ATTACHMENT L-11: MATERIAL MANAGEMENT REFERENCE DOCUMENTS

NAVFAC's Standard Operating Procedure (SOP) - Management of Excavated and Imported Soils (HR-SOP-HW-03)

DOCUMENT NO.:

HR-SOP-HW-03

TITLE:

Management of Excavated and Imported Soils Standard Operating Procedure (SOP)

CONTENTS

DOCUMENT OWNER: Waste Program Manager	AUTHORIZED BY: Director, HW Compliance & P2

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From: NAVFAC MIDLANT Director, HW Compliance & P2
To: NAVFAC MIDLANT FEADS, Commands and Tenants at CNIC Hampton Roads Naval Installations

Subj.: Standard Operating Procedure (SOP) – Management of Excavated and Imported Soils

1. **Purpose:**
NAVFAC Mid-Atlantic's Environmental Office manages soils at Hampton Roads installations by ensuring compliance with applicable federal, state, laws, regulations, and policies.

This SOP contains guidance for the management of excavated and imported soils in the Commonwealth of Virginia through reuse at the site of excavation, off-site disposal or off-site re-use. It is preferred that excess soil be used at the project site.

Adherence to the following soil management procedures is imperative to maintain compliance. A failure to maintain compliance can result in violations and fines.

2. **References:**
-Virginia Waste Management Act
-Virginia Solid Waste Management Regulations 9 VAC 20-81 *et. seq.*
-Virginia Hazardous Waste Management Regulations 9 VAC 20-60 *et. seq*.
-Virginia Department of Environmental Quality Guidance Document #LPR-SW-02-012 Titled "Solid Waste Special Waste Disposal Request" as revised
- Virginia Department of Environmental Quality Guidance Document #LPR-SW-04-2012 Titled "Management of and Reuse of Contaminated Media Guidance and Variance" as revised
-Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

3. **Applicability:**
It is the responsibility of the activity to notify the Installation Hazardous Waste Media Manager (HWMM) of soils requiring removal from or imported to project sites. The Installation HWMM should be notified before any soils are removed or imported.

4. **Action:**
Due diligence is required to be conducted when any excavation is planned. It is imperative that the management of excess soil be considered at the earliest stages of project planning. Excess soil can be managed a number of ways: it can be used within the area of the excavation, taken for disposal to an offsite appropriately permitted facility, or re-used offsite in accordance with Virginia Department of Environmental Quality Guidance Document #LPR-SW-04-2012 Titled "Management of and Reuse of Contaminated Media Guidance and Variance" as revised.
Every reasonable precaution shall be taken, including temporary and permanent soil stabilization measures, throughout the duration of the project to control erosion and prevent siltation of adjacent lands, rivers, stream, wetlands, lakes, and storm water conveyance

systems. Soil stabilization and/or erosion control measures shall be applied to erodible materials, soil stockpiles, or denuded ground surfaces exposed by any land disturbing activity.

A. <u>Excavated Soil To Be Re-Used On-Site Only</u>

Soils that have been excavated as part of a construction project and that are used as backfill for the same excavation or excavations containing similar contaminants at the same project site, at concentrations of the same level or higher are excluded from the definition of solid waste per the Virginia Solid Waste Management Regulations 9 VAC 20-81 *et. seq.*

Therefore, soils re-used on site (project site area only) are not regulated and will not require any analytical testing provided there is no free petroleum product. If during excavation of soils any visible and/or odor/smell of contamination is encountered, excavation operations should stop and the Installation Environmental Department be contacted immediately.

B. <u>Requirements for Excavated Soil Planned For Disposal At Permitted Landfill</u>

The Resource Conservation and Recovery Act (RCRA) requires waste generators to determine if materials intended to be discarded (disposed of) meet the definition of a solid waste, and if so, whether the solid waste is a characteristic or listed hazardous waste. The Commonwealth of Virginia has adopted all the requirements set forth under RCRA for waste determinations. Therefore, to be in compliance with Federal and State regulations, all soils destined for disposal require a waste determination (includes generator knowledge and analytical testing) to be completed. The waste determination shall be made by the installation's HWMM or authorized EV Services staff.

Generator knowledge (includes but is not limited to: industrial operations, releases/spills, former contamination clean-up, etc. at the project site) should be utilized whenever possible in the waste determination process, along with analytical testing. Use of generator knowledge will be the responsibility of the Navy representatives (FEADs, PMs, CMs, OICCs, etc.) who will provide the Installation HWMM and NAVFAC MIDLANT EV Services with any historical information of the project site where soil excavation is required.

I. Excavated Soil Analytical Testing Requirements:

1) Analysis of excavated soil is required to be completed in accordance with the Virginia Department of Environmental Quality (DEQ) guidance document #LPR-SW-02-012 (Solid Waste Special Waste Disposal Request) which can be found at the link below:

http://deq.state.va.us/Portals/0/DEQ/Land/Guidance/LPR-SW-02-2012.SpecialWasteDisposalRequestGuidance.pdf.

Guidance document #LPR-SW-02-012 requires the following characteristics and constituents to be analyzed: ignitability, corrosivity, reactivity, TCLP (metals, VOCs, SVOCs, pesticides, and herbicides), PCBs, BTEX, TPH, TOX and Paint Filter.

2) All analysis, methods, sample collection and frequency, etc. shall be conducted in accordance with EPA SW-846 Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods.

   If soil is known to be contaminated with a petroleum product, sampling frequency will be one (1) sample for every 250 cubic yards (CY) of soil. For quantities greater than 2,500 CY, the sampling rates may be adjusted with approval from Virginia DEQ.

3) The receiving permitted disposal facility may require additional analytical requirements not covered by the Virginia DEQ guidance for their operational solid waste management facility permit requirements. Typically, the analytical parameters provided by the Virginia DEQ regulations will meet the requirements for the landfill's permit; however, this must be verified prior to sampling.

4) Analytical laboratories are required to be Virginia Environmental Laboratory Accreditation Program (VELAP) certified/accredited. Facilities providing Virginia DEQ with environmental laboratory data to satisfy permit and/or regulatory requirements must ensure their environmental laboratories (commercial or noncommercial) have been accredited or certified by Virginia Division of Consolidated Laboratory services DCLS.

5) All analytical results must be submitted to the Installation HWMM and NAVFAC MIDLANT EV Services for review and disposal requirements (non-hazardous vs hazardous).

II. Excavated Soil Disposal Requirements:

1) After analytical results have been reviewed and disposal requirements are determined, a waste profile (usually obtained from the permitted landfill, treatment facility, or disposal contractor) must be submitted to NAVFAC MIDLANT EV Services for review, approval, and signature. NAVFAC MIDLANT EV Services is the only authorized division/department with the authority to review, approve, and sign waste profile documentation for soil/waste disposal (non-hazardous or hazardous waste disposal) on behalf of the Navy; no other personnel (to include contractors) are authorized to sign waste profiles. Please allow up to 15 business days for analytical review and approval, and signature for waste profile.

2) Each disposal shipment (haul truck, bulk container, etc.) from the installation to the permitted landfill or treatment facility must be accompanied with the proper shipping documents (non-hazardous or hazardous waste manifests, etc.). NAVFAC MIDLANT EV Services is the only authorized division/department to sign any and all shipping documents on behalf of the Navy; no other personnel (to include contractors) are authorized to sign. Coordination must be made with NAVFAC MIDLANT EV Services at 757-341-0412 or 0460 to obtain proper generator information and signature for shipping documents.

III. Management Requirements for Excavated Soil to Be Disposed Of:

1) Soils that are determined to be non-hazardous or hazardous waste may only be accumulated for up to 90 days at the generating project site in an appropriate container without obtaining a solid waste or hazardous waste management storage permit.

    a. At a minimum, the "container" may be constructed on-site using poly sheeting plastic liner and cover that utilizes hay bales or other sediment control measures to minimize sediment discharge by storm water run-off.

    b. The soil may also be containerized in drums or roll-offs that are covered.

2) All accumulation areas (including containers) must be properly labeled. Prior to making a waste determination the container must prominently display a sign or label stating "Waste Pending Analysis" and include an accumulation start date.

3) If project site soils are determined to be hazardous, the contractor and Navy representatives are required to contact the Installation HWMM immediately for additional soil storage and handling requirements.

IV. Imported Fire Ant Quarantine:

The counties of James City and York, and the cities of Chesapeake, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, and Williamsburg are currently located within an Imported Fire Ant quarantine area.

Regulated articles (including soil) can be moved freely within the quarantine area; however, regulated articles may not be moved outside of the quarantine area unless they have been certified free of Imported Fire Ants by the Virginia Department of Agriculture and Consumer Affairs. More information is available at: http://www.vdacs.virginia.gov/plant-industry-services-fire-ant-suppressioneand-eradication.shtml

C. Requirements for Excavated Soil To Be Used As "Clean" Fill Outside The Original Project Site

All soils excavated from a Navy installation/facility are considered to be potentially contaminated, and proper due-diligence (to include generator knowledge and analytical testing) will be required for any excavated soil to be considered for re-use outside of a project site.

Excavated soils from a project site to be re-used at a different project site location will be required to meet the Virginia DEQ's Management and Reuse of Contaminated Media Guidance and Statewide Variance (contained under Virginia Variance #LPR-SW-04-2012). Coordination with the Installation HWMM is required for proper guidance. LPR-SW-04-2012 is enclosed as **Attachment 1**.

All contract requirements associated with the management of excavated soils on a project site must be reviewed and any changes/modifications to contract requirements must be approved by the contracting officer or his/her designee.

D. Requirements for Soils Imported From Off-Site Location For Use As "Clean" Fill Material

It is recommended that if a project site requires the importation of soils from off-site locations (e.g. borrow pits) for backfilling excavations, grading, restoration, etc., the imported soils be verified "clean" via analytical testing.

Analytical testing requirements for imported soil provided below do not apply to **Comprehensive Environmental Response, Compensation, and Liability** Act (CERCLA) remedial sites. Remediation activities at CERCLA remedial sites are overseen by EPA and Virginia DEQ; therefore, analytical requirements are pre-determined, reviewed, and approved by EPA and Virginia DEQ.

I. Imported Soil Analytical Recommendations:

1) Analytical sampling requirements should be in accordance with the Virginia DEQ's Management of and Reuse of Contaminated Media Guidance (contained under Virginia Variance #LPR-SW-04-2012) which are included as attachment 1.

    a. All constituents/parameters displayed on Table 2 (Soil: Residential and Other High Frequency Receptors) provided in Variance #LPR-SW-04-2012 are recommended for analysis.

    b. Soils should not contain concentrations of analytes above the appropriate criteria displayed in Table 2 (Soil: Residential and Other High Frequency Receptors).

2) In addition to Table 2 constituents listed above, the soil should also be analyzed for TPH, BTEX, and TOX to ensure the imported soils are not contaminated with petroleum products per Virginia regulation 9VAC20-81-660.

   Soils should not contain concentrations of analytes above the appropriate criteria set forth in Virginia regulation 9VAC20-81-660.

3) All analysis, methods, sample collection and frequency, etc. should be conducted in accordance with EPA SW-846 Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods.

4) Analytical laboratories are required to be VELAP certified/accredited. Laboratories must provide documentation (e.g. certification number) upon request.

5) All analytical results should be submitted to the Installation HWMM for review and approval prior to importing soil to the project site.

Attachment 1

HR-SOP-HW-03

COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
Solid Waste Guidance Memorandum

Subject: Division of Land Protection & Revitalization State-Wide Variance Guidance Memo No. LPR-SW-04-2012
Management and Reuse of Contaminated Media

To: Regional Land Protection & Revitalization Program Managers
Regional Water Program Managers

From: Jeffery Steers
Director, Division of Land Protection and Revitalization

Date: July 17, 2012

Copies: Richard Weeks, James Golden
Air and Water Division Directors
Regional and Deputy Regional Directors

Background: Businesses look continuously to purchase and revitalize former manufacturing facilities, residential sites, parks, and other previously used properties, and to conduct upgrades on currently occupied property. Benefits for businesses include utilization of a site with suitable structure(s) in-place, existing zoning appropriate for industrial/commercial use, lower development costs, and tax incentives. Revitalization and upgrades of these properties helps conserve land that would otherwise be developed, increases revenues for the locality and the Commonwealth, and reduces blight. Many of these properties remain undeveloped because of actual or perceived concerns of contamination or concerns about managing soils on-site with low concentrations of contaminants. Each site needs evaluation to determine if the site is safe to use as-is or if restrictions or remediation is necessary. Many times site improvements may require soil or sediment excavations that require evaluation of costs of the management of the excess media generated at the site. This "Variance" was prepared to allow owners/operators to reuse soils/sediment generated in the Commonwealth, both on-site and off-site, as one option in managing excess media from property upgrades.

Electronic Copy: An electronic copy of this variance is available on DEQ's website at http://www.deq.virginia.gov/ .

Contact Information: Please contact staff within the Division of Land Protection & Revitalization at your local DEQ regional office with any questions regarding the application of this Variance. The DEQ regional offices can be found at the following link: http://www.deq.virginia.gov/Locations.aspx.

Disclaimer: *This document is provided as guidance and, as such, sets forth standard operating*

procedures for the agency. However, it does not mandate any particular method nor does it prohibit any alternative method. If alternative proposals are made, such proposals should be reviewed and accepted or denied based on their technical adequacy and compliance with appropriate laws and regulations. Nothing in this guidance shall relieve the owner or operator from conducting notifications or cleanups as required by DEQ.

I. Introduction

Summary of Management and Reuse of Contaminated Media:

Due to the increasing cost of prime land, the Commonwealth is experiencing a growing need for the redevelopment of previously used and idle properties and upgrades of existing properties. Re-vitalizing these properties frequently requires some form of soil excavation and management. Similarly, material excavated from surface waters during dredging operations is often disposed of at off-site locations, necessitating added soil evaluation procedures and management techniques. Quite often, the soil and dredge media contain contaminants that need to be evaluated for disposal or reuse. The knowledge of the nature of the contamination may be known or is newly discovered during the course of development.

The Virginia Department of Environmental Quality ("DEQ") developed this variance based upon experience with numerous separate site-specific contaminated soil/sediment use plans. Standard contaminant concentration tables are used to allow a quick determination of soil management procedures and options to owners, purchasers and developers. Owners/operators can make more expeditious determinations of media reuse for a site based upon standard considerations with the use of these tables.

Submittals generated from this Variance will not be technically reviewed by DEQ unless necessary. This Variance is meant to be self-implementing to expedite property reuse in a sound manner protective of human health and the environment. Property owners and developers can use this variance to make basic development decisions using standardized tools regarding soil/sediment management without involving DEQ in a regulatory approval process. As per current regulations, contaminated soils and sediment from legacy operations often are not regulated in-situ provided that:

- materials have not been intentionally disposed or spilled onto the soils/sediment;
- materials have not been released from handling operations that are sloppy and do not follow typical industry standards for handling;
- materials are not listed hazardous waste;
- materials are not chemicals that have been released in volumes greater than their respective reportable quantity; and
- the contaminated condition is not considered an open dump, hazard, nuisance, or a threat to public health, public safety, the environment, and natural resources.

Based on the above, DEQ developed a tier-based decision model that provides basic criteria for comparing the level of contamination in media to concentrations that have been determined to be acceptable for human health and the environment.
This variance is not to be used for remediation standards for a site being remediated under other regulatory programs such as Underground Storage Tanks, Resource Conservation and Recovery Act ("RCRA") Corrective action, Voluntary Remediation Program or other programs which have their own cleanup or remediation standards. This

variance may be used to manage excess media at a clean-up site if allowed by the particular remediation program and with any required approval.

II. Authority

Virginia Code §§10.1-1404-1405 authorizes the Department and the DEQ Director to administer the regulations promulgated by the Virginia Waste Management Board ("Board") and vests the powers of the Board with the Director when not in session. The Virginia Solid Waste Management Regulations ("VSWMR" or "Regulation") allows the Director to grant variances to the VSWMR, including 9 Virginia Administrative Code 20-81-710.

III. Definitions

Definitions in the Virginia Waste Management Act and VSWMR apply to this policy. Additional definitions are detailed below.

"Contaminated media" – This includes soil, sediment, and dredged material that that, as a result of a release or human usage, has absorbed or adsorbed physical, chemical, or radiological substances at concentrations above those consistent with nearby undisturbed soil or natural earth materials.

"Dredged material" means material that is excavated or dredged from surface waters (9 VAC 25-210-10).

"Environmental due diligence" – Investigative techniques, including but not limited to visual property inspection, electronic database searches, review of ownership and use history of property, Sanborn maps, environmental questionnaires, analytical testing, environmental testing and audits.

"Generator and Owner/Operator" – The generator is the owner of the property from which the contaminated media is first managed such to make the material subject to regulation. A developer or contractor may be the entity that moves the material, and thus may be a co-generator, but the owner would still be considered a generator.
"Solid waste" and "Hazardous waste" – As defined in 40 CFR 261.2 and 40 CFR 261.3 of the Federal Regulations as adopted by Virginia in 9 VAC 20-60-261. These definitions may be found at the following website:
http://www.access.gpo.gov/nara/cfr/waisidx_09/40cfr261_09.html

"Open dump" - means a site on which any solid waste is placed, discharged, deposited, injected, dumped or spilled so as to present a threat of a release of harmful substances into the environment or present a hazard to human health. A site meeting the Open Dump Criteria in 9VAC20-81-45 may be determined to be an open dump.

"Sensitive Environment" means an area that serves a critical ecological function or that overlies groundwater that is currently used or is reasonably anticipated to be used as a potable source. Sensitive environments include areas that support state or federally recognized rare, threatened, or endangered species; areas characterized by karst topography, caves, or sinkholes; a 25 year floodplain as defined by FEMA and/or local planning officials; and surface waters (streams, creeks, ponds, lakes, rivers, wetlands, springs, etc.).

"Unrestricted upland reuse" – Soils that meet the criteria in Tables 1 and 2 of this Variance.

IV. Hierarchy for Contaminated Media Management

DEQ recognizes that there are various means to manage contaminated media which may be regulated under the VSWMR or exempt under the VSWMR. Additionally, DEQ maintains a hierarchy of contaminated media management as a means to use the least expensive and resource conservative methods that maintain public and environmental health. The order of management options that should be pursued are as follows:

1) Appropriate reuse of contaminated media within the actual excavation project.
2) Appropriate reuse of the contaminated media on the site of the development as allowed under 9 VAC 20-81-95.C.7.d.
3) Reuse of the contaminated media on the site of generation or at another site with comparable contaminants (through the use of this variance).
4) Thermal or biological remediation of the contaminated media followed by reuse - using a DEQ permitted thermal or biological treatment facility.
5) Landfill burial of contaminated media – burial in a permitted sanitary, industrial, or hazardous waste landfill authorized by DEQ (or other states) to receive this material.

V. Relationship with other Regulations

The application of this Variance does not relieve the Generator or Property Owner from complying with other regulations of the Commonwealth, Federal Regulations, or local ordinances. In evaluating contaminated media for use under this Variance, the Generator should determine if the media meets the criteria of a hazardous waste, regulated medical waste, or other appropriate criteria (e.g., petroleum-regulated waste regulated under Article 11 or Article 9). This variance may be used to manage excess media at a clean-up site if allowed by the particular remediation program and with any required approval within the program.

Relation to "Sensitive Environments" – In situations where media will be placed within a sensitive environment specifically within surface waters, the Generator must comply with state regulations as described in the State Water Control Law (§62.1-44, 15:20) and

the Virginia Water Protection Permit Regulation (9 VAC 25-210), and/or applicable federal regulations associated with the Section 404 of the Clean Water Act.

Relation to "Contained-In" Situations - There are certain situations where waste chemicals are released that would classify the resulting containing media as hazardous waste. This classification is determined solely upon the classification of the released chemical and the resulting concentration in the media. In a situation where hazardous wastes have been released, cleanup would be coordinated by DEQ's Hazardous Waste permitting program.

Landfill Mining – This Variance may not be used for situations where permitted landfills are being mined. This activity would be regulated by the Solid Waste Permitting Program.

Corrective Action – This Variance may only be used for cleanup programs regulated by the RCRA Corrective Action program in coordination with the Corrective Action project manager.

VI. Management and Reuse Guidance

This Management and Reuse of Contaminated Media Variance applies to the reuse of contaminated media on-site and the movement and beneficial reuse of contaminated media on other sites. In determining whether media may require extra care during excavation and reuse, the Owner or Generator should perform environmental due diligence for the site. Environmental due diligence involves using the relevant techniques as included in the definition above. Not all of the included techniques need to be used. For example, if environmental audits (including generator knowledge of the nature of the release with appropriate testing) are sufficient to define the nature of the media (e.g. quantity of material, contaminants/concentrations, location, areal extent) then a complete site characterization may not be needed. If environmental due diligence (e.g. through file and document review and staff interviews) demonstrates the potential for contamination, the owner/developer is responsible for conducting proper testing to determine the presence and concentration of any contaminants. The results of the environmental due diligence will dictate the contaminants of concern for the subject property. Environmental due diligence may be initiated at any time during a project when the Owner, developer, or contractor notices that the media being managed appears to be contaminated in some manner. The Owner is, and still remains, responsible for the movement and management of any media generated during development on his property.

The Owner/developer should use adequate sampling and analytical techniques to fully define the contaminants and the extent of contamination. Sampling and analytical methods described in the U.S. Environmental Protection Agency ("EPA")'s SW-846 method papers would be an example of suitable methods to define the contaminants as determined from the environmental due diligence process. These methods may be accessed at http://www.epa.gov/wastes/hazard/testmethods/sw846/. Additionally,

analysis should be performed by a Virginia Environmental Laboratory Accreditation Program laboratory.

The environmental nature of these sites are infinitely variable from small areas of similar contaminant to large sites with varying mixes of different contaminants, media, and media structure (homogenous, heterogeneous, etc). It is the responsibility of the generator to contract with a qualified contractor to recommend appropriate sampling and analytical strategies to accomplish the task of defining the types and extent of contamination. This recommendation should be submitted with appropriate justification, to DEQ along with Appendix A form and accompanying information.

This Variance uses a tiered criteria for reuse. Once the contaminants and concentrations are known, the Owner/developer should utilize the following tables to determine how the media may be used. Table 1 defines media which has contaminant concentrations below which are acceptable for reuse in sensitive environments. Table 2 defines media that has contaminant concentrations below which may be used on residential or sites with other high frequency receptors. Table 3 defines media that has contaminant concentrations below which the media may be used on sites that are restricted to commercial/industrial use. The values on these tables draw from risk calculations and assessment work conducted by DEQ and EPA to calculate risk factors for each of the contaminants. The final contaminant concentrations are generated using exposure scenarios that take into account contaminant toxicity and exposure. The use of these tables is also demonstrated in the attached Figure I which is a diagrammatic flow-chart for use of the contaminated media.

