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NWS YORKTOWN  
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LETTER AND COMMENTS FROM VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY  
REGARDING DRAFT SITE MANAGEMENT PLAN MAY 2009 FOR FY 2010-2011 NWS  
YORKTOWN VA  
7/7/2009  
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

## Sawyer, Stephanie/VBO

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**Subject:** FW: NWSY: SMP - DEQ Comments  
**Attachments:** WPNSTA SMP\_2010 to 2011\_rev1(DEQ).doc

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**From:** Smith, Wade [<mailto:Wade.Smith@deq.virginia.gov>]  
**Sent:** Tuesday, July 07, 2009 1:11 PM  
**To:** [tom.kowalski@navy.mil](mailto:tom.kowalski@navy.mil)  
**Cc:** Friedmann, William/VBO; Forshey, Adam/VBO; [Thomson.Bob@epamail.epa.gov](mailto:Thomson.Bob@epamail.epa.gov)  
**Subject:** NWSY: SMP - DEQ Comments

Thank you for giving the DEQ the opportunity to comment on the May 2009 *Draft Site Management Plan, Fiscal Years 2010-2011* for NWSY.

The Draft SMP was received by the DEQ on June 3, 2009.

The DEQ's comments are attached (Track Changes via Microsoft Word).

Upon your acceptance of the proposed changes and upon your submittal of the requested revisions, the DEQ will issue an official letter for your files.

Please let me know if you have any questions.

Sincerely,

**Wade M. Smith**  
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Draft

**Site Management Plan  
Fiscal Years 2010—2011**

**Naval Weapons Station Yorktown  
Yorktown, Virginia**

**Contract Task Order X058**

**May 2009**

Prepared for

**Department of the Navy  
Naval Facilities Engineering Command  
Mid-Atlantic**

Under the

**NAVFAC CLEAN 1000 Program  
Contract N62470-08-D-1000**

Prepared by



**CH2MHILL**

**Virginia Beach, Virginia**

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4	Land Use Planning.....	<del>4-14-514-1</del>
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**Comment [WMS1]:** Please ignore, I didn't change these page numbers.

**Tables (Tables are located at the end of each section.)**

- 2-1 Site Summary WPNSTA Yorktown
- 2-2 WPNSTA Yorktown/CAX Partnering Team Consensus Statement Summary
- 2-3 Major Elements of the CERCLA Process

**Comment [WMS2]:** Please revise this table. It currently contains incomplete descriptions of the EE/CA and IRA; FS; PP; and Five Year Review.

**Figures (Figures are located at the end of each section.)**

- 1-1 Location of WPNSTA Yorktown and CAX
- ~~1-22-1~~ Location of WPNSTA Sites and SSAs
  - 3-1 Site 1 – Dudley Road Landfill
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  - 3-3 Site 4 - Burning Pad Residue Landfill
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  - 3-5 Site 7 - Plant 3 Explosives-Contaminated Wastewater Discharge Area
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  - 3-10 Site 16 - West Road Landfill & SSA 16 - Building 402 Metal Disposal Area & Environs
  - 3-11 Site 17 - Holm Road Landfill
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  - 3-13 Site 21 - Battery and Drum Disposal Area
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  - 3-16 Site 24 – Aviation Field
  - 3-17 Site 25 - Building 373 Rocket Plant
  - 3-18 Site 26 - Building 1816 Mark 48 Waste Otto Fuel Tank
  - 3-19 Site 28 - Building 28 X-Ray Facility Tank Drain Field
  - 3-20 Site 29 – Lee Pond
  - 3-21 Site 30 – Bracken Road Incinerator and Environs
  - 3-22 Site 31 – Barracks Road Landfill Industrial Area
  - 3-23 SSA 14 - Building 537 Discharge to Felgates Creek
  - 3-24 SSA 15 – Sewage Treatment Plant #1 Sludge Drying Beds and Discharge Area
  - 3-25 SSA 22 – Sand Blasting Grit Pile
  - 3-26 SSA 25 - Wetlands Downgradient of Beaver Pond

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- 3-27 MWR Skeet Range
- 3-28 Site 2 - Turkey Road Landfill
- 4-1 WPNSTA LUC Boundary Map

**Schedules (Schedules are located at the end of Section 3.)**

- 3-1 Site 1 FY10-11 Schedule
- 3-2 Site 3 FY10-11 Schedule
- 3-3 Site 4 FY10-11 Schedule
- 3-4 Site 6 FY10-11 Schedule
- 3-5 Site 7 FY10-11 Schedule
- 3-6 Site 8 FY10-11 Schedule
- 3-7 Site 9 FY10-11 Schedule
- 3-8 Site 11 FY10-11 Schedule
- 3-9 Site 12 FY10-11 Schedule
- 3-10 Site 16/SSA16 FY10-11 Schedule
- 3-11 Site 17 FY10-11 Schedule
- 3-12 Site 19 FY10-11 Schedule
- 3-13 Site 21 FY10-11 Schedule
- 3-14 Site 22 FY10-11 Schedule
- 3-15 Site 23 FY10-11 Schedule
- 3-16 Site 24 FY10-11 Schedule
- 3-17 Site 25 FY10-11 Schedule
- 3-18 Site 26 FY10-11 Schedule
- 3-19 Site 28 FY10-11 Schedule
- 3-20 Site 29 FY10-11 Schedule
- 3-21 Site 30 FY10-11 Schedule
- 3-22 Site 31 FY10-11 Schedule
- 3-23 SSA 14 FY10-11 Schedule
- 3-24 SSA 15 FY10-11 Schedule
- 3-25 SSA 22 FY10-11 Schedule
- 3-26 SSA 25 FY10-11 Schedule

**Comment [WMS3]:** Please verify that Schedules 3-1 through 3-26 have been accurately established and consistently detailed (including Duration, Start, and Finish) according to the CERCLA Path Forward for each site.

