres of the installation, with special consideration afforded to certain buildings, structures, monuments, and areas of archaeological sensitivity. This also proves challenging, as facility modifications and ground disturbance within certain areas often require formal consultation with the Maine State Historic Preservation Officer (MESHPO).

» Restricted Access & Security: Since PNSY holds and maintains a nuclear license in the servicing of Navy nuclear-powered submarines, access to the facility is strictly managed and monitored. Coordination with mission and security requirements presents a significant challenge for IR Program execution, including the choice of field equipment and the implementation of innovated technology.

» Full of Activity, Limited on Space: PNSY encompasses 288 acres, two-thirds of which is covered by high density industrial area, including over 376 buildings. Over 6,000 civilian and military personnel work at the Shipyard on a daily basis. Space is extremely limited at PNSY, making any additional activity outside the daily functionality of PNSY difficult to execute, including IR field investigation and cleanup activities.

» Protection of the River: Local residents and other stakeholders have a special interest in PNSY due to the common bond of the Piscataqua River. Groundwater modeling and monitoring is a key component to the investigation and documentation of potential contaminant migration. Additionally, sediment sampling and analysis aids in the identification of offshore environmental conditions. Special consideration must be given during all field activities to limit potential adverse impacts to the river.

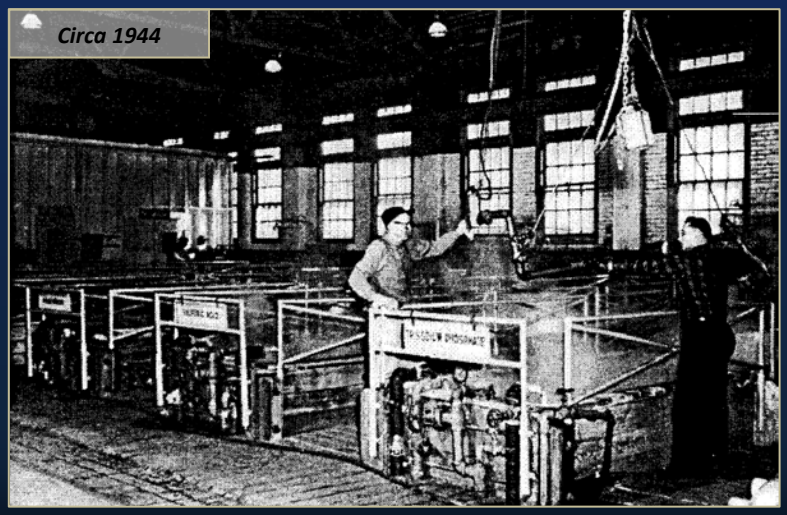
FY11-FY12 NOTEWORTHY ACCOMPLISHMENTS

SSA: SITE 30 – BUILDING 184 GALVANIZING PLANT

Building 184 was originally constructed in 1943 to serve as a galvanizing plant for PNSY during World War II. The tank vault was constructed at the approximate center, along the eastern wall of the building. The tank vault, measuring approximately 52 feet long by 35 feet wide by 4 feet deep, was constructed with concrete and lined with acid-proof bricks set in acid-proof cement. The tank vault originally contained multiple pickling tanks that were used to remove oxide scale from metal surfaces via immersion in a diluted acid bath. This past process chemically cleaned the metal surfaces in preparation for plating and galvanizing. During peak production between 1943 and 1945, up to 500,000 pounds of material were galvanized per month. Circa 1960, in order to accommodate a new PNSY welding school, the tanks were removed and the vault was backfilled and covered with a concrete slab. In 1973, crystalline growth was discovered along the edges of the concrete slab. During a 2001 investigation, the substance tested hazardous (dermal contact) as a result of its low pH. Numerous periodic removals of the crystalline growth occurred up until 2007, when a rubber membrane was installed as a barrier designed to eliminate direct contact and inhibit further growth. The exterior pavement was also re-graded in 2007 to redirect stormwater away from the Building 184. An Engineering Evaluation Cost Analysis (EE/CA) was finalized in November 2010 and an Action Memorandum (AM) was signed by the CO in December 2010. A Remedial Action Work Plan (RAWP) was finalized in Summer 2011, with removal activities starting in September 2011. Initial work involved the removal of the existing concrete slab via a jack hammer-equipped skid steer.