This Variance is proposed as a means to effectively manage contaminated media as fill on-site and on appropriate off-site locations. As such, movement of contaminated media is more suitable and logical from one site of certain contamination to a site with a similar level and type of contamination. Thus, movement of contaminated media from one industrial site to another industrial site of similar contamination would be more favorable than trying to move contaminated media from one site to a newly established industrial location with no documented contamination.

Additionally, there are numerous sites in Virginia that have higher concentrations of metals such as arsenic and lead (e. g., background concentrations) due to natural occurrence. Again, using the discussion above and the principles in the criteria seen below, movement of media with elevated concentrations of contaminants could be moved to a "like" site with similar documented naturally-occurring contaminants and concentrations levels as demonstrated by comparing background at the receiving site. This would include naturally occurring metals that are in concentrations greater than on the attached tables – if the receiving site has similar concentrations. However, anthropogenic contaminated soil exceeding those in the attached tables should not be moved from one site to another site with anthropogenic contamination. The generator/developer may not purposefully mix (or dilute) regulated contaminated media with clean fill to achieve the concentrations as described in the fill-types below.

Table 1–Protection of Sensitive Environments

Table 1 should be used to determine whether the media in question may be used as fill in areas that constitute a sensitive environment either for ecological receptors or a groundwater resource.

A sensitive environment for ecological receptors is an area in which the primary function of the land is to support natural habitat with limited human intervention. This includes, but is not limited to: an area that serves a critical ecological function; an area that supports state or federally recognized rare, threatened, or endangered species; areas characterized by karst topography, caves, or sinkholes; a 25 year floodplain as defined by FEMA and/or local planning officials; and surface waters (streams, creeks, ponds, lakes, rivers, wetlands, etc.) It does not include landscaped and maintained areas on primarily commercial/industrial properties. Contaminants with a maximum concentration exceeding the "Beneficial Fill Ecological Screening Level" on Table 1 will be flagged as a Contaminant of Potential Concern for Ecologically Sensitive Environments. Media with concentrations exceeding these levels should not be placed in or directly adjacent to ecologically sensitive environments.

A sensitive environment for protection of groundwater resources includes areas in which groundwater (including springs) is currently used or is reasonably anticipated to be used as a potable source. For purposes of this guidance, a local ordinance that prohibits the potable use of groundwater may be used to make the "reasonably anticipated" determination. However, groundwater flow direction and velocity must be considered to insure that down gradient receptors not covered by the ordinance are protected. In addition, areas characterized by karst topography, caves or sinkholes are also considered sensitive environments for groundwater protection due to the uncertainty surrounding flow direction and the ability to rapidly transport contaminants. Contaminants with maximum concentrations exceeding the "Beneficial Fill Groundwater Protection Screening Level" on Table 1 will be flagged as a Contaminant of Potential Concern for Groundwater Resources. Media with concentrations exceeding these levels should not be placed in or directly adjacent to sensitive environments for protection of groundwater resources unless placement occurs on the same or adjacent property to where the soil was generated.

Please note that placement of media within a sensitive ecosystem may require additional permits from DEQ and/or the U.S. Army Corps of Engineers. As with any fill project, all State and Local requirements must be followed in terms of notices and Best Management Practices.

For purposes of this Variance contaminated media utilizing Table I standards should use the following setbacks:

- 200 feet separation to any wells, springs, or surface water currently used as a drinking water source.

- 50 feet separation to a cave, sinkhole, , sinking and losing streams, or large flow springs.

Table 2-Protection of Residential and Other High Exposure Frequency Receptors

Table 2 should be used to determine whether the media in question may be used as fill in areas that are currently used or reasonably anticipated to be used as residential housing or for other high exposure frequency purposes. For purposes of this guidance high exposure frequency uses include residential housing, schools, day care, parks, playgrounds, and long term health care facilities. Hotels and motels are not included in this definition. Contaminants with maximum concentrations exceeding the "Beneficial Fill Residential Screening Level" on Table 2 will be flagged as a Contaminant of Potential Concern for Residential Use. Media with concentrations exceeding these levels should not be placed on or directly adjacent to areas with high exposure frequency uses. For contaminants on Table 2 that are based solely on non-carcinogenic effects, the EPA Regional Screening Levels (RSL) have been divided by 10 to account for the potential additivity of toxic effects. For media with fewer than 10 non-carcinogenic contaminants exceeding the Table 2 level, the original RSL may be divided by the number of non-carcinogenic contaminants to derive an adjusted Table 2 level. The intent is to ensure that the hazard index for the managed media does not exceed 1 under a standard residential scenario. If contaminants are present that are not on the attached Table 2, the owner may use EPA's RSL Table that can be found at the link below. The column labeled Resident Soil should be used. RSLs that are based on non-carcinogenic effects should be divided by 10.
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

Table 3-Protection of Commercial/Industrial Workers

Table 3 should be used to determine whether the media in question may be used as fill in areas that are restricted to use as commercial/industrial sites. Contaminants with maximum concentrations exceeding the "Beneficial Fill Industrial Screening Level" on Table 3 will be flagged as a Contaminant of Potential Concern for Commercial/Industrial Use. Media with concentrations below these levels may be used on sites that are restricted to commercial/industrial use. Media with concentrations exceeding these levels should not be used as fill but should be managed appropriately as solid or hazardous waste. For contaminants on Table 3 that are based solely on non-carcinogenic effects, the EPA RSLs have been divided by 10 to account for the potential additivity of toxic effects. For media with fewer than 10 non-carcinogenic contaminants exceeding the Table 2 level, the original RSL may be divided by the number of non-carcinogenic contaminants to derive an adjusted Table 3 level. The intent is to ensure that the hazard index for the managed media does not exceed 1 under a standard industrial scenario.

If contaminants are present that are not on the attached Table 2, the owner may use EPA's RSL Table that can be found at the link below. The column labeled Industrial Soil should be used. RSLs that are based on non-carcinogenic effects should be divided by 10.

http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

The restrictions for use are noted below:

- The owner of the land where the Contaminated Media is deposited must file a declaration of restrictive covenants on the property to ensure that future use of the property is restricted to industrial use. The landowner may file a restriction on the entire property or file a plat identifying the area of the property with the contaminated media and a restriction on that portion of the property. The restriction must be filed regardless of the depth of placement of the media. The restriction must be filed within 90 days of first placement of the media. A template for the restriction is provided in Appendix B.
- 50 feet separation to any off-property residence, health care facility, school, recreational park area, daycare or similar public institution.

Note that some situations will require the use of more than one of these tables. For example, a potential fill site may be planned for residential use in a locality that uses groundwater for drinking. In this case, both the residential screening levels and the groundwater protection screening levels must be met. Another example is a potential industrial site directly adjacent to a surface water body. In this case, both the industrial and the ecological screening level must be met.

Also note that there are some chemicals for which naturally occurring background concentrations are above the screening levels. In this case the background concentration for the receiving site may be substituted for the risk-based screening level. The generator must collect site-specific samples from the receiving site to support the use of background concentrations.

General Restrictions for All Sites/Uses

Additionally, for each of the scenarios described above, the generator shall comply with the following:

- The media used must have been generated from property in the Commonwealth of Virginia.
- The fill material should be suitably stable and of sufficient quality to support vegetation or supplemented with such material if the fill material is to be used as topsoil.
- This material should be placed such that it does not spill or erode onto another property.
- This material should be placed such that it is not deposited into waterways (proper use of Erosion & Sediment Best Management Practices).
- Comply with local ordinances regarding movement/placement of fill soil.
- Comply with standard E&S control practices and BMPs.
- Notification to, and approval of, the landowner where the soil is to be used as fill by use of the form in Appendix A.

- Maintenance of Appendix A document in facility files and submittal of Appendix A notification to DLPR regional office.

VII. Technical Assistance and Compliance Evaluation

Technical assistance regarding use of this Variance is available from your DEQ regional office. You can find the appropriate office by going to the link below: http://www.deq.virginia.gov/Locations.aspx.

Management of any waste material, even the beneficial use of lightly contaminated fill, has the potential for problems to arise if not properly managed. The more comprehensive the environmental due diligence that is conducted prior to the project initiation, the better the chance of a positive outcome. Additionally, proper project planning, to include transportation of the fill, is important.

The intent of this Variance is to provide a self-implementing mechanism for Generators and Owner/Operators to effect proper management of contaminated media and the details to accomplish that are in this Variance. It is the Generator and Owner/operators responsibility and liability to manage this media in a manner consistent with State and Local regulations. If levels are above those identified in the tables for a proposed use, in order to still use the media for that proposed use, the Generators and Owner/Operator would need to apply for an individual variance in accordance with the VSWMR.

DEQ staff will provide an acknowledgement of the information and may complete a cursory completeness review of the submitted information. DEQ will not conduct technical reviews of the submitted Appendix A information unless necessary. Management of contaminated media under this Variance will be considered beneficial and the process will not be regulated as management of a solid waste under the VSWMR so long as these materials are handled in a manner that does not constitute a public nuisance, health hazard or open dump. DEQ retains the obligation and right to investigate any and all fill sites operating under this Variance to the extent allowed by state law, to verify that site operations are as described in the Appendix A submittal and the site operations have not created a public nuisance, open dump, or threat to human health and the environment.

The speculative accumulation provisions of the VSWMR (defined in 9VAC 20-81-10 of the VSWMR) shall apply to accumulated fill stockpiles. At least 75% of any material accumulated must be used within one year of accumulation or it will be subject to regulation in accordance with the VSWMR.

VIII. Collaboration Process

This Variance was developed by a small project team consisting of DEQ Central Office and Regional staff. Additionally, comments from VDOT staff and interested parties in the legal and environmental consulting professions, and the regulated community were solicited and considered in its preparation.

IX. Attachments

- Appendix A – Notification to Property Owner of Contaminated Media Use
- Appendix B – Sample Declaration of Restrictive Covenants
- Figure 1 – Hierarchy for Contaminated Media
- Table 1 – Protection of Ecological Receptors and Groundwater
- Table 2 – Residential and Other High Frequency Receptors
- Table 3 – Restricted (Commercial/Industrial)

APPENDIX A

Contaminated Media Use Form

I, the Generator, certify that the fill material described in the following "Fill Description" has been determined to meet the following Tier classification (circle all that apply):

Table 1 –Sensitive Ecosystem/Groundwater Resource

Table 2 – Residential

Table 3– Commercial/Industrial

FILL DESCRIPTION

Address of media origination:

Facility Name:

Facility Owner (Name and Phone number):

General description of contaminant origin including brief list of contaminants of concern (Attach analytical list of contaminants):

Specific location of media to be excavated **(attach as Figures 1 and 2):**

Quantity of media to be excavated and reused:

This fill material is to be used at the following location:

Property Name:

Current Owner of Property (include phone number):

Signature of Property Owner:

Property Address and Tax parcel:

Location of Fill use on property: **(attach as Figures 3 and 4)**

This fill material will be used solely for the purpose of property improvement, construction purposes, or general fill. A copy of the laboratory analyses that confirm the "Level" classification is included with this Appendix.

Date:

Generator Name (print):

Generator Name (signature):

Title:

Address:

Phone:

NOTE: This form is to be retained by the property owner receiving the fill material and the generator of the fill. If a property receives contaminated media as fill under this Guidance from multiple sources, a separate certification is required for each source.

Specifications for Facility Site Maps

Maps must be neat and professional; surveying is not required but recommended. Maps should be to scale and include a street address or bounding addresses and a reference to a specific, permanent, location marker. Two maps each should be submitted for both the excavation site and the deposition site:

1. **General Map**: Map 1 should show where in a locality the property is located (mark the site on the map). The map may be a topographic map or a large enough scale map from an Internet mapping site that at least shows the nearest crossroads;
2. **Specific Location Map**: Map 2 should be specific to the excavation or deposition site itself. If a site map already exists due to remediation processes or a previous environmental site assessment, that map may be used to mark the excavation/deposition area. Copies of plats are also acceptable and encouraged to supplement documentation. Map should contain:
    a. Complete and detailed site map(s) including:
        i. - Scale, north arrow, and legend
        ii. - Location of all buildings, roads, and adjacent properties
        iii. - Location of potential receptors such as drinking water wells, streams, etc.
        iv. – Location of deposition/fill area in relation to items listed in ii and iii.

Specific location of media excavated or to be excavated (attach maps and label Figure 1 – Excavation General Map and Figure 2 – Excavation Specific Location)

Specific location of media deposition (attach maps and label Figure 3 – Deposition General Map and Figure 4 – Deposition Specific Location)

Quantity of media to be excavated: _____cubic yards OR _____ tons
Quantity of media to be reused: _____ cubic yards OR _____ tons
Quantity to be disposed in Solid Waste or CDD Landfill: _____cubic yards OR _____ tons

APPENDIX B

SAMPLE-DECLARATION OF RESTRICTIVE COVENANTS

This Declaration of Restrictive Covenants made as of this ____ day of [month, year], by [owner], owner of the fee simple title to the property hereinafter described, GRANTOR, and by [add names of trustees if any], Trustee, as follows:

ALL THAT certain tract, piece or parcel of land containing a total [amount of acres] acres, lying and being in the City of [name of city], Virginia, and [metes and bounds description of property and/or plat attached].

WHEREAS, [owner] is the fee simple owner of the said property (see deed recorded in Deed Book [Deed Book number], page [page number]); and

[*If the property is subject to a Deed of Trust*:]
WHEREAS, this property is subject to a Deed of Trust of record at Deed Book __, Page __, to _____ and _____, Trustees, to secure a note in the amount of _____ made to _____. The Trustee joins this Declaration to the end that the Deed of Trust shall be subordinate to this Declaration and its terms; and

WHEREAS, in consideration of certain allowances made by the Director of the Virginia Department of Environmental Quality [and consideration offered by Generator, if different], the Grantor has agreed to establish certain irrevocable restrictive covenants limiting the use of certain portions of said property in order to protect human health and the environment;

NOW THEREFORE, for the consideration referred to above, the receipt and legal sufficiency of which is hereby acknowledged by the undersigned, and in order to protect human health and the environment, the undersigned do hereby irrevocably, dedicate, declare and impose the following restrictive covenants to run with the land on the above described property as follows:

> The property shall not be used for residential purposes or for children's (under the age of 16) daycare facilities, schools or playground purposes (although hotels and motels are not prohibited).]

This Declaration of Restrictive Covenants may be modified or released only with the consent of the Director of the Department of Environmental Quality, upon a showing of changed circumstances sufficient to justify the change.

Given under my hand and seal at [name of city], Virginia, on the _____ day of [month, year],

_____
[Name of Owner/Corporation]
By: [Name]

State of _____, County of _____

The foregoing instrument was acknowledged before me this [date] by [name of person acknowledged].

[Notary]

[*If the Owner and Generator are not the same*]

_____

[Name of Generator]

State of _____, County of _____

The foregoing instrument was acknowledged before me this [date] by [name of person acknowledged].

[Notary]

[*If there is a deed of trust*]

_____

[Name], Trustee

State of _____, County of _____

The foregoing instrument was acknowledged before me this [date] by [name of person acknowledged].

[Notary]

[*If there are other encumbrances listed on the Certificate*]

_____

[Name]

State of _____, County of _____

The foregoing instrument was acknowledged before me this [date] by [name of person acknowledged].

[Notary]

Hierarchy for Contaminated Soils

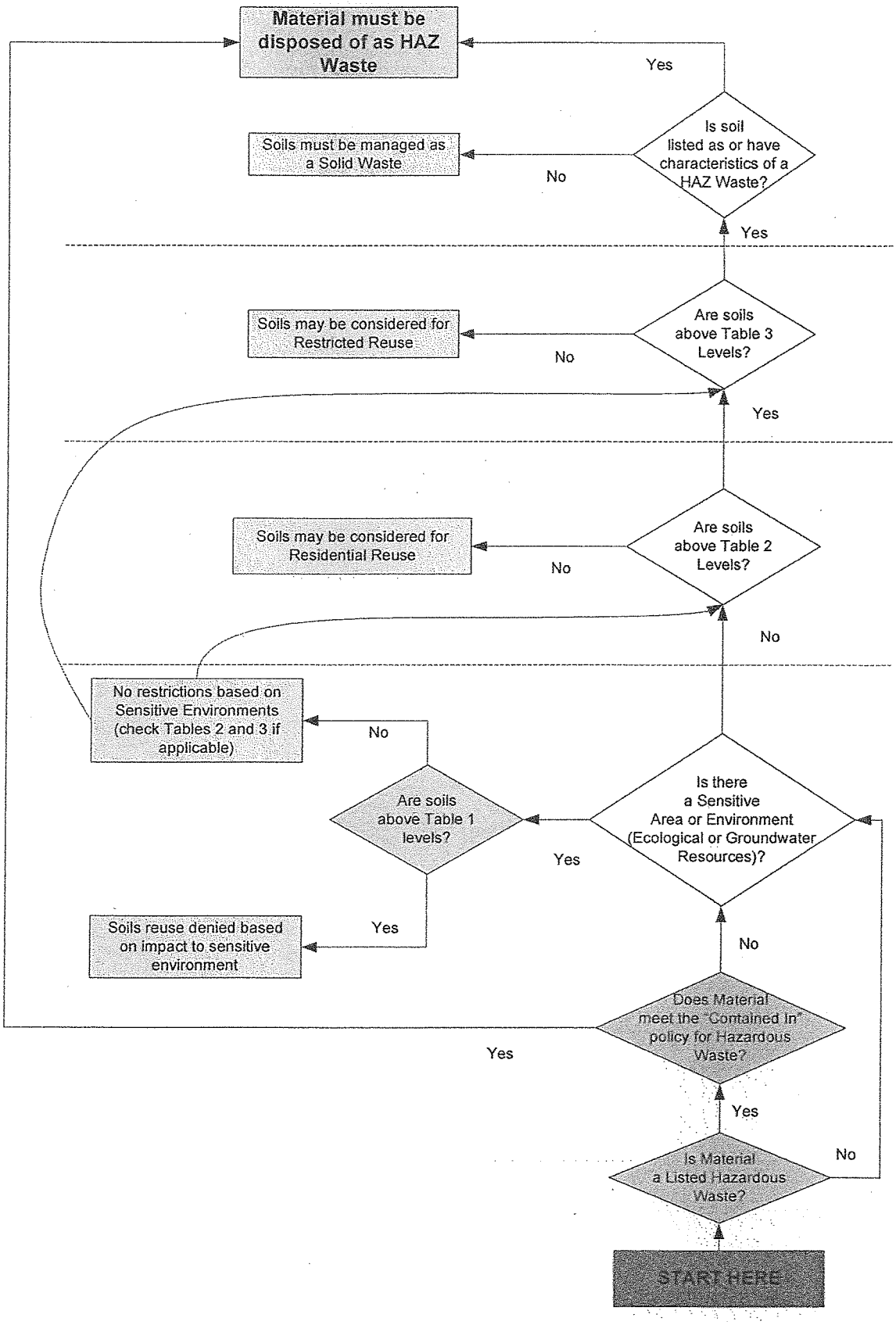

Table 1
Protection of Ecological Receptors and Groundwater

Revised 7/13/12

Table 1 Protection of Groundwater and Ecological Receptors	CAS No.	Beneficial Fill Ecological Screening Level mg/kg	Beneficial Fill Groundwater Protection Screening Level SSL (soil to groundwater) DAF 10 mg/kg	Maximum Soil Concentration mg/kg	Contaminant Of Potential Concern for Ecologically Sensitive Environments?	Contaminant of Potential Concern for Groundwater Resources?
TAL Inorganics						
Aluminum	7429-90-5	pH dependent	2.40E+04			
Antimony	7440-36-0	0.27	2.71E+00			
Arsenic	7440-38-2	18	2.91E+00			
Barium	7440-39-3	330	8.22E+02			
Beryllium	7440-41-7	21	3.16E+01			
Cadmium	7440-43-9	0.36	3.76E+00			
Calcium	7440-70-2					
Chromium	7440-47-3	26	1.91E+01			
Cobalt	7440-48-4	13	2.12E-01			
Copper	7440-50-8	28	5.57E+03			
Cyanide	57-12-5	0.005	2.00E+01			
Iron	7439-89-6	pH dependent	2.76E+02			
Lead	7439-92-1	11	1.35E+02			
Magnesium	7439-95-4	4400				
Manganese (nonfood)	7439-96-5	220	2.08E+01			
Mercury, inorganic salts	7487-94-7	0.1				
Mercury	7439-97-6	0.058	1.04E+00			
Methylmercury	22967-92-6	0.00158				
Nickel	7440-02-0	38	1.95E+01			
Potassium	7440-09-7					
Selenium	7782-49-2	0.52	2.55E+00			
Silver	7440-22-4	4.2	5.98E-01			
Sodium	7440-23-5					
Thallium	7440-28-0	0.001	1.42E+00			
Vanadium	7440-62-2	7.8	7.80E+01			
Zinc	7440-66-6	46	2.92E+02			
Other Inorganics						
Perchlorate						
TCL Volatile Organic Compounds (VOCs)						
Acetone	67-64-1	2.5	1.25E+00			
Benzene	71-43-2	0.06	2.46E-02			
Bromochloromethane	74-97-5	3000	1.70E-02			
Bromodichloromethane	75-27-4	0.54	3.50E-01			
Bromoform	75-25-2	15.9	5.16E-01			
Bromomethane	74-83-9	0.235	1.48E-03			
2-Butanone (methyl ethyl ketone)	78-93-3	89.6	5.52E-01			
Carbon disulfide	75-15-0	0.0941	5.48E-01			
Carbon tetrachloride	56-23-5	0.3	7.94E-02			
Chlorobenzene	108-90-7	0.05	1.40E+00			
Chloroethane	75-00-3		5.58E+00			
Chloroform	67-66-3	0.001	3.11E-01			
Chloromethane	74-87-3	10.4	3.92E-02			
Cyclohexane	110-82-7	0.1	7.05E+01			
1,2-Dibromo-3-chloropropane	96-12-8	0.0352	1.09E-03			
Dibromochloromethane	124-48-1	2.05	4.20E-01			
1,2-Dibromoethane	106-93-4	1.23	1.81E-04			
1,2-Dichlorobenzene (ortho)	95-50-1	0.01	2.12E+01			
1,3-Dichlorobenzene (meta)	541-73-1	0.01	2.25E-02			
1,4-Dichlorobenzene (para)	106-46-7	0.01	3.39E+00			
Dichlorodifluoromethane	75-71-8	39.5	5.95E-01			
1,1-Dichloroethane	75-34-3	0.3	7.95E-03			
1,2-Dichloroethane	107-06-2	0.4	1.07E-02			
1,1-Dichloroethene	75-35-4	8.28	4.56E-02			
1,2-Dichloroethene (total)	540-59-0	0.3	5.18E-02			
cis-1,2-Dichloroethene	156-59-2	0.3	2.42E-01			
trans-1,2-Dichloroethene	156-60-5	0.3	4.98E-01			
1,2-Dichloropropane	78-87-5	0.3	1.99E-02			
1,3-Dichloropropene (total)	542-75-6	0.3	1.52E-03			
cis-1,3-Dichloropropene	10061-01-5	0.398	1.66E-03			
trans-1,3-Dichloropropene	10061-02-6	0.398	1.64E-03			
1,4-dioxane	123-91-1	2.05	7.10E-04			
Ethylbenzene	100-41-4	0.05	1.68E+01			
Hexane	110-54-3					
2-Hexanone	591-78-6	12.6	6.45E-03			
Isopropylbenzene (cumene)	98-82-8		5.77E+00			
4-Methyl-2-pentanone (methyl isobutyl ketone)	108-10-1	100	1.64E-01			
Methyl acetate	79-20-9		1.77E+00			
Methyl tert-butyl ether	1634-04-4		2.08E-02			
Methylcyclohexane	108-87-2		5.44E+01			
Methylene chloride	75-09-2	0.3	9.36E-03			
Styrene	100-42-5	0.1	4.89E+00			
1,1,2,2-Tetrachloroethane	79-34-5	0.127	4.38E-04			
Tetrachloroethene	127-18-4	0.01	1.89E-01			
Toluene	108-88-3	0.05	1.19E+01			
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		3.24E+02			
1,2,3-Trichlorobenzene	87-61-6	0.01	6.08E-02			
1,2,4-Trichlorobenzene	120-82-1	0.01	7.21E+00			
1,1,1-Trichloroethane	71-55-6	0.3	1.81E+00			
1,1,2-Trichloroethane	79-00-5	0.3	2.05E-02			
Trichloroethene	79-01-6	0.001	3.86E-02			
Trichlorofluoromethane	75-69-4	16.4	1.74E+00			
Vinyl Chloride	75-01-4	0.01	7.92E-03			
Total Xylenes	1330-20-7	0.05	2.43E+02			
Other VOCs						
n-butylbenzene	104-51-8		1.67E+01			
sec-butylbenzene	135-98-8					
tert-butylbenzene	98-06-6					
Isopropyltoluene	99-87-6		8.75E+00			
n-propylbenzene	103-65-1		2.65E+00			
1,1,1,2-tetrachloroethane	630-20-6	0.3	9.99E-03			
1,2,4-trimethylbenzene	95-63-6		1.08E-01			
1,3,5-trimethylbenzene	108-67-8		3.34E-01			
m-xylene	108-38-3		2.62E+02			
o-xylene	95-47-6		2.26E+02			
p-xylene	106-42-3		2.40E+02			
TCL Semivolatile Organic Compounds (SVOCs)						
Acenaphthene	83-32-9	29	1.72E+01			
Acenaphthylene	208-96-8	29	6.63E+01			