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## Background and Regulatory Framework

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### 2.1 Activity Description

WPNSTA Yorktown is a 10,624-acre installation located on the Virginia Peninsula in York and James City Counties, Virginia (Figure 1-1). WPNSTA Yorktown is bounded on the northwest by Cheatham Annex and the King's Creek Commerce Center; on the northeast by the York River and the Colonial National Historic Parkway; on the southwest by Route 143 and Interstate 64; and on the southeast by Route 238 and the town of Lackey.

Originally named the United States (U.S.) Mine Depot, WPNSTA Yorktown was established in 1918 to support the laying of mines in the North Sea during World War I. For 20 years after World War I, the depot continued to receive, reclaim, store, and issue mines, depth charges, and related materials. During World War II, the facility was expanded to include three trinitrotoluene (TNT) loading plants and new torpedo overhaul facilities. A research and development laboratory for experimentation with high explosives was established in 1944. In 1947, a quality evaluation laboratory was developed to monitor special tasks assigned to the facility which included the design and development of depth charges and advanced underwater weapons. On August 7, 1959, the depot was renamed the U.S. Naval Weapons Station. Today, the primary mission of WPNSTA Yorktown is to provide ordnance, technical support, and related services to sustain the war-fighting capability of the armed forces in support of national military strategy.

### 2.2 Environmental History

#### 2.2.1 Regulatory History

Comprehensive environmental restoration activities at WPNSTA Yorktown began in 1984 under the Navy Assessment and Control of Installation Pollutants (NACIP) and ER Programs. The purpose of the NACIP and ER Programs was to identify, assess, characterize, and clean up or control contamination from past waste management activities. The NACIP program was modified into the ER Program (ERP) in 1986 to reflect the requirements of CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA). The Navy is committed to clean up sites that pose a threat to human health or the environment and implementing environmental stewardship practices that ensures Navy waste management operations are in compliance with all federal and state regulations and Navy policy.

On October 15, 1992, WPNSTA Yorktown was added to the National Priorities List (NPL) based on a Hazard Ranking System (HRS) score of 50. An FFA between the Navy and the USEPA was signed August 1994, and incorporated the Resource Conservation and Recovery Act (RCRA) Solid Waste Management Units (SWMUs) at WPNSTA Yorktown, as identified in a 1992 RCRA SWMU Investigation Report (A. T. Kearney, 1992). The FFA Findings of

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Fact identified 16 Sites (Sites 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 16, 17, 18, 19, and 21) for Remedial Investigation (RI). Appendix A of the FFA identified 19 Site Screening Areas (SSAs) [SSAs 1-19] for the Site Screening Process (SSP). Subsequent to the FFA, six additional SSAs (SSA 20 - SSA 25) were identified for consideration in CERCLA. Based on the results of the SSP, SSA 1 (currently Site 23), SSA 6 (currently Site 24), SSA 7 (currently Site 25), SSA 10 (currently Site 28), SSA 16 (currently Site 16), SSA 18 (currently Site 26), SSA 20 (currently Site 29), and SSA 24 (currently Site 30) were determined to warrant Remedial Investigation/Feasibility Study (RI/FS) efforts under CERCLA. Appendix B of the FFA identified 21 Areas of Concern (AOCs) for desktop audits under CERCLA to determine if the AOCs warranted further consideration in the SSP. With the exception of AOCs 5, 6, and 7 which are associated with SSA 15, the Navy in partnership with USEPA and VDEQ agreed that no action was warranted for all other AOCs (Baker, 1997a). However, one additional AOC (AOC 23, currently Site 31) was added in 2007 when it was determined that groundwater in the industrial area upgradient of Site 12 was contaminated with trichloroethene (TCE). In addition, in 2007, the Navy initiated investigation of numerous Munitions Response Program (MRP) sites including the Morale, Welfare, and Recreation (MWR) Skeet Range. Although Site 31 and the MWR Skeet Range were not included in the FFA, investigations at these sites have been or will be conducted following CERCLA guidance and are thus included in this document.

Comment [WMS4]: Please identify the 21 AOCs.

Comment [WMS5]: Is there an AOC 22?

Table 2-1 identifies active sites, SSAs, and AOCs addressed under CERCLA at WPNSTA Yorktown and those in which it was determined that no action or no further action (NFA) is required. Figure 2-1 shows the location of each site at WPNSTA. Active sites, SSAs, and AOCs are discussed in Section 3. Additional background information for sites and SSAs with no action or NFA determinations prior to 2007 is provided in the FY08-09 SMP, which was identified as a "baseline" SMP in the FY09-10 SMP.

**Partnering**

The Navy works in partnership with USEPA and VDEQ and has established a formal WPNSTA Yorktown Partnering Team to implement CERCLA. Partnering Team decisions are documented through consensus statements; a summary of Team<sup>1</sup> consensus statements is presented in Table 2-2.