The area beneath the slab was immediately inspected for crystalline growth, which was found to be limited strictly to the perimeter of the vault. The fill contained within the vault consisted of tan sand and gravel not impacted by crystalline growth. Approximately 300 cubic yards of non-hazardous soil were removed from the vault, with approximately two inches of perched water encountered at the center of the vault floor. A total of approximately 600 gallons, including rinse waste water used to clean the acid-proof brick vault floor, were removed and disposed of as part of the effort. The brick floor and sidewalls of the vault were reported in excellent condition with no evidence of staining.

Since Building 184 is considered a historically significant building, MESHPO consultation was required prior to the start of the remedial activities to comply with Section 106 of the National Historic Preservation Act (NHPA). The consultation required documentation of the empty vault's historic features by an historic architectural photographer using large format and digital photography meeting the National Register photo criteria. After conducting site visits in November 2011, EPA and MEDEP agreed that a NFA decision was appropriate for Site 30. The Navy completed backfilling and concrete floor work as part of the final site restoration during November 2011. The completion of this removal action prepared the way for the design and execution of a $1.6-million FY13/14 Energy and Repairs Project for the Deep Submergence Testing Facility. This project will ultimately enable long-term adaptive reuse of this historic building. The Building 184 remedial project is an exceptional example of IR Program support to the PNSY mission.