Table 1
Protection of Ecological Receptors and Groundwater

Revised 7/13/12

Table 1 Protection of Groundwater and Ecological Receptors	CAS No.	Beneficial Fill Ecological Screening Level mg/kg	Beneficial Fill Groundwater Protection Screening Level SSL (soil to groundwater) DAF 10 mg/kg	Maximum Soil Concentration mg/kg	Contaminant Of Potential Concern for Ecologically Sensitive Environments?	Contaminant of Potential Concern for Groundwater Resources?
Acetophenone	98-86-2	300	4.72E-01			
Anthracene	120-12-7	29	1.85E+02			
Atrazine	1912-24-9	0.00005	6.78E-02			
Benzaldehyde	100-52-7		4.07E-01			
Benzo(a)anthracene	56-55-3	1.1	6.44E-01			
Benzo(a)pyrene	50-32-8	1.1	8.87E+00			
Benzo(b)fluoranthene	205-99-2	1.1	1.82E+00			
Benzo(g,h,i)perylene	191-24-2	1.1	1.94E+04			
Benzo(k)fluoranthene	207-08-9	1.1	1.82E+01			
1,1'-Biphenyl	92-52-4		5.23E-02			
bis(2-Chloroethoxy)methane	111-91-1		6.24E-03			
bis(2-chloroethyl)ether	111-44-4	23.7	2.54E-05			
bis-(2-Ethylhexyl)phthalate	117-81-7	0.925	3.80E+01			
4-Bromophenyl-phenylether	101-55-3					
Butylbenzylphthalate	85-68-7	0.239	5.64E+01			
Caprolactam	105-60-2		8.00E-01			
Carbazole	86-74-8		9.30E-01			
4-Chloro-3-methylphenol	59-50-7	7.95	7.47E+00			
4-Chloroaniline	106-47-8	1.1	1.59E-03			
2-Chloronaphthalene	91-58-7	0.0122	7.00E+00			
2-Chlorophenol	95-57-8	0.01	1.73E-01			
4-Chlorophenyl-phenylether	7005-72-3					
Chrysene	218-01-9	1.1	6.44E+01			
Dibutyl phthalate	84-74-2	0.15	1.76E+02			
Di-n-octylphthalate	117-84-0	70.9				
Dibenzo(a,h)anthracene	53-70-3	1.1	4.27E-01			
Dibenzofuran	132-64-9		3.91E-01			
3,3'-Dichlorobenzidine	91-94-1	0.646	1.87E-02			
2,4-Dichlorophenol	120-83-2	0.003	3.45E-02			
Diethylphthalate	84-66-2	24.8	1.88E+01			
2,4-Dimethylphenol	105-67-9	0.01	3.23E-01			
Dimethylphthalate	131-11-3	200				
4,6-Dinitro-2-methylphenol	534-52-1	0.144	1.36E-04			
2,4-Dinitrophenol	51-28-5	0.0608	3.00E-03			
2,4-Dinitrotoluene	121-14-2	1.26	1.39E-03			
2,6-Dinitrotoluene	606-20-2	0.0328	5.92E-03			
Fluoranthene	206-44-0	1.1	2.78E+02			
Fluorene	86-73-7	29	1.70E+01			
Hexachlorobenzene	118-74-1	0.0025	9.96E+00			
Hexachlorobutadiene	87-68-3	0.0398	7.81E-01			
Hexachlorocyclopentadiene	77-47-4	0.755	2.70E+02			
Hexachloroethane	67-72-1	0.596	3.47E-01			
Indeno(1,2,3-cd)pyrene	193-39-5	1.1	5.16E+00			
Isophorone	78-59-1	139	2.43E-01			
2-Methylnaphthalene	91-57-6	29	1.01E+00			
2-Methylphenol	95-48-7	0.1	4.29E-01			
3-Methylphenol	108-39-4	0.5	4.37E-01			
4-Methylphenol	106-44-5	0.1	8.19E-01			
N-Nitroso-di-n-propylamine	621-64-7	0.544	2.14E-05			
N-Nitrosodiphenylamine	86-30-6	0.545	7.27E-01			
Naphthalene	91-20-3	29	1.49E-02			
2-Nitroaniline	88-74-4	74.1	7.43E-02			
3-Nitroaniline	99-09-2	3.16				
4-Nitroaniline	100-01-6	21.9	7.91E-03			
Nitrobenzene	98-95-3	1.31	5.95E-04			
2-Nitrophenol	88-75-5	1.6				
4-Nitrophenol	100-02-7	0.1				
2,2'-Oxybis(1-chloropropane)	108-60-1		5.41E-03			
Pentachlorophenol	87-86-5	2.1	3.65E-02			
Phenanthrene	85-01-8	29	1.60E+02			
Phenol	108-95-2	0.05	1.19E+00			
Pyrene	129-00-0	1.1	3.27E+01			
1,2,4,5-Tetrachlorobenzene	95-94-3	0.01	3.94E-01			
2,3,4,6-Tetrachlorophenol	58-90-2	0.001	3.05E+00			
2,4,5-Trichlorophenol	95-95-4	0.1	8.62E+00			
2,4,6-Trichlorophenol	88-06-2	0.1	8.36E-02			
Semivolatile Organic Compounds (SVOCs)						
Benzoic Acid	65-85-0		6.00E+00			
TCL Polychlorinated Biphenyls (PCBs)						
Aroclor-1016	12674-11-2		9.60E+00			
Aroclor-1221	11104-28-2		1.25E+00			
Aroclor-1232	11141-16-5		3.10E+00			
Aroclor-1242	53469-21-9		9.60E+00			
Aroclor-1248	12672-29-6		3.73E+01			
Aroclor-1254	11097-69-1		7.36E+01			
Aroclor-1260	11096-82-5		1.45E+02			
Aroclor-1262	37324-23-5		1.45E+02			
Aroclor-1268	11100-14-4		1.45E+02			
Total PCBs	1336-36-3	0.000332				
TCL Pesticides						
Aldrin	309-00-2	0.0025	3.36E-03			
alpha-BHC	319-84-6	0.0025	4.61E-04			
beta-BHC	319-85-7	0.001	1.58E-03			
delta-BHC	319-86-8	9.94	1.51E-03			
gamma-BHC (lindane)	58-89-9	0.00005	1.06E-02			
Chlordane	57-74-9	0.1	1.45E+01			
alpha-Chlordane	5103-71-9	0.1	7.85E-01			
gamma-Chlordane	5103-74-2	0.1	1.63E+00			
4,4'-DDD	72-54-8	0.021	1.39E+01			
4,4'-DDE	72-55-9	0.021	4.71E+00			
4,4'-DDT	50-29-3	0.021	2.14E+01			
Dieldrin	60-57-1	0.0049	4.34E-04			
Endosulfan	115-29-7	0.1	9.97E-01			
Endosulfan I	959-98-8	0.1	1.73E+00			
Endosulfan II	33213-65-9	0.1	1.73E+00			
Endosulfan Sulfate	1031-07-8	0.0358	1.27E+00			
Endrin	72-20-8	0.001	5.69E-01			
Endrin Aldehyde	7421-93-4	0.0105	2.31E-01			
Endrin Ketone	53494-70-5	0.1	7.08E-01			
Heptachlor	76-44-8	0.00598	4.25E-01			
Heptachlor epoxide	1024-57-3	0.1	2.44E+00			

Table 1
Protection of Ecological Receptors and Groundwater

Revised 7/13/12

Table 1 Protection of Groundwater and Ecological Receptors	CAS No.	Beneficial Fill Ecological Screening Level mg/kg	Beneficial Fill Groundwater Protection Screening Level SSL (soil to groundwater) DAF 10 mg/kg	Maximum Soil Concentration mg/kg	Contaminant Of Potential Concern for Ecologically Sensitive Environments?	Contaminant of Potential Concern for Groundwater Resources?
Methoxychlor	72-43-5	0.0199	1.34E+02			
Toxaphene	8001-35-2	0.119	9.86E+00			
Chlorinated dioxins/dibenzofurans (CDDs/CDFs)						
2,3,7,8-TCDD	1746-01-6	1.99E-07	6.08E-03			
2,3,7,8-TCDF	51207-31-9	0.0000386				

Eco=Ecological
SSL=Soil Screening Levels
DAF=Dilution Attenuation Factor
TAL=Target Analyte List
TCL=Target Compound List

Revised 10/16/12

Table 2 (a) Soil: Residential and Other High Frequency Receptors	CAS No.	Beneficial Fill Residential Screening Level (b) mg/kg	Maximum Soil Concentration mg/kg	Contaminant Of Potential Concern for Residential Use?
TAL Inorganics				
Aluminum	7429-90-5	7.70E+03		
Antimony	7440-36-0	3.10E+00		
Arsenic	7440-38-2	3.90E-01		
Barium	7440-39-3	1.50E+03		
Beryllium	7440-41-7	1.60E+01		
Cadmium (food, soil)	7440-43-9	7.00E+00		
Calcium	7440-70-2			
Chromium (based on Chromium VI)	7440-47-3	2.90E-01		
Chromium III	16065-83-1	1.20E+04		
Cobalt	7440-48-4	2.30E+00		
Copper	7440-50-8	3.10E+02		
Cyanide	57-12-5	4.70E+00		
Iron	7439-89-6	5.50E+03		
Lead	7439-92-1	4.00E+02		
Magnesium	7439-95-4			
Manganese (nonfood)	7439-96-5	1.80E+02		
Mercury, inorganic salts	7487-94-7	2.30E+00		
Mercury	7439-97-6	1.00E+00		
Methylmercury	22967-92-6	7.80E-01		
Nickel	7440-02-0	1.50E+02		
Potassium	7440-09-7			
Selenium	7782-49-2	3.90E+01		
Silver	7440-22-4	3.90E+01		
Sodium	7440-23-5			
Thallium	7440-28-0	7.80E-02		
Vanadium	7440-62-2	3.90E+01		
Zinc	7440-66-6	2.30E+03		
Other Inorganics				
Perchlorate		5.50E+00		
TCL Volatile Organic Compounds (VOCs)				
Acetone	67-64-1	6.10E+03		
Benzene	71-43-2	1.10E+00		
Bromochloromethane (based on bromodichloromethane)	74-97-5	1.60E+01		
Bromodichloromethane	75-27-4	2.70E-01		
Bromoform	75-25-2	6.20E+01		
Bromomethane	74-83-9	7.30E-01		
2-Butanone (methyl ethyl ketone)	78-93-3	2.80E+03		
Carbon disulfide	75-15-0	8.20E+01		
Carbon tetrachloride	56-23-5	6.10E-01		
Chlorobenzene	108-90-7	2.90E+01		
Chloroethane	75-00-3	1.50E+03		
Chloroform	67-66-3	2.90E-01		
Chloromethane	74-87-3	1.20E+01		
Cyclohexane	110-82-7	7.00E+02		
1,2-Dibromo-3-chloropropane	96-12-8	5.40E-03		
Dibromochloromethane	124-48-1	6.80E-01		
1,2-Dibromoethane	106-93-4	3.40E-02		
1,2-Dichlorobenzene (ortho)	95-50-1	1.90E+02		
1,3-Dichlorobenzene (meta)(based on 1,4-dichlorobenzene)	541-73-1			
1,4-Dichlorobenzene (para)	106-46-7	2.40E+00		
Dichlorodifluoromethane	75-71-8	9.40E+00		
1,1-Dichloroethane	75-34-3	3.30E+00		
1,2-Dichloroethane	107-06-2	4.30E-01		
1,1-Dichloroethene	75-35-4	2.40E+01		
1,2-Dichloroethene (total)	540-59-0	7.00E+01		
cis-1,2-Dichloroethene	156-59-2	1.60E+01		
trans-1,2-Dichloroethene	156-60-5	1.50E+01		
1,2-Dichloropropane	78-87-5	9.40E-01		
1,3-Dichloropropene (total)	542-75-6	1.70E+00		
cis-1,3-Dichloropropene	10061-01-5	1.70E+00		
trans-1,3-Dichloropropene	10061-02-6	1.70E+00		
1,4-dioxane	123-91-1	4.90E+00		
Ethylbenzene	100-41-4	5.40E+00		
Hexane	110-54-3	5.70E+01		
2-Hexanone	591-78-6	2.10E+01		
Isopropylbenzene (cumene)	98-82-8	2.10E+02		
4-Methyl-2-pentanone (methyl isobutyl ketone)	108-10-1	5.30E+02		
Methyl acetate	79-20-9	7.80E+03		
Methyl tert-butyl ether	1634-04-4	4.30E+01		
Methylcyclohexane (based on cyclohexane)	108-87-2			
Methylene chloride	75-09-2	5.60E+01		
Styrene	100-42-5	6.30E+02		
1,1,2,2-Tetrachloroethane	79-34-5	5.60E-01		
Tetrachloroethene	127-18-4	2.20E+01		
Toluene	108-88-3	5.00E+02		
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	4.30E+03		
1,2,3-Trichlorobenzene	87-61-6	4.90E+00		
1,2,4-Trichlorobenzene **	120-82-1	2.20E+01		
1,1,1-Trichloroethane	71-55-6	8.70E+02		

Table 2 (a) Soil: Residential and Other High Frequency Receptors	CAS No.	Beneficial Fill Residential Screening Level (b) mg/kg	Maximum Soil Concentration mg/kg	Contaminant Of Potential Concern for Residential Use?
1,1,2-Trichloroethane **	79-00-5	1.10E+00		
Trichloroethene **	79-01-6	9.10E-01		
Trichlorofluoromethane	75-69-4	7.90E+01		
Vinyl Chloride	75-01-4	6.00E-02		
Total Xylenes	1330-20-7	6.30E+01		
Other VOCs				
n-butylbenzene	104-51-8	3.90E+02		
sec-butylbenzene	135-98-8			
tert-butylbenzene	98-06-6			
isopropyltoluene (based on isopropylbenzene)	99-87-6			
n-propylbenzene	103-65-1	3.40E+02		
1,1,1,2-tetrachloroethane	630-20-6	1.90E+00		
1,2,4-trimethylbenzene	95-63-6	6.20E+00		
1,3,5-trimethylbenzene	108-67-8	7.80E+01		
m-xylene	108-38-3	5.90E+01		
o-xylene	95-47-6	6.90E+01		
p-xylene	106-42-3	6.00E+01		
TCL Semivolatile Organic Compounds (SVOCs)				
Acenaphthene	83-32-9	3.40E+02		
Acenaphthylene (based on pyrene)	208-96-8	1.70E+02		
Acetophenone	98-86-2	7.80E+02		
Anthracene	120-12-7	1.70E+03		
Atrazine	1912-24-9	2.10E+00		
Benzaldehyde	100-52-7	7.80E+02		
Benzo(a)anthracene	56-55-3	1.50E-01		
Benzo(a)pyrene	50-32-8	1.50E-02		
Benzo(b)fluoranthene	205-99-2	1.50E-01		
Benzo(g,h,i)perylene (based on pyrene)	191-24-2	1.70E+02		
Benzo(k)fluoranthene	207-08-9	1.50E+00		
1,1'-Biphenyl	92-52-4	5.10E+00		
bis(2-Chloroethoxy)methane	111-91-1	1.80E+01		
bis(2-chloroethyl)ether	111-44-4	2.10E-01		
bis-(2-Ethylhexyl)phthalate	117-81-7	3.50E+01		
4-Bromophenyl-phenylether	101-55-3			
Butylbenzylphthalate	85-68-7	2.60E+02		
Caprolactam	105-60-2	3.10E+03		
Carbazole	86-74-8			
4-Chloro-3-methylphenol	59-50-7	6.10E+02		
4-Chloroaniline	106-47-8	2.40E+00		
2-Chloronaphthalene	91-58-7	6.30E+02		
2-Chlorophenol	95-57-8	3.90E+01		
4-Chlorophenyl-phenylether	7005-72-3			
Chrysene	218-01-9	1.50E+01		
Dibutyl phthalate	84-74-2	6.10E+02		
Di-n-octylphthalate	117-84-0			
Dibenzo(a,h)anthracene	53-70-3	1.50E-02		
Dibenzofuran	132-64-9	7.80E+00		
3,3'-Dichlorobenzidine	91-94-1	1.10E+00		
2,4-Dichlorophenol	120-83-2	1.80E+01		
Diethylphthalate	84-66-2	4.90E+03		
2,4-Dimethylphenol	105-67-9	1.20E+02		
Dimethylphthalate	131-11-3			
4,6-Dinitro-2-methylphenol	534-52-1	4.90E-01		
2,4-Dinitrophenol	51-28-5	1.20E+01		
2,4-Dinitrotoluene	121-14-2	1.60E+00		
2,6-Dinitrotoluene	606-20-2	6.10E+00		
Fluoranthene	206-44-0	2.30E+02		
Fluorene	86-73-7	2.30E+02		
Hexachlorobenzene	118-74-1	3.00E-01		
Hexachlorobutadiene **	87-68-3	6.20E+00		
Hexachlorocyclopentadiene	77-47-4	3.70E+01		
Hexachloroethane **	67-72-1	1.20E+01		
Indeno(1,2,3-cd)pyrene	193-39-5	1.50E-01		
Isophorone	78-59-1	5.10E+02		
2-Methylnaphthalene	91-57-6	2.30E+01		
2-Methylphenol	95-48-7	3.10E+02		
3-Methylphenol	108-39-4	3.10E+02		
4-Methylphenol	106-44-5	6.10E+02		
N-Nitroso-di-n-propylamine	621-64-7	6.90E-02		
N-Nitrosodiphenylamine	86-30-6	9.90E+01		
Naphthalene	91-20-3	3.60E+00		
2-Nitroaniline	88-74-4	6.10E+01		
3-Nitroaniline	99-09-2			
4-Nitroaniline	100-01-6	2.40E+01		
Nitrobenzene	98-95-3	4.80E+00		
2-Nitrophenol	88-75-5			
4-Nitrophenol	100-02-7			
2,2'-Oxybis(1-chloropropane)	108-60-1	4.60E+00		
Pentachlorophenol	87-86-5	8.90E-01		
Phenanthrene (based on pyrene)	85-01-8	1.70E+02		
Phenol	108-95-2	1.80E+03		
Pyrene	129-00-0	1.70E+02		

Table 2 [a] Soil: Residential and Other High Frequency Receptors	CAS No.	Beneficial Fill Residential Screening Level [b] mg/kg	Maximum Soil Concentration mg/kg	Contaminant Of Potential Concern for Residential Use?
1,2,4,5-Tetrachlorobenzene	95-94-3	1.80E+00		
2,3,4,6-Tetrachlorophenol	58-90-2	1.80E+02		
2,4,5-Trichlorophenol	95-95-4	6.10E+02		
2,4,6-Trichlorophenol **	88-06-2	4.40E+01		
Semivolatile Organic Compounds (SVOCs)				
Benzoic Acid	65-85-0	2.40E+04		
TCL Polychlorinated Biphenyls (PCBs)				
Aroclor-1016	12674-11-2	3.90E-01		
Aroclor-1221	11104-28-2	1.40E-01		
Aroclor-1232	11141-16-5	1.40E-01		
Aroclor-1242	53469-21-9	2.20E-01		
Aroclor-1248	12672-29-6	2.20E-01		
Aroclor-1254 **	11097-69-1	2.20E-01		
Aroclor-1260	11096-82-5	2.20E-01		
Aroclor-1262 (based on Aroclor 1260)	37324-23-5	2.20E-01		
Aroclor-1268 (based on Aroclor 1260)	11100-14-4	2.20E-01		
Total PCBs	1336-36-3	2.20E-01		
TCL Pesticides				
Aldrin	309-00-2	2.90E-02		
alpha-BHC	319-84-6	7.70E-02		
beta-BHC	319-85-7	2.70E-01		
delta-BHC (based on alpha-BHC)	319-86-8	7.70E-02		
gamma-BHC (lindane)	58-89-9	5.20E-01		
Chlordane	12789-03-6	1.60E+00		
alpha-Chlordane	5103-71-9	1.60E+00		
gamma-Chlordane	5103-74-2	1.60E+00		
4,4'-DDD	72-54-8	2.00E+00		
4,4'-DDE	72-55-9	1.40E+00		
4,4'-DDT	50-29-3	1.70E+00		
Dieldrin	60-57-1	3.00E-02		
Endosulfan	115-29-7	3.70E+01		
Endosulfan I (based on Endosulfan)	959-98-8	3.70E+01		
Endosulfan II (based on Endosulfan)	33213-65-9	3.70E+01		
Endosulfan Sulfate (based on Endosulfan)	1031-07-8	3.70E+01		
Endrin	72-20-8	1.80E+00		
Endrin Aldehyde (based on Endrin)	7421-93-4	1.80E+00		
Endrin Ketone (based on Endrin)	53494-70-5	1.80E+00		
Heptachlor	76-44-8	1.10E-01		
Heptachlor epoxide	1024-57-3	5.30E-02		
Methoxychlor	72-43-5	3.10E+01		
Toxaphene	8001-35-2	4.40E-01		
Chlorinated dioxins/dibenzofurans (CDDs/CDFs)				
2,3,7,8-TCDD	1746-01-6	4.50E-06		
2,3,7,8-TCDF	51207-31-9			