**2.2.2 Hydrogeologic Setting**

WPNSTA Yorktown is situated within the Virginia Coastal Plain Physiographic Province, which is characterized by unconsolidated sediments several thousand feet in thickness (Meng and Harsh, 1988). Deposition and erosion associated with fluctuating sea levels resulted in terraces that decrease in topographic elevation in a stair-step pattern with scarps, oriented north to south, that delineate the eroded shoreline along the toe of each terrace. Two terraces (Lackey Plain and Croaker Flat) are divided by one scarp (the Camp Peary Scarp) within the boundaries of WPNSTA Yorktown.

A total of ten geologic formations have been identified (Brockman et al., 1997) beneath WPNSTA. The upper most geologic formations consists of alluvial, colluvial, and marsh deposits composed of silt, sand, and pebbles with some clay. The geologic units are grouped

<sup>1</sup> WPNSTA Yorktown and Cheatham Annex (CAX) conducted joint Partnering between 2000 and September 2008, when the bases split into separate Partnering Teams.

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**Groundwater.** In Site 7 groundwater, VOCs comprising of 1,1,1-TCA, 1,1-DCA, and 1,1-DCE were detected at maximum concentrations of 200 µg/L, 58 µg/L, and 33 µg/L, respectively. In addition, explosives HMX, RDX, 4-amino-2,6-DNT, and TNT were detected at concentrations of 34 µg/L, 180 µg/L, 37 µg/L, and 56 µg/L, respectively. No SVOCs, pesticides, or PCBs were detected in Site 7 groundwater. There are currently no groundwater wells within or close to the drainage area which received the contaminated wastewater. Groundwater monitoring at Site 7 is ongoing.

### Potential Risks

Human health risks were evaluated for Site 7 and concluded that exposure to surface soils posed potential unacceptable non-cancer hazards to future child residents (HI=4.4) and exposure to subsurface soils posed unacceptable non-cancer hazards to future construction workers (HI=4.4). No unacceptable cancer risks or other non-cancer hazards were identified from exposure to soils. However, potential cancer risks and non-cancer hazards were not calculated for the future resident from exposure to subsurface soils. In addition, no unacceptable human health risks were identified from exposure to surface water or sediment from the unnamed tributary or Felgates Creek and no unacceptable risks were identified from exposure to groundwater under a non-potable, beneficial use scenario (lawn watering and car washing). Risks from potable groundwater use by future residents have not been calculated.

The SERA determined that surface soil concentrations of aluminum, antimony, cadmium, chromium, copper, iron, lead, mercury, vanadium, and zinc presented potential unacceptable risks to ecological receptors. Aluminum, iron, manganese, and nickel were detected at concentrations posing potential unacceptable risk to aquatic ecological receptors in surface water from the unnamed tributary leading to Felgates Creek; however, these constituents were below their respective background values. Sediment collected from the Site 7 unnamed tributary posed potential unacceptable risk to benthic macroinvertebrates or aquatic receptors from exposure to di-n-butylphthalate, aluminum, beryllium, iron, and manganese. However, sediment concentrations of aluminum, beryllium, iron, and manganese were detected within background sediment concentrations. In addition, in Felgates Creek sediment, di-n-butylphthalate, beryllium, iron, manganese, and/or selenium potentially pose unacceptable risk to aquatic receptors; however, selenium was the only chemical that exceeded background concentrations (Baker, 1998b).

### Remedial Action(s)

In 1996, following the Round Two RI, a field-scale pilot study to treat explosives-contaminated soil and sediment at Site 7 was conducted. Approximately 770 cubic yards (yd<sup>3</sup>) of soil and sediment were excavated from the drainage area leading to the tributary at Site 7. TNT contaminated soil was excavated and sent to the newly-constructed bio-cell located at Site 22. The TNT concentrations in the soils entering the bio-cell averaged over 1,000 parts per million (ppm). After treatment, the TNT concentrations ranged from less than 1 ppm to 4 ppm (Baker, 1997b).

A ROD was signed in October 1998 for site soils and drainage area sediment. The ROD included proposed LUC boundaries. Although the ROD indicated LTM would be conducted for surface water and groundwater, it specified that LTM was not the final

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remedy for these media. The ROD specified no additional remedial action for soil and sediment in the drainage way because the field-scale pilot study mitigated potential human health risks and ecological concerns in these media under industrial/commercial land use (Baker, 1998c). LTM of surface water and sediment in Felgates Creek, and groundwater associated with the site was conducted between 2000 and 2005 and included VOCs, explosives, and inorganic analysis (Baker, 2006). The 2007 Five-Year Review concluded that the remedy was protective of human health and the environment. Although groundwater monitoring is included in the LTM program, further investigations of groundwater are currently ongoing. LUCs prohibiting residential use within and around the Site 7 drainage area have been maintained through routine inspections.

**Activities Completed 2008-2009**

The Navy has negotiated a draft LUC RD with the USEPA, however specific details (i.e., sentence structure and wording) have not been finalized. Phase II RI field activities are being conducted and include the collection of groundwater, surface water, and sediment samples. A draft Phase II RI Report is expected in late 2009.

**CERCLA Path Forward**

- Completion of LTM Phase II RI Report
- FS/PP/ROD for groundwater, as appropriate
- Five-Year Review (2012)
- RACR

Schedule 3-5 presents the FY10-11 schedule for Site 7.