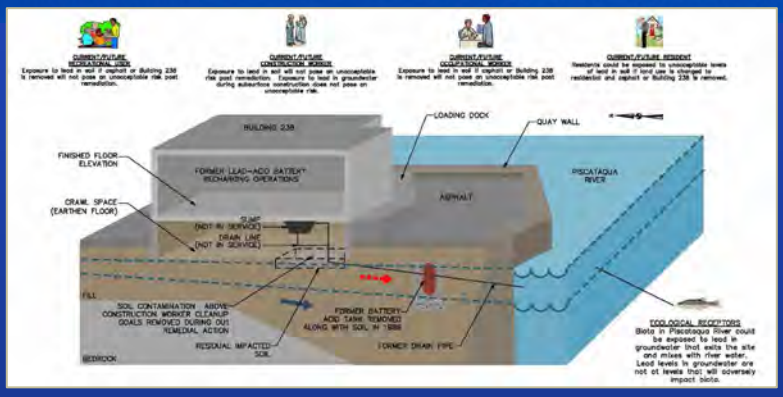


Circa 1944

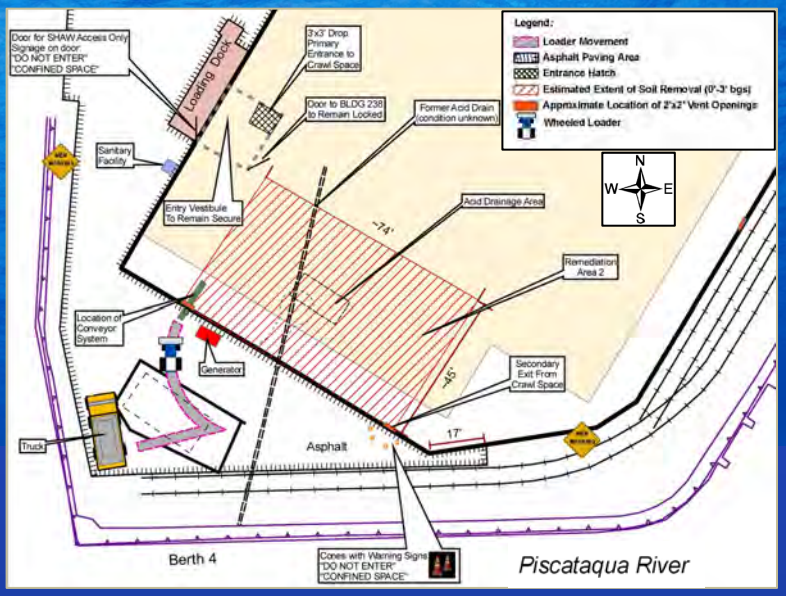
November 2011

OU1: SITE 10 – BUILDING 238 FORMER BATTERY ACID TANK

Building 238 is located on a small peninsula in the CIA where critical submarine maintenance activities are conducted on a daily basis. Building 238 was constructed in 1955 and was previously used for battery recharging operations. Lead is the primary contaminant of concern in both soil and groundwater at the OU1 Former Battery Acid Tank Site. The Piscataqua River forms the eastern, southern, and some of the western boundary of OU1. The lead contamination originated from pre-1984 releases of rinse water discharged from lead-acid battery operations. Specifically, these releases occurred under the crawl space of the building/loading dock via former decrepit rinse water drainage piping.



The earthen floor crawl space beneath Building 238 is five to six feet below the outside ground elevation and is completely inundated by groundwater at tidal levels greater than mean high tide. Lead concentrations in soil, which were reported at levels exceeding 10,000 parts per million (ppm), created an unacceptable human health risk for construction workers and personnel requiring access within the crawl space. Upon finalization of a Feasibility Study (FS) and PRAP in June 2010, a ROD was signed by the CO in September 2010. The RAWP was finalized in Fall 2011, with work starting in November. Over a two and one half month period, a total of approximately 400 cubic yards of lead-contaminated soil was removed by hand from the crawl space. The footprint of the final excavation totaled approximately 3,650 square feet and extended to a depth of three feet. The extreme, unfavorable working conditions posed numerous challenges, including intense physical labor.



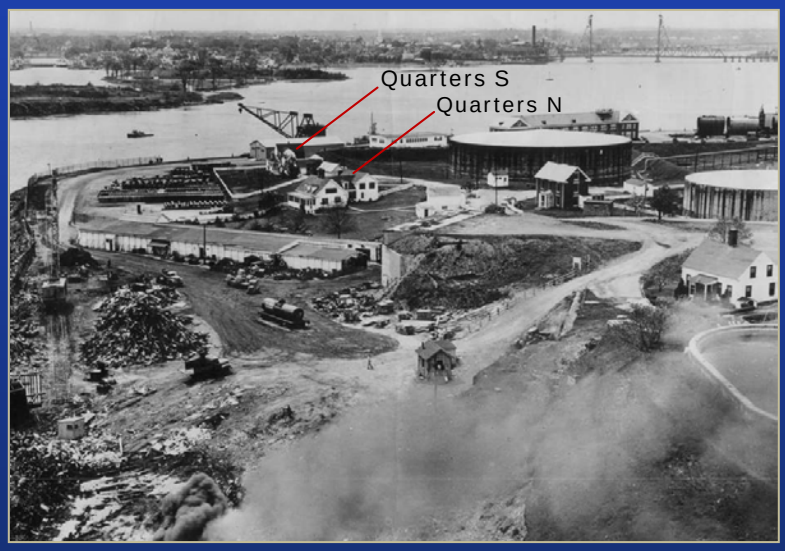
The crawl space is considered a non-permit required confined space necessitating increased safety expertise in entry/exit and emergency response. Given the workspace constraints, lead-contaminated soils were hand shoveled onto a motorized conveyor system and stockpiled outside the building pending disposal. The worksite footprint, including laydown area, was constrained by narrow access lanes, high pedestrian and vehicle traffic, and numerous waterfront operations. Inclement weather, including snow and ice, also posed safety and operational considerations. Tenant coordination was proactively managed to minimize access and scheduling conflicts for an active loading dock located at the rear of the building, utilized daily to support multiple PNSY codes/shops. Many of these logistical/physical challenges were directly associated with the worksite being located within the CIA, immediately adjacent to Dry Dock 2 and two frequently occupied berths. Accordingly, consistent coordination with the CIA was also critical to the success of the project which was ultimately completed in February 2012. Two rounds of confirmatory groundwater sampling were also completed in 2012. This, in conjunction with Land Use Controls (LUCs) outlined in the January 2012 Land Use Control Remedial Design (LUC RD), documented that the remedial action was successful in achieving site remediation goals.