[a] Use this table for sites where groundwater use and ecological receptors are not a concern

[b] Based on EPA Regional Screening Level Table Residential Soil; values based on non-carcinogenic effects have been divided by 10

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Table 3 (a) Soil: Restricted (Commercial/Industrial)	CAS No.	Beneficial Fill Industrial Screening Level (b) * mg/kg	Maximum Soil Concentration mg/kg	Contaminant Of Potential Concern for Commercial/ Industrial Use?
TAL Inorganics				
Aluminum	7429-90-5	9.90E+04		
Antimony	7440-36-0	4.10E+01		
Arsenic	7440-38-2	1.60E+00		
Barium	7440-39-3	1.90E+04		
Beryllium	7440-41-7	2.00E+02		
Cadmium (food, soil)	7440-43-9	8.00E+01		
Calcium	7440-70-2			
Chromium (based on Chromium VI)	7440-47-3	5.60E+00		
Chromium III	16065-83-1	1.50E+05		
Cobalt	7440-48-4	3.00E+01		
Copper	7440-50-8	4.10E+03		
Cyanide	57-12-5	6.10E+01		
Iron	7439-89-6	7.20E+04		
Lead	7439-92-1	8.00E+02		
Magnesium	7439-95-4			
Manganese (nonfood)	7439-96-5	2.30E+03		
Mercury (inorganic salts)	7487-94-7	3.10E+01		
Mercury	7439-97-6	4.30E+00		
Methylmercury	22967-92-6	1.00E+01		
Nickel	7440-02-0	2.00E+03		
Potassium	7440-09-7			
Selenium	7782-49-2	5.10E+02		
Silver	7440-22-4	5.10E+02		
Sodium	7440-23-5			
Thallium	7440-28-0	1.00E+00		
Vanadium	7440-62-2	5.20E+02		
Zinc	7440-66-6	3.10E+04		
Other Inorganics				
Perchlorate		7.20E+01		
TCL Volatile Organic Compounds (VOCs)				
Acetone	67-64-1	6.30E+04		
Benzene	71-43-2	5.40E+00		
Bromochloromethane	74-97-5	6.80E+01		
Bromodichloromethane	75-27-4	1.40E+00		
Bromoform	75-25-2	2.20E+02		
Bromomethane	74-83-9	3.20E+00		
2-Butanone (methyl ethyl ketone)	78-93-3	2.00E+04		
Carbon disulfide	75-15-0	3.70E+02		
Carbon tetrachloride	56-23-5	3.00E+00		
Chlorobenzene	108-90-7	1.40E+02		
Chloroethane	75-00-3	6.10E+03		
Chloroform	67-66-3	1.50E+00		
Chloromethane	74-87-3	5.00E+01		
Cyclohexane	110-82-7	2.90E+03		
1,2-Dibromo-3-chloropropane	96-12-8	6.90E-02		
Dibromochloromethane	124-48-1	3.30E+00		
1,2-Dibromoethane	106-93-4	1.70E-01		
1,2-Dichlorobenzene (ortho)	95-50-1	9.80E+02		
1,3-Dichlorobenzene (meta)(based on 1,4-dichlorobenzene)	541-73-1	1.20E+01		
1,4-Dichlorobenzene (para)	106-46-7	1.20E+01		
Dichlorodifluoromethane	75-71-8	4.00E+01		
1,1-Dichloroethane	75-34-3	1.70E+01		
1,2-Dichloroethane	107-06-2	2.20E+00		
1,1-Dichloroethene	75-35-4	1.10E+02		
1,2-Dichloroethene (total)	540-59-0	9.20E+02		
cis-1,2-Dichloroethene	156-59-2	2.00E+02		
trans-1,2-Dichloroethene	156-60-5	6.90E+01		
1,2-Dichloropropane	78-87-5	4.70E+00		
1,3-Dichloropropene (total)	542-75-6	8.30E+00		
cis-1,3-Dichloropropene	10061-01-5	8.30E+00		
trans-1,3-Dichloropropene	10061-02-6	8.30E+00		
1,4-dioxane	123-91-1	1.70E+01		
Ethylbenzene	100-41-4	2.70E+01		
Hexane	110-54-3	2.60E+02		
2-Hexanone	591-78-6	1.40E+02		
Isopropylbenzene (cumene)	98-82-8	1.10E+03		
4-Methyl-2-pentanone (methyl isobutyl ketone)	108-10-1	5.30E+03		
Methyl acetate	79-20-9	1.00E+05		
Methyl tert-butyl ether	1634-04-4	2.20E+02		
Methylcyclohexane (based on Cyclohexane)	108-87-2	2.90E+03		
Methylene chloride	75-09-2	9.60E+02		
Styrene	100-42-5	3.60E+03		
1,1,2,2-Tetrachloroethane	79-34-5	2.80E+00		
Tetrachloroethene	127-18-4	1.10E+02		
Toluene	108-88-3	4.50E+03		
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.80E+04		
1,2,3-Trichlorobenzene	87-61-6	4.90E+01		

Table 3 (a) Soil: Restricted (Commercial/Industrial)	CAS No.	Beneficial Fill Industrial Screening Level (b) * mg/kg	Maximum Soil Concentration mg/kg	Contaminant Of Potential Concern for Commercial/ Industrial Use?
1,2,4-Trichlorobenzene **	120-82-1	9.90E+01		
1,1,1-Trichloroethane	71-55-6	3.80E+03		
1,1,2-Trichloroethane **	79-00-5	5.30E+00		
Trichloroethene **	79-01-6	6.40E+00		
Trichlorofluoromethane	75-69-4	3.40E+02		
Vinyl Chloride	75-01-4	1.70E+00		
Total Xylenes	1330-20-7	2.70E+02		
Other VOCs				
n-butylbenzene	104-51-8	5.10E+03		
sec-butylbenzene	135-98-8			
tert-butylbenzene	98-06-6			
isopropyltoluene (based on isopropylbenzene)	99-87-6	1.10E+03		
n-propylbenzene	103-65-1	2.10E+03		
1,1,1,2-tetrachloroethane	630-20-6	9.30E+00		
1,2,4-trimethylbenzene	95-63-6	2.60E+01		
1,3,5-trimethylbenzene	108-67-8	1.00E+03		
m-xylene	108-38-3	2.50E+02		
o-xylene	95-47-6	3.00E+02		
p-xylene	106-42-3	2.60E+02		
TCL Semivolatile Organic Compounds (SVOCs)				
Acenaphthene	83-32-9	3.30E+03		
Acenaphthylene (based on pyrene)	208-96-8	1.70E+03		
Acetophenone	98-86-2	1.00E+04		
Anthracene	120-12-7	1.70E+04		
Atrazine	1912-24-9	7.50E+00		
Benzaldehyde	100-52-7	1.00E+04		
Benzo(a)anthracene	56-55-3	2.10E+00		
Benzo(a)pyrene	50-32-8	2.10E-01		
Benzo(b)fluoranthene	205-99-2	2.10E+00		
Benzo(g,h,i)perylene (based on pyrene)	191-24-2	1.70E+03		
Benzo(k)fluoranthene	207-08-9	2.10E+01		
1,1'-Biphenyl	92-52-4	2.10E+01		
bis(2-Chloroethoxy)methane	111-91-1	1.80E+02		
bis(2-chloroethyl)ether	111-44-4	1.00E+00		
bis-(2-Ethylhexyl)phthalate	117-81-7	1.20E+02		
4-Bromophenyl-phenylether	101-55-3			
Butylbenzylphthalate	85-68-7	9.10E+02		
Caprolactam	105-60-2	3.10E+04		
Carbazole	86-74-8			
4-Chloro-3-methylphenol	59-50-7	6.20E+03		
4-Chloroaniline	106-47-8	8.60E+00		
2-Chloronaphthalene	91-58-7	8.20E+03		
2-Chlorophenol	95-57-8	5.10E+02		
4-Chlorophenyl-phenylether	7005-72-3			
Chrysene	218-01-9	2.10E+02		
Dibutyl Phthalate	84-74-2	6.20E+03		
Di-n-octylphthalate	117-84-0			
Dibenzo(a,h)anthracene	53-70-3	2.10E-01		
Dibenzofuran	132-64-9	1.00E+02		
3,3'-Dichlorobenzidine	91-94-1	3.80E+00		
2,4-Dichlorophenol	120-83-2	1.80E+02		
Diethylphthalate	84-66-2	4.90E+04		
2,4-Dimethylphenol	105-67-9	1.20E+03		
Dimethylphthalate	131-11-3			
4,6-Dinitro-2-methylphenol	534-52-1	4.90E+00		
2,4-Dinitrophenol	51-28-5	1.20E+02		
2,4-Dinitrotoluene	121-14-2	5.50E+00		
2,6-Dinitrotoluene	606-20-2	6.20E+01		
Fluoranthene	206-44-0	2.20E+03		
Fluorene	86-73-7	2.20E+03		
Hexachlorobenzene	118-74-1	1.10E+00		
Hexachlorobutadiene	87-68-3	2.20E+01		
Hexachlorocyclopentadiene	77-47-4	3.70E+02		
Hexachloroethane **	67-72-1	4.30E+01		
Indeno(1,2,3-cd)pyrene	193-39-5	2.10E+00		
Isophorone	78-59-1	1.80E+03		
2-Methylnaphthalene	91-57-6	2.20E+02		
2-Methylphenol	95-48-7	3.10E+03		
3-Methylphenol	108-39-4	3.10E+03		
4-Methylphenol	106-44-5	6.20E+03		
N-Nitroso-di-n-propylamine	621-64-7	2.50E-01		
N-Nitrosodiphenylamine	86-30-6	3.50E+02		
Naphthalene	91-20-3	1.80E+01		
2-Nitroaniline	88-74-4	6.00E+02		
3-Nitroaniline	99-09-2			
4-Nitroaniline	100-01-6	8.60E+01		
Nitrobenzene	98-95-3	2.40E+01		
2-Nitrophenol	88-75-5			
4-Nitrophenol	100-02-7			
2,2'-Oxybis(1-chloropropane)	108-60-1	2.20E+01		

Table 3 [a] Soil: Restricted (Commercial/Industrial)	CAS No.	Beneficial Fill Industrial Screening Level [b] * mg/kg	Maximum Soil Concentration mg/kg	Contaminant Of Potential Concern for Commercial/ Industrial Use?
Pentachlorophenol	87-86-5	2.70E+00		
Phenanthrene (based on pyrene)	85-01-8	1.70E+03		
Phenol	108-95-2	1.80E+04		
Pyrene	129-00-0	1.70E+03		
1,2,4,5-Tetrachlorobenzene	95-94-3	1.80E+01		
2,3,4,6-Tetrachlorophenol	58-90-2	1.80E+03		
2,4,5-Trichlorophenol	95-95-4	6.20E+03		
2,4,6-Trichlorophenol **	88-06-2	1.60E+02		
Other SVOCs				
Benzoic Acid	65-85-0	2.50E+05		
TCL Polychlorinated Biphenyls (PCBs)				
Aroclor-1016 **	12674-11-2	2.10E+01		
Aroclor-1221	11104-28-2	5.40E-01		
Aroclor-1232	11141-16-5	5.40E-01		
Aroclor-1242	53469-21-9	7.40E-01		
Aroclor-1248	12672-29-6	7.40E-01		
Aroclor-1254	11097-69-1	7.40E-01		
Aroclor-1260	11096-82-5	7.40E-01		
Aroclor-1262 (based on Aroclor 1260)	37324-23-5	7.40E-01		
Aroclor-1268 (based on Aroclor 1260)	11100-14-4	7.40E-01		
Total PCBs	1336-36-3	7.40E-01		
TCL Pesticides				
Aldrin	309-00-2	1.00E-01		
alpha-BHC	319-84-6	2.70E-01		
beta-BHC	319-85-7	9.60E-01		
delta-BHC (based on alpha-BHC)	319-86-8	2.70E-01		
gamma-BHC (lindane)	58-89-9	2.10E+00		
Chlordane	57-74-9	6.50E+00		
alpha-Chlordane	5103-71-9	6.50E+00		
gamma-Chlordane	5103-74-2	6.50E+00		
4,4'-DDD	72-54-8	7.20E+00		
4,4'-DDE	72-55-9	5.10E+00		
4,4'-DDT	50-29-3	7.00E+00		
Dieldrin	60-57-1	1.10E-01		
Endosulfan	115-29-7	3.70E+02		
Endosulfan I (based on Endosulfan)	959-98-8	3.70E+02		
Endosulfan II (based on Endosulfan)	33213-65-9	3.70E+02		
Endosulfan Sulfate (based on Endosulfan)	1031-07-8	3.70E+02		
Endrin	72-20-8	1.80E+01		
Endrin Aldehyde (based on Endrin)	7421-93-4	1.80E+01		
Endrin Ketone (based on Endrin)	53494-70-5	1.80E+01		
Heptachlor	76-44-8	3.80E-01		
Heptachlor epoxide	1024-57-3	1.90E-01		
Methoxychlor	72-43-5	3.10E+02		
Toxaphene	8001-35-2	1.60E+00		
Chlorinated dioxins/dibenzofurans (CDDs/CDFs)				
2,3,7,8-TCDD	1746-01-6	1.80E-05		
2,3,7,8-TCDF	51207-31-9			

[a] Use this table for sites that are restricted to commercial/industrial use (no residential, day care, schools, play areas)

[b] Based on EPA Regional Screening Level Table Residential Soil; values based on non-carcinogenic effects have been divided by 10

** non-carcinogenic RSL/10 < carcinogenic RSL

Hazardous Waste Co-Generator Policy for P3 and Design-Build Projects

VDOT GOVERNANCE DOCUMENT

HAZARDOUS WASTE CO-GENERATOR POLICY FOR PUBLIC-PRIVATE PARTNERSHIPS AND DESIGN-BUILD PROJECTS

ENVIRONMENTAL DIVISION

DATE OF ISSUANCE: 09/24/2015

Virginia Department of Transportation
Environmental Division
Hazardous Waste Co-Generator Policy for Public-Private Partnership and Design-Build Projects
Environmental Memorandum

Directed to: **Douglas Koelemay** **Bart Thrasher, P.E.** **Shailendra Patel, P.E.**	**EM Number:** EM-COMP-06-15-2010
Date: September 24, 2015	**Authority:** **RCRA 40 CFR 261, Subparts C and D**
Effective Date: June 15, 2010	**Supersedes:** **Hazardous Waste Co-Generator Policy Memorandum dated June 15, 2010**
Approved by: **Angel Deem**	**Agency Governance Document?** ☒ **Yes** ☐ **No**

PURPOSE

This document addresses Hazardous Waste Generator responsibilities of the Owner (VDOT) and Contractor (Concessionaire) on Public-Private Partnership (P3) projects and Design-Build projects.

BACKGROUND

The subject of this Environmental Memorandum was originally communicated to the State Engineer dated June 15, 2010. (Attachment A)

Periodically, during the course of negotiations on Public-Private Partnership (P3) projects, concerns are expressed by industry that they cannot assume liability attached to being classified as “generators” of Hazardous Waste[1]. Such waste might be encountered as pre-existing contaminated soil and/or groundwater that must be excavated or dewatered to support construction. The stated basis of this concern is either corporate policy that prevents the company from assuming such liability or similar concerns raised by their bonding companies.

EPA defines a hazardous waste generator as "*any person, by site, whose act or process produces hazardous waste identified or listed in Part 261 of this chapter whose act first causes a hazardous waste to become subject to regulation*."[2] In context of Owner (VDOT) and Contractor (Concessionaire) relationships, this definition can be applied to the Concessionaire, and/or its subcontractors, who will be performing the excavation or dewatering activities and to VDOT as the property owner and contractee for the project. In such situations, EPA refers to the Concessionaire, and/or its subcontractors, and VDOT as "co-generators" and thus all are jointly and severably liable for complying with the generator standards[3]. VDOT has no control over EPA's designation of the Concessionaire or its subcontractors as a generator(s). It is a legally, not contractually, defined status. EPA prefers that co-generators mutually agree (by contract or other means) who will perform the duties of the generator on behalf of the other co-generator(s). However, EPA reserves the right to hold all parties liable for violation of the regulations. Since the Concessionaire is responsible for all aspects of design, construction and subsequent waste management, VDOT should, as a matter of Policy, require that the Concessionaire assume the functional generator responsibilities.

While VDOT could contractually agree to accept the generator responsibilities, such assignment would be impractical from a coordination standpoint and offer no additional liability protection to the Concessionaire and/or its subcontractors.

This Memorandum of Policy is extended to cover Design-Build as well Bid-Build Contracts (although the specifications for Bid-Build contracts currently addresses this requirement).

[1] Hazardous Waste as defined in 40 CFR Part 261, Subparts C and D
[2] 40CFR §261.10
[3] See 45 FR 72026 and EPA's November 18, 1980 response to Julie R. Cooper-Mobay Chemical Corporation – RCRA Online Number 11005

ATTACHMENTS

Attachment A – Hazardous Waste Co-Generator Policy Memorandum

COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
1401 EAST BROAD STREET
RICHMOND, VIRGINIA 23219 2000

Gregory A. Whirley
Acting Commissioner

June 15, 2010

MEMORANDUM

TO: Malcolm Kerley, P.E.

FROM: Richard Walton, Jr.

SUBJECT: Hazardous Waste Co-Generator Policy

Periodically, during the course of negotiations on Public-Private Partnership (P3) projects, concerns are expressed by industry that they cannot assume liability attached to being classified as "generators" of Hazardous Waste[1]. Such waste might be encountered as pre-existing contaminated soil and/or groundwater that must be excavated or dewatered to support construction. The stated basis of this concern is either corporate policy that prevents the company from assuming such liability or similar concerns raised by their bonding companies.

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Naval Station Norfolk - Site Management Plan FY2006

11/1/06-01526

Final

Site Management Plan FY 2006

Naval Station Norfolk
Norfolk, Virginia

NAVFAC
Naval Facilities Engineering Command

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Atlantic

Contract No. N62470-02-D-3052
CTO-0017

November 2006

Prepared by
CH2MHILL

Contents

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

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

Acronyms and Abbreviations

AOCs	Areas of Concern
ARAR	applicable or relevant and appropriate requirements
AS	air sparge
asl	above sea level
AST	aboveground storage tank
BRAC	base realignment and closure
BTAG	Biological Technical Assistance Group
CALF	Camp Allen Landfill
CASY	Camp Allen Salvage Yard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act ("Superfund")
CHF	contaminant hazard factor
CI	Confirmatory Investigation
CNRMA	Commander Navy Region Mid-Atlantic
CS	confirmation study
DD	Decision Document
DoD	Department of Defense
DPVE	dual-phase vapor extraction
EE/CA	Engineering Evaluation and Cost Analysis
EP	Extraction Procedure
EPA	U.S. Environmental Protection Agency
EPIC	EPA Photographic Interpretation Center
ER-M	Effects Range-Medium
ESI	Expanded Site Investigation
FEMA	Federal Emergency Management Agency
FFA	Federal Facility Agreement
FFS	focused feasibility study
FS	feasibility study
ft	foot/feet
FY	fiscal year
HM	hazardous materials
HWAA	Hazardous Waste Accumulation Area
IAS	Initial Assessment Study
IDW	investigation-derived waste
in.	inches
IRA	interim remedial action
IRP	Installation Restoration Program
IRPRI	IRP Remedial Investigation
IWMP	Industrial Wastewater Management Plan

LTM	long-term monitoring
LUC	land use control
MCL	Maximum Contaminant Level
MIP	membrane interface probe
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command - Mid-Atlantic
NCP	National Contingency Plan
NFA	No Further Action
NFESC	Naval Facilities Engineering Support Center
NPL	National Priorities List
NSN	Naval Station Norfolk
OU	Operable Unit
O/WS	oil/water separator
PA	preliminary assessment
PCB	polychlorinated biphenyl
PP	petroleum product
PRAP	Proposed Remedial Action Plan
PWC	public works center
QADSY	Q-Area Drum Storage Yard
RA	Risk Assessment
RAB	restoration advisory board
RAO	Remedial Action Objectives
RBCs	risk-based concentrations
RCRA	Resource Conservation and Recovery Act
RD/RA	remedial design/remedial action
RFA	RCRA Facility Assessment
RI	Remedial Investigation
ROD	Record of Decision or Decision Document
RRR	relative risk ranking
SAA	satellite accumulation area
SI	Site Investigation
SI(n)	Site Inspection
SMP	Site Management Plan
SSA	Site Screening Area
SSP	site screening process
SVE	soil-vapor extraction
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TAL	target analyte list
TCL	target compound list
TPH	total petroleum hydrocarbons
UST	underground storage tank

VC	Vinyl Chloride
VDEQ	Virginia Department of Environmental Quality
VDOT	Virginia Department of Transportation
VHWMR	Virginia Hazardous Waste Management Regulations
VPDES	Virginia Pollutant Discharge Elimination System
VSWMR	Virginia Solid Waste Management Regulations
VOC	volatile organic compound
WDA	Waste Disposal Area
yd^2	square yards
yd^3	cubic yards

SECTION 1

Introduction

This report presents the fiscal year (FY) 2006 Site Management Plan (SMP) for Naval Station Norfolk (NSN) located in Norfolk, Virginia. This report has been prepared by CH2M HILL for use by the Navy, U.S. Environmental Protection Agency Region III (EPA), Virginia Department of Environmental Quality (VDEQ, and Naval Station Norfolk Restoration Advisory Board (RAB).