**3.2.6 Site 8—NEDED Explosives-Contaminated Wastewater Discharge Area**

**Site Description**

Site 8 is a 300-foot drainage way located along the Eastern Branch of Felgates Creek, approximately 1.5 miles from the confluence of Felgates Creek and the York River (Figure 3-6). The drainage way lies east of the Naval Explosives Development Engineering Department (NEDED) complex (Building 456). The topography is generally level around Building 456, but slopes steeply into the drainage way. The ground surface is paved with the exception of the wooded western and northern portions of the site. The surficial aquifer within the drainage way at the site is encountered at approximately 6 feet bgs, and flows towards Felgates Creek.

Between 1940 and 1975, Site 8 received wastewater discharge from the NEDED complex. The wastewater reportedly contained unspecified solvents, spent/neutralized acids, and nitramine compounds. In 1974, a carbon adsorption tower was installed to treat the contaminated wastewater prior to discharge. In 1986, the effluent from the tower was diverted fro Site 8 to the sanitary sewer serviced by HRSD. Since 1986, the site has reverted to a natural drainage area. A summary of relevant documents and action milestones is presented in the table below.

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surface water. Because concentrations of 2,4,6-TNT in soils could be impacting surface water, this constituent was also identified as posing a potential risk for terrestrial receptors. In addition, potentially unacceptable risks were identified for aquatic receptors due to concentrations of BEHP in sediment.

### Remedial Action(s)

Pre-removal confirmation sampling was conducted in the drainage area from the discharge point to the Felgates Creek channel to determine the extent of chemicals posing potential risk (Baker, 2005c). As a result, the EE/CA recommended excavation and offsite disposal of contaminated soil and sediment (Baker, 2005d) based on established remediation goals (RGs) for BEPH, Aroclor-1260, amino-DNTs, HMX, RDX, 2,4,6-TNT, chromium, iron, mercury, vanadium, and zinc. A sediment RG for Aroclor-1260 was also established in the event that the contamination extended beyond the soil/sediment interface.

The removal action was initiated in March 2007. Upon completion, 1,193 tons of contaminated soils/sediment and 44 tons of PCB-contaminated soils were removed. The results of post-removal confirmation samples indicated that all explosives were either non-detect or below the established RG. In addition, chromium, iron, mercury, vanadium, and zinc were detected in confirmation samples at concentrations either below their established RGs or consistent with background values. Total PCBs (0.61 mg/kg) in soils exceeded the RG (0.1 mg/kg) at the transition of soil to sediment along the western excavation towards Felgates Creek. Based on these results, the Navy, in partnership with the USEPA and VDEQ reached consensus (April 2007 Partnering meeting) that NFA for explosives and inorganics in soil or sediment was required. Further removal of PCBs in sediment at the western boundary toward Felgates Creek continued out into the creek channel. Post-removal confirmation samples and pre-removal grab samples collected from the western boundary contained elevated levels of PCBs (0.145 mg/kg at F53659-4 and 0.130 mg/kg at F53659-12) in exceedance of RGs. As a result, a TM was written to risk-manage the elevated levels of PCBs in sediment (CH2M HILL, 2008a). In May 2008, the Navy, the USEPA, and VDEQ reached consensus that NFA for soils and sediment is required. Groundwater and surface water are currently under further investigation and have not yet been addressed by any remedial actions.

### Activities Completed 2008-2009

It is anticipated that the Construction Completion Report (CCR), documenting the removal action, will be finalized in 2009. In addition, Phase I RI work plan field activities were completed in 2008 and a RI for groundwater and surface water is expected in 2009.

**Comment [WMS6]:** Do you want the anticipated completion of this in the CERCLA Path Forward?

### CERCLA Path Forward

- Completion of RI for groundwater
- FS/PP/ROD for all media, as appropriate
- RACR

Schedule 3-6 presents the FY10-11 schedule for Site 8.

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### 3.2.7 Site 9—Plant 1 Explosives-Contaminated Wastewater Discharge Area

#### Site Description

Site 9 is a discharge area that consists of a 600-foot drainage way and the immediate surrounding area (Figure 3-7). Site 9 is located east of Lee Pond and topographically downgradient of Site 19. The drainage way flows from the northwest portion of Building 10 westward, underneath Bollman Road, and discharges to Lee Pond. Wooded areas immediately surround the drainage way and rip-rap is present along the top of the relatively steep slope leading down into the site. Groundwater is encountered at a depth of 10 to 29 feet bgs within the shallow Cornwallis Cave aquifer and flows to the southwest toward Lee Pond. Within the deeper Yorktown-Eastover aquifer, groundwater is encountered between approximately 39 and 51 feet bgs and flows west/southwest.

Between the late 1930s and 1975, Site 9 was used as a drainage way for Plant 1 (Building 10) explosives-contaminated wastewater and (possibly) organic solvents. A carbon adsorption tower was installed in 1974 to treat the wastewater prior to discharge in accordance with a NPDES permit. In 1986, the effluent from the carbon adsorption tower was diverted to the sanitary sewer and ultimately to HRSD. Wastes including weapons casings and railroad ties were discarded along the drainage way bank prior to flowing under Bollman Road. In addition, on the other side of Bollman Road, several drums were discarded along the drainage way. No information is available regarding the date(s) this material was disposed (Baker, 1994). The weapon casings, railroad ties and drums were removed along with contaminated soils and sediment in 1994. Currently, the site has reverted to a natural drainage way for surface runoff from surrounding areas and receives no wastewater discharge from the Plant 1 complex. A summary of relevant documents and action milestones is presented in the table below.