November 2011 – Start


February 2012 – Complete

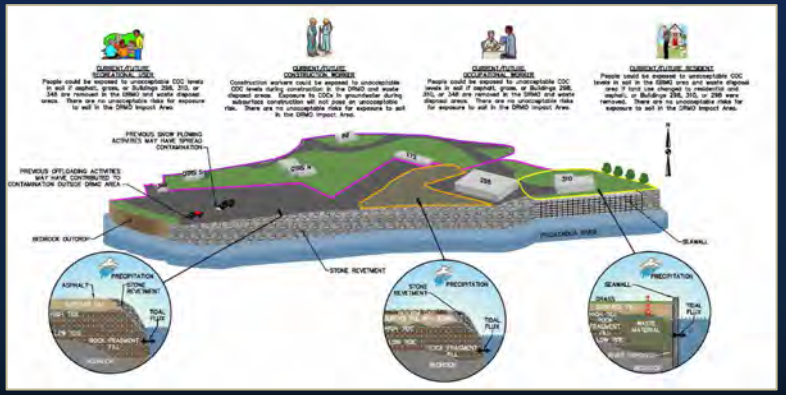
OU2: SITE 6 & 29 – FORMER DRMO STORAGE YARD

OU2 is located at the southernmost portion of Seavey Island and consists of the Former DRMO Storage Yard Site, the DRMO Impact Area, and the Former Teepee Incinerator Site. The DRMO Impact Area consists of military housing units, Quarters S and N, and is located within the original shoreline of Seavey Island dating back to 1901. The area surrounding these Quarters consists of grassed yards, mature trees, walkways, and driveways. The southern limit of the site is defined by a privacy fence which separates the Quarters' backyards from the Former DRMO Storage Yard. Since its establishment in 1920, the DRMO Storage Yard historically stored materials that included lead and nickel-cadmium battery elements, motors, and scrap metal. The site contaminants of concern are directly associated with the lead and nickel-cadmium battery cells and plates that were stored on uncovered pallets.