1.1 Purpose of the Site Management Plan

The purpose of the SMP is to provide a management tool for the Navy, EPA, VDEQ, and Activity personnel for utilization in planning, scheduling, and setting priorities for environmental remedial response activities conducted at NSN. This SMP focuses on upcoming activities planned for FY 2006 and provides a projected schedule through FY 2011. NSN was proposed for inclusion on the National Priorities List (NPL) in the *Federal Register*, Volume 16, Number 117, on June 17, 1996 and was added to the NPL on April 1, 1997. NSN was included under the "Federal Facilities" section of the NPL in which federal agencies are considered responsible for conducting most of the response actions at facilities under their jurisdiction. A Federal Facility Agreement (FFA) between EPA Region III and NSN was finalized in February 1999. With the final FFA in place, the EPA's role at the site is less extensive than at other NPL sites without FFAs; however, the EPA continues to function in an oversight role for the management and cleanup of the Installation Restoration Program (IRP) sites and solid waste management units (SWMUs) at NSN.

The SMP presents the rationale for the sequence of environmental investigations and remedial response activities to be completed for each site and the estimated schedule for completion of these activities. Detailed activity schedules are provided for FY 2006 and FY 2007, and prospective schedules are provided for FY 2008 through FY 2011.

1.2 Format of the Site Management Plan

This SMP consists of five sections.

- **Section 1, Introduction**, describes the SMP's scope and purpose; provides a description and history of NSN; summarizes the environmental setting and previous environmental investigations conducted at NSN; and provides the FFA site classification and supporting rationale for these determinations**.**
- **Section 2, Site Descriptions**, provides specific information regarding each of the active IRP sites. Site-specific information includes physical characteristics of the site, a description of past activities conducted at the site, and known contaminants in each site medium. A site map is provided for each site.

- **Section 3, Screening, Categorizing and Prioritizing Sites,** describes the procedures for screening, categorizing and prioritizing sites based on the potential for human health and ecological risk. The system has been developed to establish priorities for cleanup actions, such that the "high" risk sites are addressed first.
- **Section 4, CERCLA Process Activities**, summarizes the processes of investigation, feasibility study, and remedial action for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) IRP sites. It also describes how team partnering has been applied to streamline the CERCLA process.
- **Section 5, Site Management Plan Schedules**, provides scheduling assumptions and SMP project schedules.

1.3 Facility Description

1.3.1 Facility Location/Physical Description

NSN, the largest naval base in the United States, is situated on 4,631 acres of land (A.T. Kearny, March 1992) in the northwest portion of the City of Norfolk, Virginia. The location of the NSN is shown in Figure 1-1. NSN is bounded on the north by Willoughby Bay, on the west by the confluence of the Elizabeth and James Rivers, and on the south and east by the City of Norfolk. A portion of the NSN's eastern boundary is also formed by Mason Creek. NSN includes approximately 4,000 buildings, 20 piers, and an airfield. The western portion of NSN is a developed waterfront area containing the piers and facilities for loading, unloading, and servicing naval vessels. Land use in the surrounding area is commercial, industrial, and residential. The waterfront area south of the NSN provides shipping facilities and a network of rail lines for several large industries. Residential and recreational areas border NSN at the base's southern, eastern, and northeastern boundaries.

A number of other military installations are located within a twenty-five mile radius of the NSN. These include Fort Monroe and Langley Air Force Base to the north, Naval Amphibious Base Little Creek and Fort Story to the east, Naval Air Station Oceana to the southeast, Norfolk Naval Shipyard and St. Julien's Creek Annex to the south, and Naval Supply Center-Craney Island Fuel Terminal to the southwest.

1.3.2 Facility History and Mission

NSN began operations in 1917, when the U.S. Navy acquired 474 acres of land to develop a naval base to support World War I activities. Bulkheads were built along the coast to extend available land and after extensive dredge and fill operations, the total land under Navy control was 792 acres. An additional 143 acres of land were acquired in 1918 and officially commissioned for the Naval Air Station (NAS). Improvements to the piers and expansion of supply/material handling facilities were also completed from 1936 through 1941.

During World War II major construction projects were completed, including a power plant, numerous runways and hangars, a tank farm, and several barracks/housing complexes. During this time, the area of NSN expanded to more than 2,100 acres. After World War II, NSN continued to acquire land through various types of land transfers and dredge and fill

operations conducted in areas of Mason Creek, the Bousch Creek Basins, and Willoughby Bay.

During its history, NSN has expanded to become the world's largest naval installation, with 105 ships home ported in Norfolk. The Base currently has 20 piers handling approximately 3,100 ship movements annually.

The mission of NSN is to provide fleet support and readiness for the U.S. Atlantic Fleet.

1.3.3 Operations/ Process Descriptions

NSN operates in various capacities to provide support to vessels, aircraft, and other activities. NSN houses many tenants, each performing different operations involving the servicing and maintenance of vessels and aircraft.

The service and maintenance of ships includes utilities hook-up, on-board maintenance, and coordination of ship movements in the harbor. Additional functions include loading, unloading, and handling of fuels and oils used aboard the vessels. Ship and aircraft repair operations consist of paint stripping, patching, parts cleaning, repainting, engine overhauls, sandblasting, and metal-plating processes.

1.4 Environmental Setting

1.4.1 Topography and Surface Water Hydrology

Elevations at NSN range from sea level at the north and west boundaries to approximately 15 feet (ft) above sea level (asl) in central portions of the Base.

Four major surface water features surround the greater Norfolk area, including the James River, Elizabeth River, Willoughby Bay, and Chesapeake Bay, all of which are tidally influenced in this area.

The majority of surface water at NSN flows to either Mason Creek or the remnants of Bousch Creek. The main channel of Bousch Creek was filled during the development of NSN and replaced by a network of drainage ditches and underground culverts. Due to the proximity of tidal waters and the low relief of the land, both Mason Creek and the remnant tributaries of Bousch Creek are tidally influenced throughout NSN. Both creeks discharge to Willoughby Bay, and ultimately, to the Chesapeake Bay. In addition, some surface water runoff from NSN discharges directly to the Elizabeth River.

A Federal Emergency Management Agency (FEMA) flood insurance study established that the 100-year floodplain elevation at NSN is 8.5 ft asl (A.T. Kearny, March 1992). Therefore, the portions of NSN adjacent to Willoughby Bay and the Elizabeth River are within the 100-year floodplain.

1.4.2 Geology and Hydrogeology

NSN is in the outer Atlantic Coastal Plain Physiographic Province, which is characterized by low elevations and gently sloping relief. The Base is underlain by more than 2,000 ft of gently dipping sandy sediment, ranging in age from Recent to Lower Cretaceous. Table 1-1 contains a stratigraphic column of hydrogeologic units of southeast Virginia.

The uppermost geologic unit is the Columbia Group, composed of the Sand Bridge Formation and the underlying Norfolk Formation. The Columbia Group is approximately 60 ft thick. The upper 20 to 40 feet consist of unconsolidated fine sands and silts of low to moderate permeability. The lower 20 to 40 feet consist of relatively impermeable silt, clay, and sandy clay. The Yorktown Formation underlies the Columbia Group and is approximately 90 to 100 feet thick in the vicinity of the Base. It consists of moderately consolidated coarse sand and gravel with abundant shell fragments.

The two significant aquifer systems in the area are the water-table aquifer in the upper 20 to 40 feet of the Columbia Group and the underlying Yorktown Aquifer. The water-table aquifer is thin and consists of discontinuous heterogeneous sand and shell lenses. The depth to the water table is usually less than 8 feet. The Yorktown Aquifer is semi-confined beneath a clay layer in the upper Yorktown Formation. Water-bearing zones in the Yorktown Aquifer consist of fine to coarse sand, gravel, and shells.

1.5 Environmental History

1.5.1 Installation Restoration Program

NSN was proposed for inclusion on the NPL on June 17, 1996 and was added to the NPL on April 1, 1997. Because NSN is on the NPL, the Navy and the EPA approve all Records of Decision (RODs) with state concurrence. Prior to delisting, no further action (NFA) RODs will be signed to formally document site close-out through the CERCLA process.

In 1975, the Department of Defense (DoD) began a program to assess past hazardous and toxic materials storage and disposal activities at military installations. The goals of this program, now known as the IRP, were to identify environmental contamination resulting from past hazardous materials management practices, to assess the impacts of the contamination on public health and the environment, and to provide corrective measures as required to mitigate adverse impacts.

The environmental condition of NSN is being investigated through the DoD's IRP. The IRP is being conducted in accordance with applicable federal and state environmental regulations and requirements.

In 1976, the Resource Conservation and Recovery Act (RCRA) was passed by Congress to address potentially adverse human health and environmental impacts of hazardous waste management and disposal practices. RCRA was legislated to manage the present and future disposal of hazardous wastes. In 1980, CERCLA, or "Superfund," was passed to investigate and remediate areas resulting from past hazardous waste management practices. This program is administered by EPA or state agencies.

DoD's IRP was reissued in 1981, with additional responsibilities and authorities specified in CERCLA delegated to the Secretary of Defense. The Navy subsequently restructured the IRP to match the terminology and structure of the EPA CERCLA Program. The current IRP is consistent with CERCLA and applicable state environmental laws. The CERCLA process is further discussed in Section 4 of this SMP.

Team partnering was introduced to NSN in October 1996, to streamline the cleanup of former disposal sites by using consensus-based site management strategies during the CERCLA process. The partnering team (the Team) consists of NAVFAC-Mid-Atlantic, EPA Region III, VDEQ, CH2M HILL, and other Navy contractors. The Team has streamlined the site investigation and remediation process to reduce costs and expedite cleanup and closure at IRP sites. Section 4 of this SMP discusses how team partnering has been applied within the CERCLA process in detail.

1.5.2 Previous Investigations

Basewide Investigations

Previous basewide investigations completed through the IRP include the Initial Assessment Study (IAS) (Environmental Science & Engineering, Inc., February 1983); the IRP Remedial Investigation—Interim Report (IRPRI) (Malcolm Pirnie, March 1988); a RCRA Facility Assessment (RFA) (A. T. Kearney, March 1992); an Aerial Photographic Site Analysis (EPA, September 1994); Phase I Relative Risk Ranking System Data Collection Sampling and Analysis Report (RRR—Phase I) (Baker Environmental, Inc., January 1996); and a Relative Risk Ranking System Data Collection Sampling and Analysis Report Phase II (RRR—Phase II) (Baker Environmental, Inc., December 1996).

1.5.3 Site Classification

Installation Restoration Program Sites

The purpose of the 1983 IAS was to identify and assess sites posing a potential threat to human health or the environment due to contamination from past hazardous materials handling and operations activities. Eighteen potentially contaminated sites were identified based on information obtained from historical records, photographs, site inspections, and personnel interviews. Several of the IAS sites also have separate designations under the RFA. The 18 IAS sites and RFA designations are:

- Site 1—Camp Allen Landfill (CALF)
- Site 2—NM Area Slag Pile
- Site 3—Q Area Drum Storage Yard
- Site 4—Transformer Storage Area P-71 RFA M-5
- Site 5—Pesticide Disposal Site
- Site 6—CD Landfill
- Site 7—Inert Chemical Landfill RFA L-3
- Site 8—Asbestos Landfill RFA L-4
- Site 9—Q-Area Landfill RFA L-5
- Site 10—Apollo Disposal Site RFA M-23
- Site 11—Repair Shop Drains
- Site 12—Alleged Mercury Disposal Site RFA M-35
- Site 13—Past Wastewater Outfalls RFA TP-10/M-45
- Site 14—Oil Spill-Piers 4, 5, and 7 RFA M-24
- Site 15—Oil Spill-Piers 20, 21, and 22
- Site 16—Fire, Building X-136
- Site 17—Fire, Building SDA-215 RFA C-25/AOC E

- Site 18—Former NM Waste Storage RFA M-26

Each of the 18 sites was evaluated for the past history of potential releases, potential migration pathways, and pollutant receptors. Sampling and analysis activities were not performed as part of the IAS. The IAS concluded that 6 of the 18 sites posed sufficient threats to human health or the environment to warrant further evaluation in a Confirmation Study (CS).

Confirmation Studies were performed for the six sites recommended for further investigation in the IAS (Sites 1 through 6) to confirm or refute the existence of the suspected contamination. This effort for five of the six sites was documented in the 1988 IRPRI Report. An independent CS was performed by the Navy on Site 6-CD Landfill. The objectives of the Confirmation Studies were to determine the extent of contamination, develop and evaluate economically feasible remedial alternatives, and recommend a remedial action.

Since the IAS, the Navy has identified five sites (Sites 19 through 23) through historical information that were added to the IRP:

- Site 19—Buildings V60/V90 RFA M-34
- Site 20—LP-20 Site
- Site 21—Building W-316 RFA M-9/M-10
- Site 22—Camp Allen Salvage Yard (CASY) RFA C-14
- Site 23-Building LP-20 Plating Shop RFA M-29

Close-out reports documenting the NFA determination for eight of the IRP Sites (IR Sites 7, 8, 9, 10, 12, 16, 17, and 18) were prepared and approved by the NSN Partnering Team as part of a "Consensus Agreement" for reference in the FFA. In fall 2000, the NSN Partnering Team revisited these sites to evaluate if the NFA determination was based on unrestricted use. For IR Sites 7, 8, 10, 12, 16, 17, and 18, soil-contaminant levels were initially compared only to industrial risk-based concentrations (RBCs). A re-evaluation of the sites was performed that compared soil contaminant levels to residential RBCs. The results recommended four of the sites (7, 8, 12, and 17) for no further action and a Close-Out Report was prepared and signed by the Tier I Partnering Team in March 2001. As indicated above, Site 9 (Q-Area Landfill) was closed out as NFA, however, the SWMU 14 accumulation pad is within the landfill boundary, and is currently undergoing a full RI/FS. As a result of the SWMU 14 RI, samples have been collected within the Site 9 boundaries. Sites 10, 16, and 18 were recommended for additional investigations and the fieldwork was completed in June 2001. As a result of the investigations, Close-Out reports for Sites 10 and 16 were completed in January 2002 and May 2002, respectively. Further investigations were completed at Site 18 in February and December of 2002 and an Expanded Site Investigation (ESI) Report has been submitted to the Tier I Partnering Team. Supplemental investigation activities to further evaluate a groundwater hotspot was conducted in December of 2004.

IRP Sites 13, 14, and 15 were recommended for no further action under CERCLA in the FFA as these sites are being addressed under the jurisdiction of other environmental programs (underground storage tank or Virginia Pollutant Discharge Elimination System (VPDES)).

The status of the remaining IRP sites is summarized in Table 1-2. A base map of the NSN, showing the locations of the IRP sites and their current status in the remedial process, is

provided as Figure 1-2. As an indicator of the progress made in cleaning up sites, this figure can be compared to Figure 1-3, which shows the cleanup status of these sites in March 1997.

Solid Waste Management Units

In March 1992, a RFA was completed for NSN. This study was a basewide inventory of existing SWMUs and other Areas of Concern (AOCs). A total of 274 SWMUs and 10 AOCs were tentatively identified in this study. The September 1994 EPA Photographic Interpretation Center (EPIC) study of aerial photography identified 37 potential Waste Disposal Areas (WDAs). Of the sites identified by the RFA and EPIC studies, 148 were identified as potentially contaminated. The RRR—Phase I report provided sampling results for 45 of the 148 identified sites. Of the sites sampled as part of the RRR—Phase I report, the Navy identified 25 for additional evaluation and possible investigation; these 25 sites were identified as SWMUs in the FY1996 SMP. The following lists the 25 SWMUs and their corresponding RFA/EPIC study identification:

- SWMU 1—SP-2B Accumulation Area — RFA C-83
- SWMU 2—Building Z-309 Ash Hopper Storage Area — RFA M-13/M-14
- SWMU 3—Building Z-309 Oil/Lubricant Storage Area — RFA AOC B
- SWMU 4—Public Works Center (PWC) Sandblast Area — RFA M-19/M-20; EPIC WDA-1
- SWMU 5—LF-61 Waste Holding Tank — RFA M-36
- SWMU 6—Building V-28 Waste Pit — RFA M-31
- SWMU 7—LF-18 Aircraft Ramp — EPIC WDA-3
- SWMU 8—Firefighting Training School — EPIC WDA-20
- SWMU 9—LP-200/MAC Terminal — EPIC WDA- 28/29
- SWMU 10—LP-200/MAC Terminal/East — EPIC WDA- 31/32/35
- SWMU 11—Old Weapons Station Entrance — EPIC WDA 33/34
- SWMU 12—Disposal Area Near NM-37 — EPIC WDA-36
- SWMU 13—Disposal Area PWC Operations, Near NM-71 — EPIC WDA-37
- SWMU 14—Q-50 Satellite Accumulation Area — RFA C-17
- SWMU 15—W-130 Accumulation Area — RFA C-27
- SWMU 16—NM-37 Accumulation Area — RFA C-54
- SWMU 26—Old Mounds Northeast of NM-140/141 — EPIC WDA-21
- SWMU 27—Mason Creek Embankment — EPIC WDA-30
- SWMU 28—Probable Solid Waste Disposal South of CEP 201 — EPIC WDA-11
- SWMU 29—Solid Waste Disposal Area/CD-3/CD-4 — EPIC WDA-12
- SWMU 30—Sludge Fill Disposal Area/ Marshy Area South of Runway — EPIC WDA-15/16/17
- SWMU 32—Solid Waste Disposal Area CEP-160 Embankment — EPIC WDA-5
- SWMU 33—Debris Piled at Seawall/Corner of Sustain Pier — EPIC WDA-6
- SWMU 34—Solid Waste Disposal Area CEP-200 — EPIC WDA-7
- SWMU 35—Solid Waste Disposal Area CEP-196/ Resolute Embankment — EPIC WDA-8

To provide additional site data, a Phase II RRR sampling event was conducted in September 1996 with the results documented in the *Relative Risk Ranking System Data Collection Sampling*

and Analysis Report, Phase II, Baker Environmental, dated December 9, 1996. During FFA negotiations conducted in 1997 and 1998, the Navy/EPA project management team, in consultation with the Naval Base Partnering Team, identified several of the 148 sites to be included as SWMUs in the FY1997 SMP. These SWMUs (and corresponding RFA/EPIC study identification numbers) are:

- SWMU 24—Building LF-53 Trenches RFA M-39
- SWMU 25—Q-82/78 Former PWC Parking EPIC WDA-2
- SWMU 36—Stormwater Drainage System RFA M-44
- SWMU 37—Q-82/78 Former PWC Parking EPIC WDA-2
- SWMU 38—CD Area behind the Compost Yard EPIC WDA-13
- SWMU 39—Open Dump/Boundary of Camp Allen Landfill EPIC WDA-18/19
- SWMU 40—MCA-603 Pits EPIC WDA-22
- SWMU 41—Disposal Area, CA-99 Golf Course EPIC WDA-23
- SWMU 42—CEP 201 Area EPIC WDA-9

Based upon the results of the two RRR studies, available historical operating data, and visual site inspections, the project management team recommended ten SWMUs (SWMUs 5, 7, 11, 13, 15, 24, 26, 27, 29, and 30) for no further action under CERCLA in the FFA.

Ongoing remediation is being conducted at SWMU 37, the Q-82/78 Former PWC Parking Area, in accordance with the Virginia Underground Storage Tank (UST) regulations. The VDEQ is providing oversight of the site remediation. Therefore, the project management team reviewed information pertaining to the Site Characterization and Corrective Action Plan and has determined that no further action under CERCLA was required at SWMU 37.

The NSN stormwater drainage system (SWMU 36, RFA M-44) has undergone a $10-million rehabilitation project. The inspection and assessment of the stormwater drainage system has been completed and the rehabilitation (repair/replacement) has been conducted. Therefore, the project management team determined that no further action under CERCLA is required.

A Confirmatory Investigation (CI) was conducted at SWMUs 1, 4, 6, and 8 in 1996. The CI results were documented in the *Draft Report for the Solid Waste Management Unit Confirmatory Investigation Report*, CH2M HILL, dated November 18, 1996. The investigation results identified lead contamination in the soil at SWMU 1 and a removal action was conducted there in October 1997. As a result of the removal, the project management team determined no further action under CERCLA is required. The CI results also indicated that additional characterization was needed at SWMUs 4, 6, and 8. However, the Navy removed SWMU 4 from the CERCLA program in May 2003 because the site remains active. Due to the lack of a complete pathway and release, SWMU 6 was recommended for no further action in the Close-Out report signed by the Tier I Partnering Team in November 2002. A re-evaluation of SWMU 8 was performed that compared groundwater and surface and subsurface soil to RBCs for residential and industrial soil, EPA Region III tap water RBCs, and EPA drinking water Maximum Contaminant Levels (MCLs) for groundwater. The results recommended SWMU 8 for no further action and a Close-Out report was prepared and signed in March 2001.

A confirmatory Site Investigation (SI) was initiated in summer 1998 for SWMUs 9, 10, 12, 14, 16, 28, 32, 33, 34, 35, 38, 40, 41, and 42. The SI's objectives were to determine the extent of

contamination at each SWMU, to develop and evaluate economically feasible remedial alternatives for remedial action at contaminated SWMUs, and to close out qualified sites.

A supplemental investigation was conducted in Fall 2000 for SWMUs 12, 14, 16, 38, and 39. The study's objectives were to further characterize selected SWMUs. As a result of this investigation SWMUs 38 and 39 were closed out.

A RI was completed for SWMUs 12 and 16 in 2003. The objectives were to characterize extent and determine potential risks to human health and the environment. As a result of the RI, no action is required for SWMUs 12 and 16 and is documented in the Final ROD submitted in the Fall of 2005.

The current status of SWMUs under investigation at NSN is summarized in Table 1-3. A base map of the NSN, showing the locations of the SWMU sites and their current status in the remedial process, is provided as Figure 1-4. As an indicator of the progress made in cleaning up SWMU sites, this figure can be compared to Figures 1-5, which shows the clean-up status of these sites in March 1997.

No Further Action Sites

The remaining 148 sites previously identified were individually evaluated during the NFA negotiations between the Navy and the EPA. These sites were not previously discussed in the SMP. The project management team determined that no further action is required for the sites as detailed in Table 1-4.

FFA Site Screening Areas

Site Screening Areas (SSAs) are areas that either pose or may potentially pose a threat to public health, welfare, and the environment. SSAs may expand or contract in size during the site investigation as information becomes available indicating the extent of contamination and the area needing study. In the NSN FFA, four SSAs are identified:

- SSA 1 Q-72 Sandblast Area (SWMU 4; RFA M-19/M-20; EPIC WDA-1)
- SSA 2 V-28 Waste Pit (SWMU 6; RFA M-31)
- SSA 3 Fire Fighting School (SWMU 8; EPIC WDA-20),
- SSA 4 NM-37 Area (SWMU 12; EPIC WDA-36); (SWMU 16; RFA C-54)

Site investigations were completed during 1998 or 1999 at each SSA. The investigations at each area detected levels of site-related constituents above RBCs. A background investigation was completed to assess if the levels also exceeded background levels. To date, SSA 3 has been recommended for NFA and a closeout report has been completed. SSA 2 (V-28 Waste Pit) has also been recommended for NFA and a closeout report has been completed. SSA 1 (Q-72 Sandblast Area) is currently an active site; therefore, the NSN Partnering Team came to consensus that SSA 1 is NFA under CERCLA and the cleanup of this site will be addressed as part of the Military Construction Program when the sandblasting operations cease. SSA 4 has undergone the RI phase in which a Remedial Investigation report including a human health and ecological risk assessment were completed. The NSN Partnering Team has agreed that no further action is required. Therefore, the Navy is currently preparing a Proposed Plan that will be submitted to the NSN Partnering Team for review.