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#### Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Round One RI Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Action Memorandum and EE/CA	Baker, 1994	00615
Closeout Report, Sites 2 and 9 and Site Screening Area 4, Mine Casing and Debris Removal Action	IT Corporation, 1995	00646
Site 19 and Composites of Site 9, Site 19, SSA 6 & SSA7 Independent Sampling and Risk Screening Report	Black & Veatch, 1996	00781
Round Two RI Report, Sites 9 and 19	Baker, 1997	00889
Feasibility Study Sites 9 and 19	Baker, 1997	00966
Proposed Remedial Action Plan Sites 9 and 19	Baker, 1997	00967
Record of Decision,v3, Operable Unit Nos. VI and VII, Sites 9 and 19	Baker, 1998	02077

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and 0.27 µg/L, respectively. However, because BEHP and 3-nitrotoluene were not detected in site soils or groundwater, it is unlikely that they are related to the site. These were the only organic constituents detected in surface water. Several inorganics were also detected in surface water; however concentrations were also below background and/or ecological and human health screening values.

**Sediment.** Several VOCs, SVOCs, pesticides, and one PCB (Arochlor-1260) were detected in sediment samples from Felgates Creek adjacent to Site 25. With the exception of carbon disulfide, a naturally occurring chemical, there were no organic constituents detected in surface sediment which exceeded human health or ecological risk screening values. Carbon disulfide was detected at a concentration of 14 µg/kg in Felgates Creek surface sediment. Benzo(b)fluoranthene and 2,4-dinitrotoluene were detected in subsurface sediment at concentrations of 110 µg/kg and 130 µg/kg respectively, greater than ecological screening values. However, these constituents were detected in a duplicate sample and were not detected in the parent sample collected at the same location. There were no inorganics detected in sediment at concentrations greater than background and risk screening values.

#### Potential Risks

No unacceptable human health or ecological risks were identified from exposure to site media based on the human health and ecological risk assessments included in the 2008 Draft Final Round One RI Report (Baker, 2008a). However, groundwater risks associated with potable use and risks to future residential receptors from subsurface soil were not evaluated. The human health risk and ecological risk assessments are currently being updated using current guidance and considering the most conservative residential human exposure scenarios.

#### Remedial Action(s)

The UST, associated piping, and surrounding soils at Site 25 were removed in 1996 (OHM, 1997).

#### Activities Completed 2008-2009

A revised Draft Final Round I RI was completed in February 2008 for all media. The Final Round I RI is expected in 2009. In addition, additional groundwater samples for perchlorate analysis will be necessary in accordance with the Perchlorate White Paper (Baker, 2008b). These samples will be collected in the spring of 2009 with the results documented in a TM, which is expected to be submitted in mid-2009.

Comment [WMS8]: Please update.

Comment [WMS9]: Please update.

#### CERCLA Path Forward

- Finalize RI
- TM documenting perchlorate sampling results
- NFA PP/ROD

Schedule 3-17 presents the FY10-11 schedule for Site 25.

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### 3.2.18 Site 26—Building 1816 Mark 48 Waste Otto Fuel Tank

#### Site Description

Site 26 (formerly SSA 18) is located in the central portion of the WPNSTA, outside Building 1816 (Figure 3-18). Site 26 includes a 10,000-gallon concrete UST and network of ancillary drain pipes that were formerly used to store waste Otto fuel. This fuel consisted of a mixture of Otto fuel and water, which may have also contained oil, denatured ethyl alcohol, detergent, and trace amounts of cyanide, halogenated hydrocarbons, and heavy inorganics. In late 1987, waste Otto fuel was discovered leaking from the tank. The fuel was removed, the tank was cleaned, and a RCRA closure permit was filed. In March 1995, the 10,000-gallon waste Otto fuel UST and a nearby 8,000-gallon UST, used to store #2 fuel oil, were removed from the site. Site 26 has been retained as an Installation Restoration Program (IRP) site because of chlorinated VOCs detected in shallow groundwater. Depth to groundwater in this area is generally 30 feet to the shallow Cornwallis Cave aquifer. The Yorktown confining unit is approximately 25 feet thick at Site 26 and separates the Yorktown-Eastover aquifer from the Cornwallis Cave aquifer. The topography at the site is generally flat at about 70 feet msl. A summary of relevant documents and action milestones is presented in the table below.

Field Code Changed

#### Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Action Memorandum, Site Screening Area 18	Environmental and Safety Designs, Inc, 1994	00612
Soil Assessment Report for Site Screening Area 18	Baker, 1994	00619
Site Screening Progress Report for Site Screening Areas 2, 17, 18 and 19	Baker, 1996	00666 (Volume I) 00667 (Volume II)
Draft Final Round One Remedial Investigation Report for Sites 23, 24, 25, and 26	Baker, 2008	(Draft – No AR No.)

#### Nature and Extent of Potential Contamination

The source of contamination to site media was the contents of the USTs that were removed in 1995. Previous investigations included full suite analysis of soil and groundwater. Surface water and sediment are not associated with Site 26.