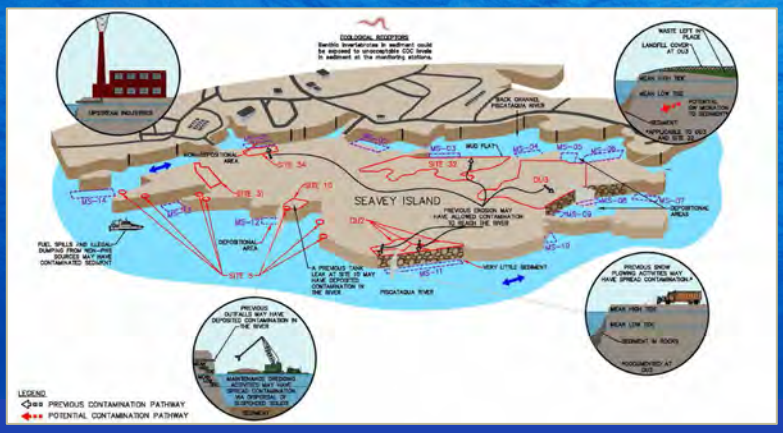


Access roads and railroad tracks used for the transportation of materials to the storage yard existed in what are presently the backyards of Quarters S and N. Snow plowing in the storage yard may have also pushed stored materials into adjacent areas, including the Quarters' backyards. In 2008, subsurface investigations at the DMRO Impact Area reported lead and copper soil concentrations which exceeded residential screening levels for human and ecological receptors. Based on the results of these investigations, future use of the Quarters was immediately suspended by the Navy until remedial activities were conducted to reduce contaminants to acceptable residential cleanup levels. In November 2009, the CO signed the AM for a Non-Time Critical Removal Action (NTCRA) at the DRMO Impact Area, focusing on the cleanup of the landscaped backyard areas located immediately south of Quarters S and N. Since excavation activities were within an area of potential archaeological significance, a Phase I Archaeological Survey was initiated in June 2010 as a result of the consultation process with the MESHPO. The Phase I survey identified three archaeological items of interest; however these items were later classified as archaeologically insignificant as a result of a Phase II Archaeological Survey. MESHPO concurrence was received in September 2010, which was shortly followed by the initiation of the site remedial excavation activities.

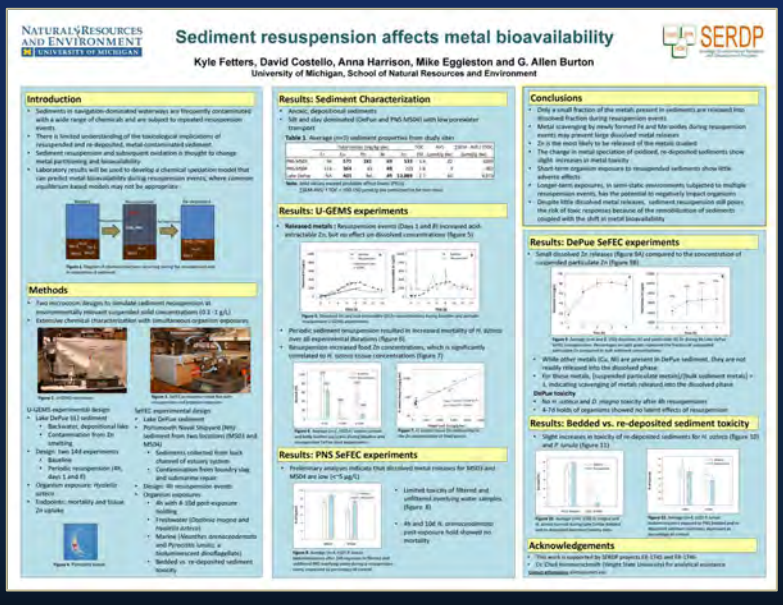
Approximately 2,670 cubic yards of lead and copper contaminated soils were excavated as part of the remedial effort completed in November 2010. Post-excavation sampling confirmed that site conditions were restored to meet residential cleanup standards at the DRMO Impact Area, resulting in unlimited exposure and unrestricted property use. Final site restoration, including landscaping and fence replacement, were completed in Spring 2011. A NFA decision for the DRMO Impact Area was subsequently documented in the OU2 DRMO Storage Yard ROD, signed by the CO in September 2011. The ROD also outlined remedial action requirements for the Former DRMO Storage Yard and Teepee Incinerator Site portions of OU2. The Draft OU2 Remedial Design (RD) included evaluation of sustainable remediation for the remedial alternatives. Environmental and social sustainability aspect evaluation focused on footprint reduction and remedy optimization. SiteWise™ computer software was used to conduct a Life Cycle Assessment assisting in the evaluation of environmental impacts of remedial activities. As excavation was the primary component of the proposed remedial action, the impact categories considered included global warming potential (through greenhouse gas emissions), energy consumption, water consumption, criteria pollutants (NO_X, SO_X and PM_{10} emissions), and risk of accident (fatality/injury). The evaluation considered the construction, operation and long-term monitoring phases of the remedies, including manufacturing and production of consumable materials and equipment. The remedial action activities are scheduled for Spring 2013 and will include excavation of approximately 12,000 cubic yards of contaminated soils from the Former DRMO Storage Yard and Teepee Incinerator Sites. Coordination with PNSY base personnel will be critical to minimize any impacts to Buildings 298 and 310 occupants as well as various PNSY codes/shops utilizing the Former DRMO Storage Yard for equipment storage and laydown space. The LUC RD for OU2 was finalized in March 2012, which outlined institutional and engineering site controls as well as future shore stabilization monitoring.