FFA Areas of Concern

The FFA signed by EPA on February 18, 1999 listed eight AOCs as sites under evaluation to determine if the sites should proceed in the screening process and be investigated as SSAs, or whether the information under review supports a no further action determination. The documentation and sampling of each of these areas were discussed at the Tier I Partnering meeting on March 16, 1999. The current status of the eight AOCs are presented in Table 1-5.

TABLE 1-1
Stratigraphic and Hydrogeologic Units of Southeast Virginia
(from Harsh and Laczniak, 1990)

Geologic Age		Group	Stratigraphic Formation	Hydrogeologic Unit
Period	**Epoch**			
Quaternary	Holocene	Columbia	Holocene Deposits	Columbia aquifer
	Pleistocene		Undifferentiated Deposits	
Tertiary	Pliocene		Bacons Castle Formation	Yorktown confining unit
		Chesapeake	Yorktown Formation	Yorktown-Eastover aquifer
	Miocene		Eastover Formation	
			St. Mary's Formation	St. Mary's confining unit
			Choptank Formation	St. Mary's Choptank aquifer
			Calvert Formation	Calvert confining unit
	Oligocene	Pamunkey	Old Church Formation	Chickahominy-Piney Point aquifer
	Eocene		Chickahominy Formation	
			Piney Point Formation	
			Nanjemoy Formation	Nanjemoy-Marlboro Clay confining unit
	Paleocene		Marlboro clay	
			Aquia Formation	Aquia aquifer
			Brightseat Formation	Brightseat confining unit
				Brightseat aquifer
Cretaceous	Late Cretaceous		Undifferentiated Sediments	Upper Potomac confining unit
	Early Cretaceous		Potomac Formation	Upper Potomac aquifer
				Middle Potomac confining unit
				Middle Potomac aquifer
				Lower Potomac confining unit
				Lower Potomac aquifer

TABLE 1-2
Status Summary of IRP Sites, December 2004
Naval Station Norfolk

Site	RFA Designations	PA or IAS	SI or CS	EE/CA	Work Plans	RI	FS	PRAP	Close-Out Report	ROD/DD	RD	RA Construct	RA Ops	Comments
CERCLA Investigation in Progress														
Site 18 - Former NM Hazardous Waste Storage Area	RFA M-26	1983	2002, 2003		2001, 2003, 2004, 2005									Final SI completed in November 2002. Final ESI completed in July 2004. Technical Memoranda for Additional Delineation completed in September 2004 and July 2005.
Site 22 - Camp Allen Salvage Yard	RFA C-14	1994	1994	1999, 2002	1996	1999	2002	2002		2004	2002, 2004	2002		An EE/CA was completed in January 2002 recommending that a soil cover be placed at the site. The cover was completed in Summer 2002. The ROD, addressing soil and sediment cleanup strategies, was finalized in September 2004. The RD for Land Use Controls was completed in December 2004.
Site 23 - Building LP-20 Plating Shop	RFA M-29		2005		2004									This site has recently been transferred to the CERCLA program from RCRA. Final SI Work Plan completed in October 2004. Draft SI reports completed in July 2005.
Remedy in Place (Ongoing O&M and LTM)														
Site 1 - Camp Allen Landfill		1983*	1988*		1991	1994	1994	1995		1995	1996, 2005	1997		Removal action (soil) completed. Construction of Groundwater Pump and Treat as well as DPVE systems complete and in operation. Long-term monitoring to evaluate system effectiveness was initiated in 1999.
Site 2- NM Slag Pile - All Media		1983*	1988*		1996, 1998			1999		2000	1999, 2005	1999		ROD finalized in December 2000. Sediments removed in December 1999. Annual post closure monitoring instituted in October 2000.
Site 3 - Q-Area Drum Storage Yard		1983*	1988*		1991	1996	1996	1996		1996	1996, 2005	1998		Construction of Air Sparge/SVE system complete and in operation. Long-term monitoring to evaluate the effectiveness of treatment system was instituted in 1999.
Site 6 - CD Landfill		1983*	1991		1993		1995							Removal of contaminated sediments partially completed in fall 1997. Cap construction completed in December 1999. Post closure monitoring initiated in January 2000.

TABLE 1-2
Status Summary of IRP Sites, December 2004
Naval Station Norfolk

Site	RFA Designations	PA or IAS	SI or CS	EE/CA	Work Plans	RI	FS	PRAP	Close-Out Report	ROD/DD	RD	RA Construct	RA Ops	Comments
Site 6, OU1 - Sediments								1996		1996	1996, 2005	1999		
Site 6, OU2 - Landfill Cap								1998		1999	1999, 2005	1999		
Site 20 - Building LP-20 Site	RFA M-9/M-10	1991	1991		1994	1996	1996	1996		1996	1997, 2005	1998		Construction of Air Sparge/SVE system to address TPH and chlorinated solvents in groundwater complete. Remediation systems are currently in operation. Long-term monitoring to evaluate effectiveness was instituted in 1999.
Response Complete/NFA														
Site 4 - P-71 Transformer Storage	RFA M-5	1983*	1988*		1991	1991	1991	1991		1992	1991	1992		Cleanup completed. Groundwater monitoring completed in 1995.
Site 5 - Pesticide Disposal Site		1983*	1988** 1998***	1998								1999		Pesticide-contaminated soil removal action completed in November 1999 and the site was closed out.
Site 7 - Inert Chemical Landfill	RFA L-3	1983							2001					Close-Out report completed in March 2001
Site 8 - Asbestos Landfill	RFA L-4	1983							2001					Close-Out report completed in March 2001
Site 9 Q-50 Area Landfill	RFA L-5	1983							2001					Close-Out report completed; Site revisited in 2002 for to determine if NFA was for unrestricted use; SWMU 14 RI currently in progress which has included collection of soil data from Site 9
Site 10 - Apollo Fuel Disposal Sites	RFA M-23	1983	2001		2001				2002					Close-Out report completed in January 2002
Site 12 - Alleged Mercury Disposal Site	RFA M-35	1983							2001					Close-Out report completed in March 2001
Site 16 - Chemical Fire Building X-136		1983	2001		2001				2002					Close-Out report completed in May 2002
Site 17 - Chemical Fire Building SDA-	RFA C-25/AOC E	1983							2001					Close-Out report completed in March 2001

TABLE 1-2
Status Summary of IRP Sites, December 2004
Naval Station Norfolk

Site	RFA Designations	PA or IAS	SI or CS	EE/CA	Work Plans	RI	FS	PRAP	Close-Out Report	ROD/DD	RD	RA Construct	RA Ops	Comments
215														
Site 19 - Buildings V-60/V-90	RFA M-34	1988	1988		1989	1989	1989	1989		1989	1989	1991		Building demolition and site cleanup completed.
Site 21 - Building W-316	RFA M-9/10	1996	1996	1997	1996									PCB-contaminated soil removal action completed in March 1998 under TSCA.

Legend:

1993	Year Activity Completed (fiscal year)	RI	Remedial Investigation	LTM	Long-Term Monitoring
X	Activity Completed (date unknown)	FS	Feasibility Study	Construct	Construction Phase
Aip	Activity In Progress (expected completion)	PRAP	Proposed Remedial Action Plan	Ops	Operations Phase
^	Activity Planned	ROD	Record of Decision or Decision Document	*Refers to "Initial Assessment Study of Sewells Point Naval Complex," dated February 1983.	
PA	Preliminary Assessment	RD	Remedial Design		
IAS	Initial Assessment Study	RA	Remedial Action /Removal Action	** Refers to "Installation Restoration Program Investigation Interim Report," dated March 1988.	
SI	Site Investigation	TBA	To Be Addressed		
CS	Confirmation Study	NFA	No Further Action	***CH2M HILL SI completed February 1998	
EE/CA	Engineering Evaluation/Cost Analysis	DD	Decision Document		

TABLE 1-3
Status Summary of SWMUs , December 2004
Naval Station Norfolk

	SWMU	RFA Designations	Phase 1 RRR*	Phase 2 RRR**	Work Plans	PA/SI(n)	SI/CI/ SSI***	RI/FS	EE/CA	Close-Out Report	ROD/DD	RD	RA Construction	Comments
CERCLA Investigation in Progress														
12	Disposal Area Near NM-37	EPIC WDA-36	1996	1996	1998	1998		2004			2005			Final RI completed in July, 2004. Final ROD completed in October 2005.
14	Q-50 Satellite Accumulation Area	RFA C-17	1996	1996	1998	1998		2004						Final RI/HHRA/ERA completed in August, 2004
16	NM 37 Accumulation Area	RFA C-54	1996	1996	1998	1998		2004			2005			Final RI completed in July, 2004. Final ROD completed in October 2005
Response Complete/NFA														
1	SP-2B Accumulation Area	RFA C-83	1996	1996			1996							Lead removal in October 1997 and determined no further action under CERCLA
2	Building Z-309 Ash Hopper Storage Area	RFA M-13/ M-14	1996	1996						2000				Close-Out Report was completed in March, 2000 based on RRR report
3	Building Z-309 Oil/Lubricant Storage Area	RFA AOC B	1996	1996						2000				Close-Out Report was completed in March, 2000 based on RRR report
4	PWC Sandblast Area	RFA M-19/M-20; EPIC WDA-1	1996	1996	1996	1996								Site removed from the CERCLA program because the facility remains active
5	LF-61 Waste Holding Tank	RFA M-36	1996	1996										No further action based on RRR report
6	Building V-28 Waste Pit	RFA M-31	1996		1996, 2001	1996	1998, 1999			2002				Close-Out Report was completed in November, 2002 based on results of CI report
7	LF-18 Aircraft Ramp	EPIC WDA-3	1996	1996										No further action based on RRR report
8	Fire Fighting School	EPIC WDA-20	1996		1996	1996	1999			2001				Close-Out Report was completed in March, 2001
9	LP-200/MAC Terminal	EPIC WDA-	1996		1998	1998				2001				Close-Out Report was completed in

TABLE 1-3
Status Summary of SWMUs , December 2004
Naval Station Norfolk

	SWMU	RFA Designations	Phase 1 RRR*	Phase 2 RRR**	Work Plans	PA/SI(n)	SI/CI/ SSI***	RI/FS	EE/CA	Close-Out Report	ROD/DD	RD	RA Construction	Comments
		28/29												October, 2001
10	LP-200/MAC Terminal/East	EPIC WDA-31/32/35	1996	1996	1998	1998				2001				Close-Out Report completed in October, 2001
11	Old Weapons Station Entrance	EPIC WDA-33/34	1996	1996										No further action based on RRR report
13	Disposal Area PWC Operations, Near NM-71	EPIC WDA-37	1996	1996										No further action based on RRR report
15	W-130 Accumulation Area	RFA C-27	1996	1996										No further action based on RRR report
17	Surface Disposal Area; Waste Generated from SP-10 Maintenance		1996	1996										No further action based on RRR report
18	Surface Disposal Area; Waste Generated from V-88 Lab		1996	1996										No further action based on RRR report
19	Surface Disposal Area; Waster Generated from LF-53 Painting		1996	1996										No further action based on RRR report
20	Surface Disposal Area; Waste Generated from Aircraft Maintenance, Former UST Site		1996	1996										No further action based on RRR report
22	Surface Disposal Area; Waste Generated from Bldg. LF-60 Helicopter Maintenance		1996	1996										No further action based on RRR report
24	Building LF-53 Trenches	RFA M-39	1996	1996										No further action based on RRR report
25	Q-82/78 Former PWC Parking Lot		1996	1996										No further action based on RRR report

TABLE 1-3
Status Summary of SWMUs , December 2004
Naval Station Norfolk

	SWMU	RFA Designations	Phase 1 RRR*	Phase 2 RRR**	Work Plans	PA/SI(n)	SI/CI/ SSI***	RI/FS	EE/CA	Close-Out Report	ROD/DD	RD	RA Construction	Comments
26	Old Mounds Northeast of NM-140/141	EPIC WDA-21	1996	1996										No further action based on RRR report
27	Mason Creek Embankment	EPIC WDA-30	1996	1996										No further action based on RRR report
28	Probable Solid Waste Disposal South of CEP 201	EPIC WDA-11	1996		1998	1998				2000				Streamlined Risk Assessment/Close-Out Report was submitted May, 2000.
29	Solid Waste Disposal Area/CD-3/CD-4	EPIC WDA-12	1996	1996										No further action based on RRR report
30	Sludge Fill Disposal Area/Marshy Area South of Runway	EPIC WDA-15/16/17	1996	1996										No further action based on RRR report
31	Solid Waste Disposal; Area V-82		1996	1996										No further action based on RRR report
32	Solid Waste Disposal Area CEP 160/161 Embankment	EPIC WDA-5	1996		1998	1998				2000				Streamlined Risk Assessment/Close-Out report was submitted in May 2000.
33	Debris Piled at Seawell	EPIC WDA-6	1996		1998	1998				2000				Streamlined Risk Assessment/Close-Out report was submitted in May 2000.
34	Solid Waste Disposal Area CEP 200	EPIC WDA-7	1996		1998	1998				2000				Streamlined Risk Assessment/Close-Out report was submitted in May 2000.
35	Solid Waste Disposal Are CEP 196/Resolute Embankment	EPIC WDA-8	1996		1998	1998				2000				Streamlined Risk Assessment/Close-Out report was submitted in May 2000.
36	Stormwater Drainage System	RFA M-44												No further action under CERCLA; undergoing a $10 million rehabilitation project
37	Q-82/78 Former PWC Parking Lot	EPIC WDA-2	1996	1996										No further action under CERCLA; moved out of CERCLA in 1998 and into the UST Program.

TABLE 1-3
Status Summary of SWMUs , December 2004
Naval Station Norfolk

	SWMU	RFA Designations	Phase 1 RRR*	Phase 2 RRR**	Work Plans	PA/SI(n)	SI/CI/ SSI***	RI/FS	EE/CA	Close-Out Report	ROD/DD	RD	RA Construction	Comments
38	CD Area Behind Compost Yard	EPC WDA-13		1996	1998	1998	2000			2001				Close-Out Report was completed in March, 2001
39	Open Dump & Disposal Area near boundary of Camp Allen Landfill	EPIC WDA-18/19					2000			2001				Close-Out Report was completed in March, 2001
40	MCA-603 Pits	EPIC WDA-22			1998	1998				2000				Close-Out Report was completed in May, 2000
41	Disposal Area,CA-99 Golf Course	EPIC WDA-23			1998	1998				2000				Close-Out Report was completed in May, 2000
42	CEP 201 Area	EPIC WDA-9	1996	1996	1998	1998				2000				Close-Out Report was completed in May, 2000
Sites where Information not available														
21														
23														

Legend:

1993	Year Activity Completed (fiscal year)	RI	Remedial Investigation	SI	Site Investigation
X	Activity Completed (date unknown)	FS	Feasibility Study	Construct	Construction Phase
Aip	Activity in Progress (expected completion)	PRAP	Proposed Remedial Action Plan	Ops	Operations Phase
^	Activity Planned	ROD	Record of Decision or Decision Document	*Refers to "Initial Assessment Study of Sewells Point Naval	
PA	Preliminary Assessment	RD	Remedial Design	Complex," dated February 1983.	
IAS	Initial Assessment Study	RA	Remedial Action /Removal Action	** Refers to "Installation Restoration Program Investigation	
SI(n)	Site Inspection	TBA	To Be Addressed	Interim Report," dated March 1988.	
CS	Confirmation Study	NFA	No Further Action	***CH2M HILL SI completed February 1998	
EE/CA	Engineering Evaluation/Cost Analysis	DD	Decision Document		

TABLE 1-4
Additional NFA Sites, December 2004
Naval Station Norfolk

Site	Site Description	Reason for No Further Action
RFA AOC C	Building V-93-1	UST / AST; Removed
RFA AOC C	Building V-93-2	UST / AST; Removed
RFA AOC C	Building V-93-3	UST / AST; Removed
RFA AOC C	Building V-112-1	UST / AST; Removed
RFA AOC C	Building V-112-2	UST / AST; Removed
RFA AOC C	Building V-112-3	UST / AST; Removed
RFA AOC C	Building NM-71-A	UST / AST; Removed
RFA AOC C	Building NM-71-B	UST / AST; Removed
RFA AOC C	Building U-117	UST / AST; Removed
RFA AOC C	Building CA-501-1	UST / AST; Removed
RFA C-4	Building CA-483 (A) SAA	Team site visit, review of existing documentation and review of operational procedures
RFA C-5	Building CA-483 (B) SAA	Team site visit, review of existing documentation and review of operational procedures
RFA C-6	Building CA-483 (C) SAA	Team site visit, review of existing documentation and review of operational procedures
RFA C-7	Building CA-483 (D) SAA	Team site visit, review of existing documentation and review of operational procedures
RFA C-9	Building W-7 (Pier 7) SAA	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
RFA C-18	Building Z-309 SAA	Team site visit, review of existing documentation and review of operational procedures
RFA C-26	Building CA-501 SAA	Team site visit, review of existing documentation and review of operational procedures
RFA C-27	Building W-130 SAA	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
RFA C-33	Building V-88 SAA (SWMU 18)	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
RFA C-36	Building LF-53 SAA (SWMU 19)	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
RFA C-61	Building LP-20 SAA	Team site visit, review of existing documentation and review of operational procedures
RFA C-71	Building SP-10 SSA (SWMU 17)	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
RFA C-79	LP Fuel Farm SAA	Team site visit, review of existing documentation and review of operational procedures
RFA C-80	Building LP-100 SAA (SWMU 20)	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data

TABLE 1-4
Additional NFA Sites, December 2004
Naval Station Norfolk

Site	Site Description	Reason for No Further Action
RFA C-81	Building LF-59 SAA	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
RFA C-82	Building LF-60 SAA (SWMU 22)	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
RFA M-18	Sanitary Sewers	Team site visit, review of existing documentation and review of operational procedures
RFA M-22	Sewage Waste Oil Barges	Team site visit, review of existing documentation and review of operational procedures
RFA M-36	Building LF-61 Waste Tank Area (SWMU 5)	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
RFA M-39	Building LF-53 Trenchs (SWMU 24)	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
RFA M-46	P-1 Pond	Team site visit, review of existing documentation and review of operational procedures
RFA R-3	LF-68 Former Hazardous Waste Storage Area	Team site visit, review of existing documentation and review of operational procedures
RFA O-1	A-80 Building O/WS	Oil / Water Separator; Managed under IWMP
RFA O-2	A-81 Building O/WS	Oil / Water Separator; Documentation of integrity and functionality inspections on file with the EPA Region III
RFA O-3	A-127 Building	Oil / Water Separator; Managed under IWMP
RFA O-4	A-Area	Oil / Water Separator; Documentation of integrity and functionality inspections on file with the EPA Region III
RFA O-7	CEP-188 Building	Oil / Water Separator; Managed under IWMP
RFA O-8	LF-38 Building	Oil / Water Separator; Demolition Complete
RFA O-9	LF-53 Building	Oil / Water Separator; Inactive due to BRAC closure of NSN tenants
RFA O-10	LF-59 Building	Oil / Water Separator; Managed under IWMP
RFA O-11	LF-60 Building	Oil / Water Separator; Documentation of integrity and functionality inspections on file with the EPA Region III
RFA O-23	LP-20 Building	Oil / Water Separator; Managed under IWMP
RFA O-24	LP-22 Building	Oil / Water Separator; Demolition Complete - FY98
RFA O-25	LP-32 Building	Oil / Water Separator; Inactive due to BRAC closure of NSN tenants
RFA O-27	LP-48 Building	Oil / Water Separator; Demolition Complete - FY98
RFA O-30	LP-78 Building	Oil / Water Separator; Demolition Complete - FY97
RFA O-31	LP-167 Area 1	Oil / Water Separator; Documentation of integrity and functionality inspections on file with the EPA Region III
RFA O-32	LP-167 Area 2	Oil / Water Separator; Managed under IWMP

TABLE 1-4
Additional NFA Sites, December 2004
Naval Station Norfolk

Site	Site Description	Reason for No Further Action
RFA O-33	LP-167 Area 3	Oil / Water Separator; Managed under IWMP
RFA O-34	LP-167 Area 4	Oil / Water Separator; Documentation of integrity and functionality inspections on file with the EPA Region III
RFA O-35	LP-167 Area 5	Oil / Water Separator; Documentation of integrity and functionality inspections on file with the EPA Region III
RFA O-36	LP-167 Area 6	Oil / Water Separator; Managed under IWMP
RFA O-37	LP-176 Building	Oil / Water Separator; Demolition Complete - FY98
RFA O-43	SP-38 Building	Oil / Water Separator; Managed under IWMP
RFA O-45	SP-296 Hanger	Oil / Water Separator; Managed under IWMP
RFA O-46	SP-313	Oil / Water Separator; Documentation of integrity and functionality inspections on file with the EPA Region III
RFA O-50	V-15 Building	Oil / Water Separator; Documentation of integrity and functionality inspections on file with the EPA Region III
RFA O-51	V-27 Area 1	Oil / Water Separator; Inactive due to BRAC closure of NSN tenants
RFA O-52	V-28 Area 2	Oil / Water Separator; Inactive due to BRAC closure of NSN tenants
RFA O-55	V-49 S Area 5	Oil / Water Separator; Managed under IWMP
RFA O-56	V-49 W Area 6	Oil / Water Separator; Managed under IWMP
RFA O-57	V-146 Building	Oil / Water Separator; Demolition Complete - FY97
RFA O-59	W-6 Building	Oil / Water Separator; Managed under IWMP
RFA O-60	Fire Fighting School	Oil / Water Separator; Documentation of integrity and functionality inspections on file with the EPA Region III
RFA O-61	Fire Fighting School	Oil / Water Separator; Demolition Complete - FY92
RFA O-62	Fire Fighting School	Oil / Water Separator; Demolition Complete - FY92
RFA T-3	Wastewater Tank 3 Building CEP-200	UST / AST; Regulated under VDEQ
RFA T-10	W-7 Building	UST / AST; Regulated under VDEQ
RFA T-12	W-388 Building high flashpoint tank	UST / AST; Regulated under VDEQ
RFA T-13	W-388	Oil / Water Separator; Managed under IWMP
RFA T-14	A-81 Building	UST / AST; Removed
RFA T-15	A-81 Building Tank No.1	UST / AST; Removed

TABLE 1-4
Additional NFA Sites, December 2004
Naval Station Norfolk

Site	Site Description	Reason for No Further Action
RFA T-16	A-81 Building Tank No.2	UST / AST; Removed
RFA T-17	Fire Fighting School	UST / AST; Removed
RFA T-20	CEP-188 Building	UST / AST; Removed
RFA T-21	V-49 Building	UST / AST; Removed
RFA T-22	U-132 calibration fluid	UST / AST; Removed
RFA T-23	U-132 varsol	UST / AST; Removed
RFA T-24	U-132 waste oil	UST / AST; Removed
RFA T-26	NH-34 Building	UST / AST; Removed
RFA T-27	NH-35 Building	UST / AST; Removed
RFA T-28	NH-94-1W Building	UST / AST; Regulated under VDEQ
RFA T-29	NH-94-2W Building	UST / AST; Regulated under VDEQ
RFA T-30	MCE-225-4 Building	UST / AST; Removed
RFA T-31	MCE-57-1	Oil / Water Separator; Demolition Complete - FY97
RFA T-32	W-6-1	UST / AST; Removed
RFA T-33	W-6-2	UST / AST; Removed
RFA T-34	W-6-3	UST / AST; Removed
RFA T-35	W-6-4	UST / AST; Removed
RFA T-36	W-196 Building	UST / AST; Removed
RFA T-37	LAFB Buildng	UST / AST; Removed
RFA T-38	NM-59 Bulding	UST / AST; Removed
RFA TP-6	Fire Fighting School Wastewater Pit	Oil / Water Separator; Demolition Complete - FY99
RFA W-4	Q-50	Oil / Water Separator; Documentation of integrity and functionality inspections on file with the EPA Region III
EPIC WDA-3	Building LF-18 Aircraft Ramp (SWMU 7)	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
EPIC WDA-4	Building V-82 Area (SWMU31)	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
EPIC WDA-12	Building CD-2/CD-3	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data

TABLE 1-4
Additional NFA Sites, December 2004
Naval Station Norfolk

Site	Site Description	Reason for No Further Action
EPIC WDA-14	Building U-40	Team site visit, review of existing documentation and review of operational procedures
EPIC WDA-15/16/17	Marshy Area south of runway (SWMU 30)	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
EPIC WDA-21	Northeast of Building NH-140/141 (SWMU 26)	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
EPIC WDA-24	Building LP-3	Team site visit, review of existing documentation and review of operational procedures
EPIC WDA-25	Building SP-367	Team site visit, review of existing documentation and review of operational procedures
EPIC WDA-26	Building SP-86	Team site visit, review of existing documentation and review of operational procedures
EPIC WDA-27	Building SP-85 Area	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
EPIC WDA-30	Mason Creek Embankment (SWMU 27)	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
EPIC WDA-33/34	NM-43 Old Weapons Station Entrance (SWMU 11)	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data
EPIC WDA-37	Building NM-71	Team site visit, review of existing documentation and review of operational procedures, review of RRR Analytical Data

Notes:

AST - Aboveground Storage Tank.