**Soil.** The only VOCs detected in soil were carbon disulfide and methylene chloride, which are common laboratory contaminants. Fluoranthene was detected in one surface soil sample at a concentration of 36 J µg/kg. Three pesticides [methoxychlor (3.4 µg/kg), alpha-chlorodane (0.56 µg/kg), and gamma-chlorodane (0.57 µg/kg)] were detected in one surface soil sample. No inorganics were detected above residential RBCs, with the exception of arsenic (53 mg/kg) and iron (129,000) with maximum concentrations in deep (37 feet bgs) subsurface samples.

**Groundwater. Shallow Groundwater (Cornwallis Cave Aquifer).** The chlorinated VOCs, 1,1 DCE, 1,1 DCA, and 1,1,1 TCA were detected in the Cornwallis Cave aquifer at maximum concentrations of 100 µg/L, 10 µg/L, and 130 µg/L, respectively. No other organic

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status determinations for AOCs 5, 6, and 7, as identified in the *Area of Concern Decision Signature Page with Attachments* (Baker, 1997a), are pending the CERCLA status decision for SSA 15.)

#### Removal Action(s)

In 2001, the Imhoff tank, trickling filter, sludge drying bed, and chlorination unit were removed.

#### Activities Completed 2008-2009

The completion of a desktop audit is expected in 2009.

#### CERCLA Path Forward

- Desktop audit

Schedule 3-24 presents the FY10-11 schedule for SSA 15.

### 3.2.25 Site Screening Area 22 – Sand Blasting Grit Area

**Comment [WMS10]:** Consider revising all references to SSA 22 (to Site 33).

#### Site Description

SSA 22 (formerly AOC 4) consists of approximately 0.5 acres located in the eastern portion of WPNSTA Yorktown. SSA 22 is bounded to the east and north by Bollman Road to the south by the former location of Building 530, and to the west by unused land (Figure 3-25). A sand blast grit area was adjacent to Building 530, which operated between 1945 and the early to mid 1980s. Bomb fins and wings, inert bomb casings, and various other inert ordnance items were grit blasted in a blasting booth inside Building 530, and outside at the northern end of the building. Grit blasting material may have been composed of coal slag or steel grit. The blasting booth within the building used a dust collector; accumulated dust may have been deposited in the vicinity of the northern side of Building 530.

SSA 22 is a mostly cleared grassy area that is generally flat in topography. There are no surface water bodies associated with this SSA. A summary of relevant documents and action milestones is presented in the table below.

#### Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Navy Final Recommendation for Areas of Concern (SSA 22 is identified as AOC#4)	P.A. Rakowski, P.E., 1995	00355
Remedial Action Report for Sites 1 and 3 and SSA 22	OHM, 2001	01091
Site Screening Process Report for Site Screening Areas 3, 4, 5, 9, 10, 20, 21, 22, 23, and 24	Baker, 2001	01350 (Volume I) 01351 (Volume II) 01352 (Volume III)

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### Nature and Extent of Potential Contamination

Potential contamination at SSA 22 is related to sand blasting activities within and near former Building 530 and the grit pile that was possibly located in the north corner of Building 530. The contaminants of concern at SSA 22 are VOCs in groundwater (note: only one monitoring well has been installed at SSA 22). Surface water and sediment are not associated with SSA 22. No SVOCs, pesticides, or PCBs were detected in the groundwater. Dissolved inorganics were significantly lower than total inorganics and were detected at concentrations below tap water RBC values. The VOCs 1,1-DCE (2 J µg/L), total 1,2-DCE (6 J µg/L), TCE (220 µg/L), and total xylenes (2 J µg/L) were detected in groundwater. Of the VOCs, only TCE exceeded its respective MCL and tap water RBC (Baker, 2001). These detections are located downgradient of a UST; however historical records indicate that only #2 fuel oil (which does not contain any VOCs) was stored in the UST. Therefore, it is most likely that the potential VOC contamination be associated with the use of solvents and degreasers as part of Building 530 activities.

### Potential Risks

The HHRA identified a cumulative non-cancer hazard (HI=19) for future residents from ingestion of unfiltered groundwater due to exposure to aluminum, arsenic, chromium, iron, manganese, and vanadium. HQs of these inorganics were below 1 except for aluminum (HQ = 1.2), arsenic (HQ = 7.7), and iron (HQ = 8.0). In addition, an unacceptable cumulative cancer risk of  $2.1 \times 10^{-3}$  was calculated from exposure to TCE (ILCR =  $1.4 \times 10^{-4}$ ) and total arsenic (ILCR =  $1.9 \times 10^{-3}$ ).

The HHRA also identified a cumulative non-cancer hazard (HI=1.5) for future residents from ingestion of filtered groundwater due to exposure to dissolved aluminum, arsenic, iron, and manganese. There were no individual HQs greater than 1 and these inorganics affect different target organs; therefore their effects are not cumulative. An unacceptable cancer risk of  $3.4 \times 10^{-4}$  was calculated from exposure to TCE (ILCR =  $1.4 \times 10^{-4}$ ) and dissolved arsenic (ILCR =  $1.2 \times 10^{-4}$ ).

Potential terrestrial ecological risks have not been evaluated.