OU4: SITE 5 – OFFSHORE AREAS OF CONCERN



Since 1999, the Navy has been conducting interim monitoring of OU4, consisting of Offshore Areas of Concern (AOCs) at PNSY which coincide with adjacent onshore IR sites and former industrial waste outfalls. OU4 Offshore AOC data is collected to determine potential influences of onshore remedial actions, natural processes, and/or other sources on contaminant concentrations in sediments. The OU4 Interim ROD designated 14 monitoring stations to adequately represent PNSY offshore conditions. In the September 2012 Draft OU4 PRAP, the Navy proposed to remove contaminated sediment at four monitoring stations posing ecological risk, with NFA proposed at the remaining 10 stations. The Navy also proposed discontinuation of the interim monitoring at OU4. In conjunction with OU4 investigations, PNSY had the unique opportunity in 2011 and 2012 to support the Strategic Environmental Research and Development Program (SERDP) executed in partnership with the Department of Defense, Department of Energy, and EPA. In support of two SERDP projects, the Navy provided researchers from the University of Michigan and Northwestern University with sediment samples from offshore locations at PNSY. Research objectives included enhanced understanding of physical, chemical, and biological processes interaction and how it controls the transformation, mobility, bioavailability, and toxicity of metals in sediments. The release of metals was also measured during repeated sediment re-suspensions to determine potential toxicity impacts to organisms. A portion of the research was recently summarized in a poster entitled, *Sediment Re-suspension Affects Metal Bioavailability*, which was presented at the Society of Environmental Toxicology and Chemistry conference held in November 2012.


Natural Resources and Environment — University of Michigan

Sediment resuspension affects metal bioavailability

SERDP

Kyle Fetters, David Costello, Anna Harrison, Mike Eggleston and G. Allen Burton
University of Michigan, School of Natural Resources and Environment

Introduction

Methods

Results: Sediment Characterization

Results: U-GEMS experiments

Results: PNS SeFEC experiments

Conclusions

Results: DePue SeFEC experiments

Results: Bedded vs. re-deposited sediment toxicity

Acknowledgements

OU3: SITES 8, 9, & 11 – JAMAICA ISLAND LANDFILL

From 1945 to 1978, PNSY used 25 acres of land, now identified as the Jamaica Island Landfill (JILF), for the disposal of refuse, trash, construction debris, dredged sediments, and industrial wastes. The area previously functioned as tidal mud flats. As prescribed in the ROD, approximately 43,000 cubic yards of landfill material was excavated and consolidated to the southern side of the site, where it was placed under a multi-layered landfill cover system. A two-acre salt marsh was constructed within the northern excavated area, which was reduced to one foot below the original tidal mudflat elevation. Re-creation of this natural resource was successful in restoring viable wildlife habitat for various native marine invertebrates, fish, bird, and mammal species.

The JILF has been successfully reutilized to provide paved parking and athletic fields for both military and civilian personnel. OU3 LUCs included institutional and engineering controls as components of the final remedy intended to control and restrict certain activities/uses. The OU3 LUC performance objectives included maintaining the landfill cover and associated shoreline erosion control measures as well as ensuring future landfill activities are consistent with the remedy. As a result of the collaborative effort to finalize the OU3 LUC RD in 2011, the EPA decided to designate the OU3 LUC RD as the template for all of EPA Region 1. The LUC RDs subsequently finalized for OU1 and OU2 were modeled after the OU3 LUC RD. This is a significant accomplishment for the Navy and speaks to its effective partnerships with stakeholders. These PNSY IR Program achievements exemplify the Navy's commitment to the protection and preservation of human health and the environment.

›› prepared by Matt Thyng, PNSY IR Program Coordinator frederick.thyng@navy.mil ‹‹