BRAC - Base Realignment and Closure.

SAA - Satellite Accumulation Areas are container storage areas used to manage various types of wastes generated from operations in the building.

SSA - Site Screening Areas are areas that either pose or may potentially pose a threat to public health, welfare, and the environment.

IWMP - NSN Industrial Wastewater Management Plan.

O/ WS - Oil/ Water Separator

Table 1-5
Status Summary of FFA Areas of Concern, December 2004
Naval Station Norfolk

AOC Designation	Site Description		Evaluation Determination
AOC 1	Building Z-309 Area	SWMU 2; RFA M-13/14	In March 2000, Close-Out Report Approved, No Further Action is Required and the Land Use will be Unresricted
		SWMU 3; RFA AOC B	In March 2000, Close-Out Report Approved, No Further Action is Required and the Land Use will be Unresricted
AOC 2	MAC Area	SWMU 9; EPIC WDA-28/29	In October 2000, Streamline Risk Assessment Approved, No Further Action is Required and the Land Use will be Unresricted
		SWMU 10; EPIC WDA-31/32/35	In October 2000, Streamline Risk Assessment Approved, No Further Action is Required and the Land Use will be Unresricted
AOC 3	CEP 201 Area	SWMU 42; EPIC WDA-9/10	In March 2000, Close-Out Report Approved, No Further Action is Required and the Land Use will be Unresricted
	CEP Area	SWMU 28; EPIC WDA-11	In May 2000, Streamline Risk Assessment Approved, No Further Action is Required and the Land Use will be Unresricted
		SWMU 32; EPIC WDA-5	In May 2000, Streamline Risk Assessment Approved, No Further Action is Required and the Land Use will be Unresricted
		SWMU 33; EPIC WDA-6	In May 2000, Streamline Risk Assessment Approved, No Further Action is Required and the Land Use will be Unresricted
		SWMU 34; EPIC WDA-7	In May 2000, Streamline Risk Assessment Approved, No Further Action is Required and the Land Use will be Unresricted
		SWMU 35; EPIC WDA-8	In May 2000, Streamline Risk Assessment Approved, No Further Action is Required and the Land Use will be Unresricted
AOC 4	Q-50 PWC Accumulation Area	SWMU 14; RFA C-17	*Refer to Table 1-2 for status*
AOC 5	CD Area Behind the Compost Yard	SWMU 38; WPIC WDA-13	In March 2001, Close-Out Report Signed, No Further Action is Required and the Land Use will be Unresricted
AOC 6	Open Dump and Disposal Area at Boundary of Camp Allen Landfill	SWMU 39; EPIC WDA-18/19	In March 2001, Close-Out Report Signed, No Further Action is Required and the Land Use will be Unresricted
AOC 7	MCA-603 Pits	SWMU 40; EPIC WDA-22	In March 2000, Close-Out Report Approved, No Further Action is Required and the Land Use will be Unresricted
AOC 8	CA-99 Golf Course Disposal Area	SWMU 41; EPIC WDA-23	In March 2000, Close-Out Report Approved, No Further Action is Required and the Land Use will be Unresricted

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N

0 2000 4000 Feet

Figure 1-1
Installation Location Map
Naval Station Norfolk
Norfolk, Virginia

CH2MHILL

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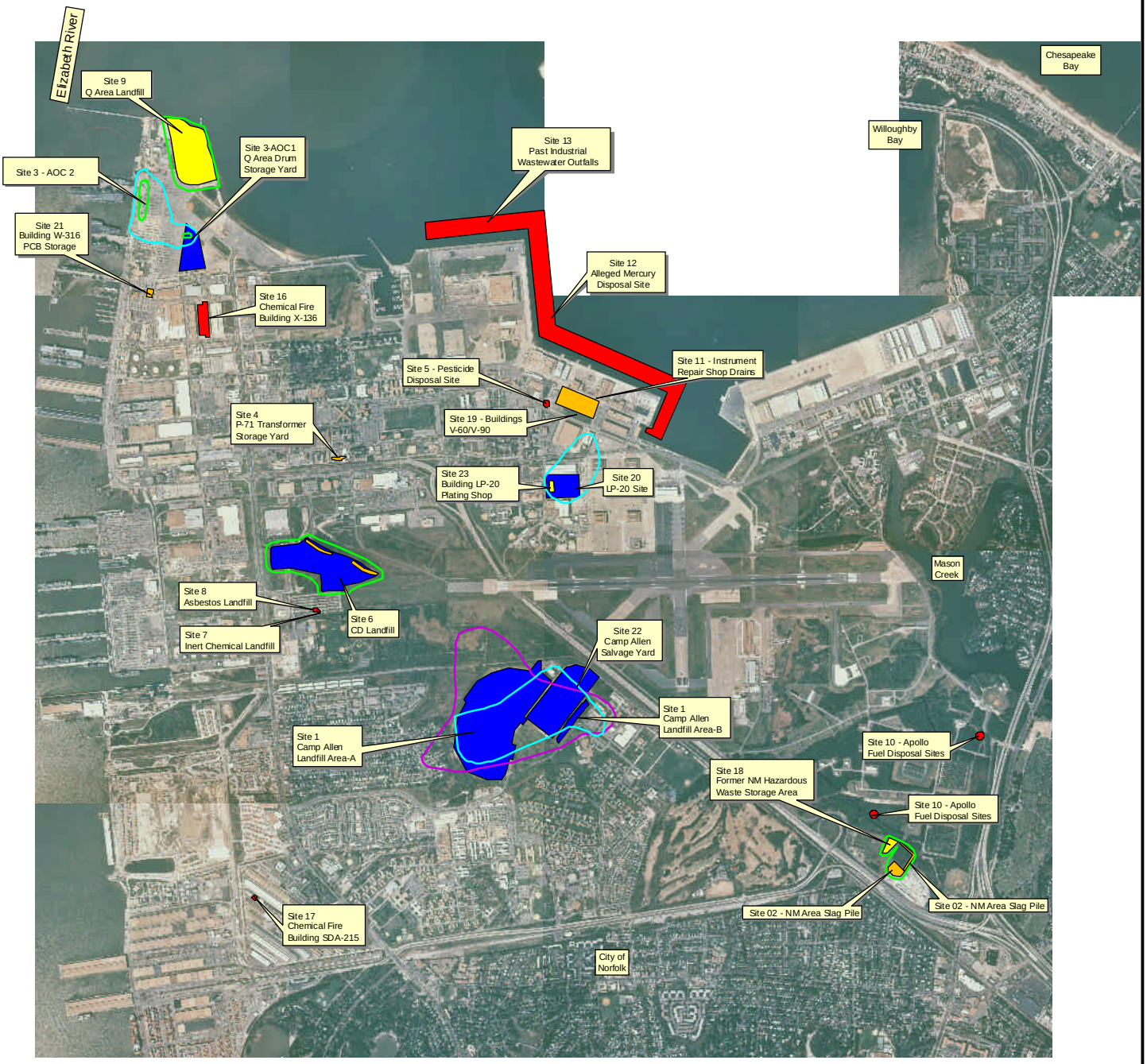

LEGEND

- NFA Sites Per FFA Close-out Reports
- Remedial/Removal Action Complete
- Remedial/Removal Action in Progress
- Remedial/Site Investigation in Progress
- Groundwater Source Area
- Deep Aquifer Groundwater Plume
- Shallow Aquifer Groundwater Plume

N

0 1500 3000 Feet

Figure 1-2
Base Map with IRP Site Locations
and Current Clean-up Status
October 2005
Naval Station Norfolk
Norfolk, Virginia

CH2MHILL

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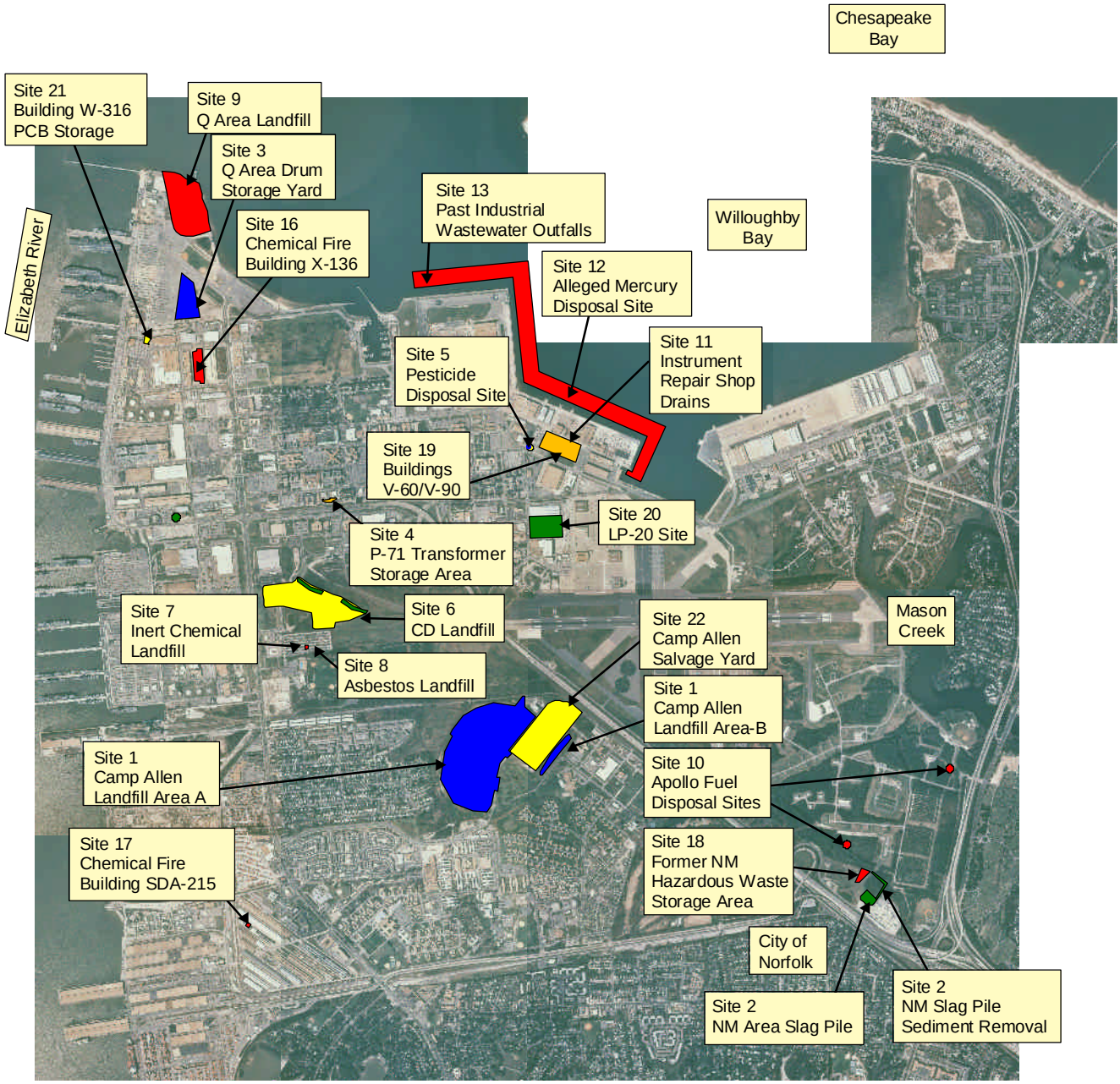

LEGEND

- NFA Sites Per IAS Recommendation
- Remedial /Removal Action Complete
- Remedial/Removal Action in Progress
- Remedial/Site Investigation in Progress
- Remedial Design in Progress

N

0 1650 3300 Feet

Figure 1-3
IRP Site Clean-Up Status
As of March 1997
Naval Station Norfolk

CH2MHILL

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LEGEND

- NFA Sites Per FFA Close-out Reports
- Remedial/Removal Action Complete
- Remedial/Site Investigation in Progress
- Transferred from CERCLA Program

N

0 1600 3200 Feet

Figure 1-4
Base Map
Additional SWMU Locations
and Current Clean-up Status
October 2005
Naval Station Norfolk
Norfolk, Virginia

CH2MHILL

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LEGEND

- Remedial/Removal Action Complete
- Remedial/Removal Action In Progress
- Remedial/Site Investigation In Progress
- To Be Determined

N

0 1800 3600 Feet

Figure 1-5
Additional SWMU Clean-Up Status
As of March 1997
Naval Station Norfolk

CH2MHILL

SECTION 2

Site Descriptions

This section provides specific information regarding the IRP sites and SWMUs at NSN that are currently undergoing remediation or investigation. Site-specific information includes site physical characteristics, a description of past activities conducted at the site, and known contaminants in each site medium. In addition, the current status of each site in the IRP is briefly discussed. A site map is provided for the IRP sites and SWMUs. However, inactive sites that were either closed out through a consensus agreement or recommended for no further action are not discussed in this section.

2.1 Installation Restoration Program Sites

The following eight IRP site descriptions include physical characteristics, past activities, detected contaminants, and future remediation plans for each site, if known.

2.1.1 Site 1—Camp Allen Landfill

The Camp Allen Landfill (CALF) site includes two distinct areas (Area A, the 45-acre landfill, and Area B, the 2-acre fire disposal area), as shown in Figures 2-1 and 2-2. The Area A landfill, which operated from the mid-1940s until approximately 1974, was used for the disposal of metal plating and parts cleaning sludge, paint-stripping residue, various chlorinated organic solvents, overage chemicals, pesticides, asbestos, incinerator ash, fly and bottom ash from the Base power plant, and miscellaneous debris. Wastes from a fire at the Camp Allen Salvage Yard (Site 22), including drums containing various chemicals, were buried in trenches at Area B in 1971.

Contamination from prior disposal practices at the Camp Allen Landfill site has affected the surface and subsurface soil, sediment, surface water, and groundwater. The primary contaminants found in all media at the site are volatile organic compounds (VOCs). Areas of inorganic contamination of surface water and sediments in the surrounding drainage ditches and in the onsite pond also were detected. Groundwater contamination was found in both the water-table aquifer and the Yorktown Aquifer in Areas A and B. The presence of contamination in the deeper Yorktown Aquifer is thought to be due to the breach of a confining layer between the two aquifers beneath much of the Camp Allen Landfill area.

Currently, the Base brig facility and a heliport are located over a portion of the Area A landfill. Area B is not used at the present time. Areas A and B are soil-covered and vegetated to minimize surface erosion as they are both adjacent to tidal drainage ditches that convey stormwater runoff to Willoughby Bay.

A non-time-critical removal action was implemented at Area B in May 1994 and completed in January 1995 to remove the primary source areas of contamination. The Camp Allen Landfill site remedial investigation and feasibility study (RI/FS) was completed in 1994 (Baker Environmental, Inc., July 1994). A Decision Document (Baker Environmental, Inc., November 1993) was signed in July 1995 requiring localized treatment of groundwater and soil using vacuum extraction. Plans for remediation of the site called for implementation of

a groundwater extraction and treatment system to remediate groundwater underlying Camp Allen Landfill Areas A and B and the Camp Allen Storage Yard identified in the Area A landfill.

Continuous operation of the groundwater extraction and treatment system began in November 1998 and consisted of pump-and-treat systems for groundwater remediation installed in Area A (for Yorktown groundwater in the western part of the area and for surficial groundwater in the northern part of the area) and in Area B (for both surficial and Yorktown groundwater). A dual phase vapor extraction (DPVE) system was completed and began operation in May 1998. Groundwater samples were collected from monitoring wells in March 1997 and June 1998 to provide baseline information on water quality before the extraction system was started. The extraction wells were sampled in August 1997 to provide information on water quality prior to system startup. Ecological sampling of surface water and sediment was performed in Fall 1997.

The long-term monitoring plan for CALF groundwater remediation systems calls for annual sampling of up to 50 monitoring wells and five stream locations for the Target Compound List (TCL) VOCs during the initial seven years of monitoring. Sampling has occurred in May 1999, March 2000, March 2001, March 2002, March 2003, March 2004, and March 2005. During the Summer of 2000, an aquifer pumping test study was conducted and groundwater modeling was completed during Fall 2000 to delineate the extent of the capture zones for the individual extraction wells. In addition, the system operational data collected by Shaw Environmental & Infrastructure (Shaw E&I) is reviewed quarterly to assess the performance of the remediation system. Based on recommendations from these reviews, adjustments may be made to both the treatment system operations and the monitoring program to optimize the efficiency of the system operations. The Long-Term Monitoring (LTM) results through the 2004 monitoring are documented in the *Final 2004 Annual Long-Term Monitoring Report* submitted by CH2M HILL in October 2005. LTM results including the March 2005 data will be presented in the *2005 Annual Long-Term Monitoring Report* to be submitted in the near future.

2.1.2 Site 2-NM Slag Pile

The NM Slag Pile (Figure 2-3) is a one acre disposal area for slag generated by an aluminum smelting operation during the 1950s and 60s. The slag is a residual cinder material formed from the fusion of a mineral such as limestone with impurities from the aluminum ore and ash from the blast furnace fuel. In order to create a level surface upon which the slag could be deposited, fly ash and/or bottom ash (derived from coal burning operations elsewhere at NSN) were also used as fill material at the site. During the smelting operation, the slag pile area was defined by a lack of vegetation around the site proximal to the slag pile. The site surface has since been regraded and vegetation was planted. Prior to remediation activities, the surface of the site consisted of a gravel parking lot and open grassy field.

The potential for site contamination from metals, including chromium, cadmium, and zinc, was identified in the 1983 IAS (Environmental Science & Engineering, February 1983). Trace amounts of inorganics were detected in surface soil, surface water, and sediment samples taken during the 1988 Interim RI (Malcolm Pirnie, May 1988). However, the samples were taken after site regrading and placement of gravel surfacing. Since these activities disturbed

the surface soil, these analytical results may not be representative of potential subsurface contamination at the site.

The 1998 RI conducted at the site concluded that the disposal activities had impacted the groundwater and soil at the site as well as sediment and surface water in the adjacent drainage channel. In correlation with the type of material disposed at the site, the primary contaminants consist of metals including arsenic, antimony, cadmium, chromium, copper, iron, lead, nickel, silver, and zinc. However, significant concentrations of organic chemicals (4-4'DDE and trichloroethene) were also detected. Sediment and surface soil sampling was conducted in February of 1998 to delineate the contamination limits for a sediment removal action.

Initially, sediment contamination was being addressed separately from other media through an engineering evaluation and cost analysis (EE/CA). Design plans and specifications for the sediment removal action were prepared in spring and early summer of 1998. The Final RI (CH2M HILL, August 1998) and FS (CH2M HILL, September 1998) documents for the entire site were completed in 1998. The Final Remedial Action Design for the sediment removal program was submitted (CH2M HILL, September 1999) and approximately 2,000 cubic yards (yd^3) of sediment were removed in November 1999. The Final ROD (CH2M HILL, October 2000) was approved in December 2000. In February 2000, an asphalt and soil cover was placed over the extent of the site.

The post-closure monitoring plan consists of the annual collection of sediment, surface water, and groundwater samples for Target Analyte List (TAL) metals analysis. The first five rounds of sampling were completed in October 2000, May 2001, June 2002, and June 2003, and June 2004. In 2004, statistical analysis results indicated that the concentrations of site constituents were decreasing in groundwater. In addition, the concentrations of site constituents in the surface water and sediment demonstrated little change since the remedial actions at the site. Therefore, based on the ROD, it was recommended that the LTM groundwater sampling be reduced to a period of once every five years and sediment and surface water LTM sampling be discontinued. Therefore, the next LTM groundwater sampling is scheduled for June 2009. The LTM results through the 2004 monitoring are documented in the *Final 2004 Annual Long-Term Monitoring Report* submitted by CH2M HILL in October 2005.