### Remedial Action(s)

In 1998, a remedial action consisted of the removal of lead contaminated soil and sandblasting grit between 6 inches and 2 feet bgs. Following the removal action, post excavation soil samples demonstrated lead concentrations in soil remaining at the site were below the remediation goal of 200 mg/kg (OHM, 2001a).

An NFA Decision Summary for soil was signed May 2004 (Baker, 2004b).

### Activities Completed 2008-2009

A RI work plan followed by a RI for groundwater is expected in 2009.

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### CERCLA Path Forward

- RI work plan for groundwater
- RI for groundwater
- FS/PP/ROD for groundwater, as appropriate
- RD/RA, as appropriate

Schedule 3-25 presents the FY10-11 schedule for SSA 22.

### 3.2.26 Site Screening Area 25—Wetlands Downgradient of Beaver Pond

**Comment [WMS11]:** Consider revising all references to SSA 25 (to Site 32).

#### Site Description

SSA 25 is located in the extreme eastern portion of WPNSTA Yorktown (Figure 3-26). The area is approximately 5.6 acres, and is located between two impounded portions of Ballard Creek: a natural beaver dam (Impoundment No. 1) which forms the eastern edge of Beaver Pond and a second impoundment approximately 750 feet downgradient (Impoundment No. 2), whose history of construction has not been determined. Ballard Creek is hydraulically connected for its entire length. Water flows from the erosive, upgradient areas down to Beaver Pond, then over a low area along the northern edge of the beaver dam into the downgradient wetlands, and then through a break in the southern edge of the second impoundment towards the York River. The second impoundment restricts tidal influences from the York River, though the break allows some interaction, the magnitude of which has varied over time. The centerline of Ballard Creek, which meanders throughout the area, marks the property boundary between WPNSTA and the National Parks Service's (NPS) Colonial National Historic Park. Based on its location on Ballard Creek between the two impoundments, the wetlands represent a low energy, bottomland depositional habitat. The topography is characterized by a broad, flat area between steep upland slopes with elevations on the order of 30 to 50 feet amsl.

During its operational period, the STP No. 2 trickling filter discharged via a regulated outfall directly to the wetland area. The trickling filter was installed in 1952 and reportedly managed sanitary waste and used elemental mercury (approximately 4 to 6 ounces) as a water seal in the pivot point. Though this seal was maintained, it is likely that mercury leaked into the trickling filter tank and was subsequently discharged to SSA 25 via the STP outfall. It is assumed that treatment operations ceased in the early 1970s, as mercury-sealed trickling filters were banned from use in the state of Virginia in 1971. STP No. 2, prior to being dismantled and removed in 2000, was an inactive treatment plant consisting of a clarifier, settling tanks, and sludge drying beds. The former STP No. 2 clarifier and settling tanks were filled with rainwater and substantial vegetation was growing in drying beds during early assessment activities associated with the WPNSTA ERP (early 1990s). Beaded elemental mercury was discovered around the base of the trickling filter during the demolition process. Twelve drums of mercury-contaminated soils were disposed of and confirmation samples indicated no residual mercury contamination following the removal of the STP buildings and infrastructure. A summary of relevant documents and action milestones is presented in the table below.

**Field Code Changed**

**Documents and Milestones**

Document Title /Milestone	Author/Date	AR Document Number
Consensus Statement 5-18-04-37	May 18, 2004	N/A
Consensus Statement 8-17-05-42	September 26, 2005	01739
Final Project Plans Step 3B and 4 of the BERA	Baker, 2005	01873
Site 12 Final Long-term Monitoring (LTM) Report (1998-2003)	Baker, 2005	02078
Final Steps 6 and 7 of the Aquatic BERA	CH2M HILL, 2008	02412
Draft Final Engineering Evaluation/Cost Analysis Site Screening Area 25	CH2M HILL, 2009	(Draft – No AR No.)

**Nature and Extent of Potential Contamination**

Soil and groundwater are not considered media at the site as discharge from the former STP#2 occurred directly into the wetland area. Sediment analytical data collected from Ballard Creek and historical records indicate that the primary source of mercury contamination to the wetlands is STP No. 2, formerly located northwest and immediately up-slope of the wetlands area. Sediment samples located near the former STP discharge pipe detected mercury at a concentration of 5.9 mg/kg, which led to additional surface and subsurface sediment sampling throughout SSA 25 where mercury concentrations were found to range between 0.031 J and 15.3 mg/kg and between 0.037 J and 19.5 mg/kg, respectively. Based on this information and potential for unacceptable impacts to aquatic ecological receptors from mercury exposures in SSA 25, the Navy in partnership with USEPA and VDEQ agreed to identify mercury as the sole contaminant of concern (COC) (May 2004 Partnering meeting).

**Potential Risks**

Since it was determined that mercury was the sole COC a BERA was implemented that included surface water, sediment and tissue samples were collected and analyzed for mercury, methyl mercury, pH, total organic carbon, sulfate, sulfide, ammonia, dissolved organic carbon, and grain size, as appropriate.

The results of the BERA indicate that mercury, cadmium, and silver in sediment pose a potential unacceptable ecological risk in the wetland area. PRGs, developed by the WPNSTA Yorktown ecological subgroup, which consisted of technical representatives from the Navy, USEPA Region 3 BTAG, and VDEQ, for mercury (4.2 mg/kg), cadmium (3.8 mg/kg), and silver (102 mg/kg) were identified in the BERA to be protective of ecological receptors. They are based on site-specific No Adverse Effect Levels (NOAELs) as documented in the March 20, 2008 ecological subgroup conference call meeting minutes. The WPNSTA partnering team concurred with these PRGs and agreed to incorporate them into the BERA during the April 2008 partnering meeting. The BERA did not identify any potential unacceptable ecological risks from exposure to surface water or from bioaccumulation of mercury or methyl mercury in fish or amphibian populations.

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Based on a human health risk screening evaluation presented in the draft EE/CA (CH2M HILL, 2009b), there are no potential human health risks from exposure to sediment or surface water. Furthermore, with no shellfish and only very small fish present within the wetland area (mosquito fish, no longer than about 6 centimeters), there is no potential human health risk associated with consumption of fish at the site.

#### **Remedial Action(s)**

No CERCLA remedial actions have taken place at SSA 25.

#### **Activities Completed 2008-2009**

A final EE/CA and final Action Memorandum are expected in 2009 to support a removal action to address contaminated wetland sediment that exceed PRGs identified in the 2008 BERA for mercury (4.2 mg/kg), cadmium (3.8 mg/kg), and silver (102 mg/kg).

#### **CERCLA Path Forward**

- Finalize EE/CA and Action Memorandum
- Removal Action
- NFA Decision Document
- RACR

Schedule 3-26 presents the FY10-11 schedule for SSA 25.

### **3.3 MRP Sites**

The MRP sites identified at Yorktown are comprised of the MWR Skeet Range and the Turkey Road Landfill (formerly ERP Site 2). The MWR Skeet Range was identified in a final PA (Malcolm Pirnie, 2005) that also identified three areas as potential MRP sites: the Demolition Range, the Detonator Blasting Pit Area, and the Detonator Pit.

#### **3.3.1 MWR Skeet Range**

The MWR Skeet Range is approximately 30 acres used exclusively for recreational purposes between 1980 and 1982 (weekends only); after 1982, the range was used sporadically until it was dismantled in 1994 (Figure 3-27). Activities were limited to skeet shooting with shotguns from a launching pad, with a 900-foot arc safety danger zone. The site currently is not maintained and not in use. There are no munitions and explosives of concern on the site, as only small-caliber ammunition was used. Munitions constituents on the site include lead, antimony, copper, zinc, arsenic, and PAHs from bullets, fragments, bullet jackets, and related sporting material such as clay targets.

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## Documents and Milestones

Document Title/ Milestone	Author/Date	AR Document Number
Preliminary Assessment, Naval Weapons Station Yorktown	Malcolm Pirnie, 2006	01942
Expanded Site Inspection Report for the Closed MWR Skeet Range and the Closed Marine Pistol and Rifle Range	CH2M HILL, March 2008	02180

### Nature and Extent of Potential Contamination

The source of potential contamination is the spent ammunition (specifically lead shot) and clay targets used at the range. A metal detector survey and sieve analysis for lead shot was also conducted during the 2007 Expanded Site Inspection (ESI). In addition, surface and subsurface soil samples were collected during the ESI and analyzed for lead and PAHs. Exceedances of residential RBCs and background levels existed for both PAHs and lead in surface soils. PAHs exceeding risk screening criteria were comprised of benzo(a)anthracene (920 µg/kg), benzo(a)pyrene (1,400 µg/kg), benzo(a)fluoranthene (620 µg/kg), and indeno(1,2,3-cd)pyrene (330 µg/kg) at sample YR01-SS78. Benzo(a)pyrene exceeded risk screening criteria at one additional location (YR01-SS75). Lead exceeded the ecological screening value at two locations: YR01-SS50 (218 mg/kg) and YR01-SS59 (210 mg/kg). There were no exceedances of the risk screening criteria for subsurface soils.

### Potential Risks

Although current and future anticipated land use is industrial, based on the conservative risk screening process potential human health risks from exposure to soils were considered acceptable for the following reasons: The cumulative carcinogenic risk ( $6.5 \times 10^{-5}$ ) from soil exposure only slightly exceeded the conservative threshold of  $5 \times 10^{-5}$  for UU/UE, individually, only benzo(a)pyrene carcinogenic risk ( $5.8 \times 10^{-5}$ ) slightly exceeded the conservative screening threshold, because potential risk based on RME only slightly exceeded the threshold, a CTE would not be expected to result in unacceptable risk, and the sporadic distribution of detected concentrations did not indicate a release.

Only two of 24 surface soil sample locations (SS50 and SS59) contained concentrations of lead (218 and 210 mg/kg, respectively) above both background and the ecological screening value. The magnitude of the screening value exceedances, however, was low, with the highest detected concentration of 218 mg/kg exceeding the screening value (120 mg/kg) by a HQ of only 1.8. In addition, the screening value (120 mg/kg) was based upon potential effects to terrestrial plants. The site is completely vegetated with no obvious signs of stress to the vegetation. Soil screening values based upon other terrestrial receptors are higher than the maximum measured concentration on the site. Also, the site wide mean surface soil concentration for lead (29.8 mg/kg) was considerably less than the ecological screening value of 120 mg/kg (HQ of 0.25). This, in combination with the low magnitude and frequency of screening value exceedances, and the lack of lead shot in sieve samples, indicates that potential ecological risks on a site-wide basis are acceptable.

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