2.1.3 Site 3-Q-Area Drum Storage Yard

The Q-Area Drum Storage Yard (QADSY), shown on Figure 2-4, was previously a compound that occupied approximately 5 acres in the northwest corner of the NSN near the carrier piers. This area of the NSN was created by dredging operations in the early 1950s. The QADSY was an open earthen yard that was used from the 1950s until the late 1980s to store tens of thousands of drums. Most of the drums contained new petroleum products, various chlorinated organic solvents, paint thinners, and pesticides. Previous investigations showed dark stains on the soil and oil-saturated soil throughout the storage yard, indicating past spills. The northern portion of the yard, which was used to store leaking or damaged drums and hazardous materials, was particularly stained. These drums have been removed, and the site is not currently used.

In 1986, Navy fire inspectors expressed concern with the oil-saturated soils at the northern end of the storage area (previously used to store damaged or leaking drums). On the basis of a potential fire hazard, the top 6 inches (in.) of soil was excavated from an area of 4,240 square yards (yd^2) (totaling approximately 750 yd^3 of soil removed) in the northern section and disposed offsite in 1987. Following the removal action, this area of the storage yard was paved.

An RI/FS (Environmental Science & Engineering, May 1996) for this site and revealed that the soil was contaminated with total petroleum hydrocarbons (TPH), VOCs, and pesticides. In addition, VOC contamination was found in the groundwater beneath the site and outside the site boundary. The shallow groundwater beneath the hazardous materials area and the northern portion of the petroleum products area was impacted the most. Some low VOC levels were also observed in the deep wells. This may be due to the lack of a confining layer between the two aquifers in this area. The general extent of the groundwater plume, which affects approximately 29 acres beneath the fleet parking area west of the site, has been defined with monitoring-well and direct-push groundwater sampling.

The Decision Document (Environmental Science & Engineering, November 1996) for the site was signed in November 1996 and calls for remediation by air sparging and soil-vapor extraction (AS/SVE). A pilot treatability study was performed and the system was constructed. The remediation system began operation in August 1998. Several monitoring wells were sampled for VOCs in February 1998 and in May 1998 to provide baseline water-quality data before the remediation system was started.

The long-term monitoring plan for the QADSY currently includes the biannual sampling of monitoring wells for VOCs and TPH. The first nine rounds of monitoring were completed in February 1999, August 1999, March 2000, August 2000, February 2001, December 2001, February 2002, August 2002, and March 2003. Based on the significant reduction of VOC concentrations during the first year of operation, the system operation was modified during September 1999, to a 2-week cycle of pulsing. The system operational data collected by Shaw E&I and the monitoring data collected by CH2M HILL were reviewed quarterly so that the system operations and monitoring program could be adjusted as necessary. Sampling rounds 10 and 11 were completed in August 2003 and February 2004, respectively. A total of 13 wells were sampled for TCL low-concentration VOCs during each sampling event. In accordance with the closeout strategy at AOC 1, five monitoring wells were removed from the LTM because the VOC concentrations were consistently below the cleanup goals. The most recent rounds of semi-annual long-term monitoring occurred in August of 2004 and in February of 2005. Two monitoring wells at Area of Concern (AOC) 1 and eight monitoring wells at AOC 2 were sampled. The monitoring wells were sampled for TCL low-concentration VOCs.

The analytical results for AOC 1 indicated that both of the monitoring wells sampled (CMW-103R and CMW-101) had VC concentrations above the cleanup goals. Wells CMW-103R and CMW-101 demonstrated exceedances of the cleanup goal for VC. However, the VC concentrations in CMW-103R only slightly exceeded the cleanup goal. Furthermore, the concentration of VC in CMW-101 was detected at 4.2 μg/L in August 2004 and not detected in February 2005.

The analytical results for AOC 2 showed that three monitoring wells had VOC concentrations above the site cleanup goals. Consistent with the previous LTM data, the two monitoring wells upgradient of the system (CMW-202 and CMW-201) demonstrated exceedances of the cleanup goals for TCE and 1,1-DCE. CMW-202 also had VC concentrations at levels above the cleanup goal in the last two rounds of sampling. At shallow well SW-10, VC had not exceeded the cleanup goal since February 2002, however in the most recent round of sampling (Round 13), the VC concentration was slightly above the cleanup goal.

Based on the LTM analytical data, the air sparge (AS) system at Q Area is operating as designed by treating the source areas and preventing offsite migration of the VOC plume.

The results through the February 2003 monitoring are documented in the *Final 2003 Annual Long-Term Monitoring Report* submitted by CH2M HILL in September 2004. The results from August 2003 (Round 10) and February 2004 (Round 11) are presented in the *Final 2004 Annual Long-Term Monitoring Report for Four Sites* (CH2M HILL, 2005). The results from August 2004 (Round 12) and February 2005 (Round 13) LTM events will be presented in the *2005 Annual Long-Term Monitoring Report* to be submitted in the near future.

2.1.4 Site 6-CD Landfill

The CD Landfill site occupies approximately 22 acres and is located just east of Hampton Boulevard and south of the Naval Exchange, as illustrated in Figure 2-5. The site incorporates two areas of landfilling operations—the easternmost (unpermitted) section and the western (permitted) section. The unpermitted portion of the landfill operated from 1974 to 1979 and was used for demolition debris and inert solid waste, fly ash, and incinerator residue.

In October 1979, the Naval Facilities Engineering Command received a permit from the Virginia Department of Health to use the landfill (western portion) for disposal of demolition debris and other non-putrescible wastes, excluding fly ash, incinerator residues, chemicals, and asbestos. Blasting grit used for sandblasting cadmium-plated aircraft parts was deposited at the landfill until 1981 when the blasting grit was tested and found to exceed the Extraction Procedure (EP) toxicity limit for cadmium. The grit was classified as a hazardous waste and onsite disposal of the material ceased. Landfilling operations continued in the western portion of the site until 1987. At the time the landfill permit was granted, a portion of the southeast corner of the site was removed and regraded to allow for runway expansion at the NAS. The design of the runway expansion specified that excess material was to be spread over the landfill and not removed from the site.

In 1993, Seabee Road was constructed over the site and opened to the public. Construction plans required only the addition of fill material; no cutting or grading into the existing landfill occurred. Most of the existing debris mounds situated in the north-central portion of the landfill were leveled and spread around the site to reduce the amount of standing water that accumulated after rain events.

The results of several investigations (performed in 1993 and 1994) guided the scoping of the RI. The RI was completed in three separate rounds of sampling. Soil, sediment, groundwater, and surface water samples were collected. As a result of the Remedial Investigation/Risk Assessment (RI/RA) Report (Baker Environmental, Inc., December 1995), an FS (Baker

Environmental, Inc., July 1996) was prepared in July 1996 to address contaminated media at the CD Landfill site. Potential risks associated with contaminants in the soil, sediments, and groundwater (including surface water) were identified and guided the development and evaluation of the media-specific remedial action alternatives. In addition to the FS, a separate geostatistical analysis was performed to evaluate and better define the areas of sediment contamination.

A 1996 Decision Document (Baker Environmental, Inc., October 1996) for the contaminated sediments (designated as Operable Unit (OU) 1) outlined a removal action for sediments at the CD Landfill that exceeded the Effects Range –Medium (ER-M) levels. Removal of heavy metal and pesticide-contaminated sediments was partially completed in Fall 1997 but was postponed during the winter because of inclement weather. When the OU 2 (soil and groundwater) landfill cap was designed, the cap was extended to cover the remaining contaminated sediments, so no further removal will be required. In June 1997, the Partnering Team agreed to an additional sampling event to characterize the fill material and determine closure requirements. A statistical sampling approach was developed to determine within a specified confidence interval whether the fill material would be classified as hazardous. All of the samples collected and analyzed during the June event were below the regulatory standards. Based on the statistical findings, the fill material at the CD Landfill is not considered a hazardous waste and it was agreed that the site would be closed under the Virginia Solid Waste Management Regulations for a construction/ demolition/debris landfill.

A Proposed Remedial Action Plan (PRAP) for OU2 (Baker Environmental, Inc., June 1998) identified the preferred alternative, a synthetic flexible liner capping system with groundwater monitoring with institutional controls, for the CD Landfill. The final ROD was issued on September 28, 1998 (Baker Environmental, Inc., September 1998). The construction of the landfill cap was completed in December 1999. As a requirement of the Virginia Solid Waste Management Regulations (VSMWR) (Part D of 9 VAC 20-80-270) the CD Landfill is part of the LTM program at NSN with groundwater and surface water monitoring as well as annual inspections and maintenance of the landfill's environmental controls for 10 years after the closure was completed. The groundwater-monitoring program initially consisted of sampling eight monitoring wells on a quarterly basis for 1 year, followed by semi-annual monitoring for selected analytical parameters. The initial 4 years of groundwater monitoring were completed in 2000, 2001, 2002, and 2003. The analytical data from the first four years of monitoring are discussed in the *Final Annual Post-Closure Monitoring Report for 2003* submitted by AGVIQ/CH2M HILL in February 2004, and in the 2004 *Final First Determination Report for Site 6, CD Landfill* submitted by CH2M HILL in March 2004.

Based on the statistical analysis of the Phase I and Phase II data, as discussed in the *Final First Determination Report for Site 6, CD Landfill* (CH2M HILL, March 2004), it was recommended that the Phase II monitoring be discontinued and the Phase I monitoring be reinstated at the site.

2.1.5 Site 18-Former NM Waste Storage Area

The NM storage area is located in the southeastern corner of NSN, as shown on Figure 2-6. It was used from 1975 to 1979 to store drums of hazardous waste, consisting of waste oil, metal plating solutions and sludges, chlorinated organic acids (including trichloroethane

and 1,1,1 trichloroethene), and paint stripping solutions. The storage area was an open, unpaved yard east of the metal storage buildings in the NM area (Taussig Can Area). Spillage of waste oil and hazardous wastes occurred in this area, including an intentional spill in July 1979. As a result of this spill, a pit was excavated and an existing drainage ditch was widened and lengthened to channel the waste oil and contaminated runoff into an unlined pit. Oil and contaminated water were periodically pumped from the pit and transported to a wastewater treatment plant. Soil in the area of the spill was sampled and found to be contaminated primarily with chromium and cadmium. However, the soil was classified non-hazardous based on EPA EP toxicity testing. A one-time landfill permit was obtained in October 1980 from the Virginia Department of Solid Waste for the disposal of the contaminated soil at the site by grading and seeding it to establish a vegetative cover. The permit required continuous monitoring of the shallow groundwater and surface water to determine if contaminant transport was occurring (Environmental Science and Engineering, Inc., 1983). The monitoring program was conducted over 55 months. In October 1985, the State Water Control Board agreed to discontinue the monitoring on the basis that no significant contamination was observed.

In 1995, a RCRA inspection was conducted and concluded that no signs of adverse impacts or threats to human health or the environment were observed; therefore, the site was no longer subject to RCRA inspections. In addition, two surface soil samples were collected during the 1995 Phase I RRR Study (Baker Environmental, Inc., January 1996) and analyzed for VOCs, semivolatile organic compounds (SVOCs), metals and cyanide, and pesticides/polychlorinated biphenols (PCBs). The soil analytical results show that the concentrations of arsenic and benzo(a)pyrene exceeded the EPA residential RBCs. The arsenic concentration also exceeded the industrial RBC. However, the benzo(a)pyrene concentration was detected at levels consistent with background. On the basis of the Phase I RRR Study, Site 18 was determined to be a NFA site.

In Fall 2000, the NSN Partnering Team re-evaluated Site 18 because the NFA determination was based on industrial RBCs. The NSN Partnering Team recommended additional investigation at the site to evaluate the results against EPA residential RBCs. The initial phase of the investigation was conducted in June 2001 and consisted of the installation and sampling of three monitoring wells. Based upon the findings from the initial investigation, additional monitoring wells were installed in February 2002 to further delineate the contamination at the site. The groundwater analytical results from both phases of the field investigation indicate that the RBCs and drinking water MCLs were exceeded for four VOCs (1,4-dichlorobenzene, cis-1,2-dichloroethene, trichloroethene, and vinyl chloride). In addition, there were metal concentrations of arsenic, thallium, and iron that exceeded the residential screening criteria. The results of the field investigations are discussed in the *Final Site 18 Site Investigation Report* submitted by CH2M HILL in November 2002.

In an effort to fill data gaps identified by the NSN Tier I Partnering Team, additional characterization of the site soil, sediment, surface water, and groundwater was conducted in December 2002. Two deep monitoring wells were installed to evaluate vertical transport of site constituents. In addition, surface and subsurface soil samples were collected across the site and sediment and surface water samples were collected in the drainage channel adjacent to the site. The results of the additional investigation are presented in the *Final Expanded Site Investigation Report for Site 18* submitted by CH2M HILL in July 2004. In

addition, a membrane interface probe (MIP) survey was recommended to further delineate the horizontal and vertical extent of the VOCs in the subsurface groundwater at the site. An additional round of sampling at the two existing monitoring wells will be collected to track VOC concentrations over time. The MIP study and collection of groundwater was conducted in December 2004. Based on the MIP study and groundwater sampling, an additional groundwater investigation was recommended. The additional activities will include the installation of three monitoring wells to confirm the MIP results and to collect groundwater samples from the three newly installed wells and three existing monitoring wells (MW03S, MW03C and MW05S). The additional delination is scheduled to be conducted in October 2005.

2.1.6 Site 20-LP-20 Site

As shown in Figure 2-7, Building LP-20 is one of many large buildings located northwest of the NAS main runway. Currently, the building houses the PWC's Transportation Department. In the past, a portion of the building was used for aircraft engine overhaul and maintenance. Previous activities at the building included painting, x-ray facilities, cleaning and blasting, and a metal-plating operation. Waste products generated from these activities were transferred to the industrial wastewater treatment plant via underground piping. In addition, a large fuel storage area, known as LP fuel farm, is also located south of the building. An underground pipeline extends from the Fuel Farm to buildings LP-78 and LP-176 located east of the site. Over the years (1940s to 1990s), numerous spills or releases of wastewater and petroleum have been documented. Significant releases were associated with damage to underground wastewater lines during construction activities, and leakage of the underground petroleum pipeline.

Investigations at the site began in 1986 following a release of JP-5 fuel from the underground pipeline. Since 1986, approximately ten separate investigations have been conducted to evaluate the extent of releases from underground fuel pipelines, the industrial wastewater line, and various USTs at the site. These investigations determined that significant amounts of free product as well as chlorinated solvents are present. An RI and FS summarizing the previous investigation data were completed in 1995 (Baker Environmental, Inc., December 1995) and 1996, respectively (Baker Environmental, Inc., September 1996).

The data generated during the RI indicate that VOCs are the primary contaminants detected in the area. Specifically, chlorinated solvents were detected in the vicinity of LP-20 and LP-26. In addition, petroleum products are present east of Building LP-22 and south of Building LP-179. Concentrations of vinyl chloride, 1,1-dichloroethene, 1,2-dichloroethene, 1,2-dichloroethane, trichloroethene, and benzene were observed in the shallow aquifer (Columbia). Furthermore, concentrations of vinyl chloride, 1,2-dichloroethene, and trichloroethene were also detected in the deep aquifer (Yorktown).

As a result of the free product at the site, two product recovery systems were installed south and southeast of Building LP-22. Product Recovery System #1 was constructed in 1986, and Product Recovery System #2 was reportedly constructed sometime between 1988 and 1990. Both systems operated four recovery wells that pumped groundwater and product into oil water separators. The oil-water separators discharged into Bousch Creek and the free product was collected in an aboveground storage tank (AST). Reportedly, neither system

performed as anticipated and both systems were seldom in operation due to mechanical problems. The systems were shut off in December 1994 and dismantled in 1995.

The Decision Document (Baker Environmental, Inc., November 1996) for the LP-20 site required that contamination at the site be treated to reduce the threat to human health and the environment. The goal of the remedial action was to treat the contaminant plume in the shallow aquifer using an AS/SVE system to prevent migration of the plume offsite and into the deep aquifer, and reduce the contaminant concentrations to established cleanup goals. In addition, aquifer use restrictions (for both the shallow and deep aquifer) were mandated to prevent the groundwater from being used for either a potable or non-potable (industrial water) source.

The construction of the treatment system was completed and began operating on April 14, 1998. The shallow aquifer is treated by an air sparging and soil vapor extraction system consisting of thirty-one air injection wells and twenty-one vapor extraction wells. The system was placed throughout the center and downgradient extent of the contaminant plume. In addition, several monitoring wells were sampled for VOCs in February 1998 to provide baseline water-quality data before the remediation system was started.

As a requirement of the Decision Document, the LP-20 site is part of the LTM program at NSN. Monitoring for LP-20 currently consists of an annual sampling of fourteen wells in the shallow and deep aquifer to track the levels of contaminants at the site and determine if these constituents are migrating offsite or into the deep aquifer. The first round of LTM for groundwater quality at the LP-20 Site was performed in February 1999, after approximately 10 months of system operation. The second round was completed in May of 1999. Annual LTM has continued annually with the eigth round of sampling completed in February 2004. The monitoring wells were sampled for TCL VOCs. The monitoring results through 2003 are documented in the *Final 2003 Annual Long-Term Monitoring Report* submitted by CH2M HILL in September 2004. The results from the seventh round of sampling (February 2004) are summarized in the *Final 2004 Annual Long-Term Monitoring Report for Four Sites* (CH2M HILL, 2005).

LTM results including the February 2005 data will be presented in the *2005 Annual Long-Term Monitoring Report* to be submitted in the near future.

2.1.7 Site 22-Camp Allen Storage Yard

The Camp Allen Storage Yard (CASY) operated from the 1940s until 1995 salvaging and processing scrap materials generated at NSN. The CASY is located between Area A and Area B of the Camp Allen Landfill Site, as shown on Figure 2-8. CASY activities have included storage and management of waste oils, used chemicals, and scrap industrial/ commercial equipment. Metal smelting, various recycling activities, and miscellaneous burning also occurred at the CASY. In addition, the facility was used to store acids, paint thinners, solvents, pesticides, and transformers. A PCB spill occurred at the CASY in 1989 when a transformer was damaged by a forklift. The PWC responded to the spill and conducted a preliminary cleanup at that time. When operations ceased in 1995, the buildings, incinerators, and rail lines were demolished.

At present, the Virginia Department of Transportation (VDOT) has implemented a plan to extend the I-564 intermodal connector to the Norfolk International Terminals. The highway

expansion will require that local utilities, Navy-owned ballfields, and a rail line be relocated impacting the northernmost section of the Salvage Yard. As a result, the Salvage Yard will be covered and ballfields have been proposed for construction at the site to replace those demolished during the highway expansion.

A Preliminary Assessment/Site Inspection (PA/SI) was completed for the CASY (Baker Environmental, Inc., May 1994) and the investigation results indicated that the surface and subsurface soil were contaminated with PCBs, pesticides, and metals. Additional data were generated during the RI (Baker Environmental, Inc., November 1999) and showed that the shallow and deep groundwater aquifers in the vicinity of the site as well as the sediment were contaminated with PCBs and metals. However, the human health risk assessment identified no unacceptable risk from exposure to groundwater for the exposure scenarios evaluated.

The initial remedial action at CASY consisted of the non time-critical removal and offsite disposal of metals and PCB contaminated soils. A PCB removal action began in August of 1998. Additional delineation of site contaminants in 2001 identified six metals hotpots throughout the site. As an interim measure, the Navy began removal of the hot spot soils in conjunction with the on-going PCB removal action. The hot spot and PCB contaminated soil removal continued through 2001 with the ultimate excavation of more than 16,000 yd^3 of material. The removal action achieved the soil PCB cleanup goals, however, the additional soil analytical data showed that the aerial extent of metals contamination was more widespread than previously estimated. It was estimated that approximately 29,000 yd^3 of soil remained at the site above the metals cleanup goals. Based upon the more comprehensive confirmation sampling and anticipated future land use of the site, the remedial measures for the site were re-evaluated. The Navy determined that the placement of a soil cover was more cost effective than removal of the metals contaminated soils, and the NSN Tier I Partnering reached consensus on this course of action in March 2002.

At the time of this report, an engineered soil cover and the cover for the sediments in the pond have been completed. The Final ROD addressing the soil and sediment at the site and encompassing the overall soil and sediment cleanup strategy for the site, was signed by EPA in September of 2004. The ROD identifies the risks to the human health and ecological receptors exposed to soil and sediment, establishes the Remedial Action Objectives (RAOs), and defines the land use controls (LUCs) for the CASY.

2.1.8 Site 23-LP-20 Plating Shop

As shown in Figure 2-7, Building LP-20 is one of many large buildings located northwest of the NAS main runway. Building LP-20 includes the cleaning shop, motor pool, plating shop, and offices (detailed in Figure 2-9). In the past, the building was used as an engine overhaul facility in which jet engines were disassembled and worked on. Currently, the building is used as a motor pool and office space.

Site 23, the LP-20 plating shop is located on the west side of the building but is currently not in use and is locked to prevent unauthorized access. Previous activities in the shop included disassembling, stripping, and replating metal parts. The shop contains seven process pits extending beneath the concrete slab floor which were used for cleaning, stripping, and plating engine parts. The process tanks and equipment were also located in pits. The floor and pits were lined with corrosion resistant brick tiles. The shop also contains a drainage

system for the collection of wastewater from the pits and delivery to the Industrial Wastewater Treatment Plant.

During a 1989 site visit, VDEQ observed violations of the Virginia Hazardous Waste Management Regulations (VHWMRs). Violations included hazardous waste stored in its generator container accumulation areas in excess of 90 days, hazardous waste stored in tanks without interim status or a permit, and containers not clearly marked as hazardous waste. Violations also included the lack of inspection records and notification of exact locations of all existing accumulation areas.

An enforcement order was effective in December 1990. Under RCRA, the Clean Closure Plan and Contingency Plan were completed in 1993 and approved by VDEQ in September 1994. The Navy requested a modification of the plans in order to conduct a risk-based closure. Multiple phases of investigation were conducted for partial implementation of the Risk-Based Closure Plan (Versar, Inc., December 1997). The investigation included the collection of soil, concrete, and groundwater and the analysis for VOCs, cyanide, and eight metals. The risk assessment indicated unacceptable industrial risk at 17 soil locations, but no unacceptable risks with exposure to the plating shop concrete floors. Groundwater was recommended to be addressed under a post closure monitoring program. Final closure was not achieved; however, partial closure including the removal of tanks and most of the piping and either decontamination or disposal as hazardous waste did occur. In September 2000, a revised Clean Closure Plan was submitted to VDEQ. The scope of the revised plan included the removal of the concrete floor and approximately three feet of soil in the plating shop. In addition, the plan included soil sampling of the remaining soils in the shop area as well as the plating sumps and select locations along the industrial wastewater piping system. If the soil samples exceeded established risk-based threshold limits a risk assessment would be conducted. Following the sampling activities, the plan called for general cleanup and decontamination of the Plating shop, the removal or rerouting of underground utilities beneath the plating shop, and the cleaning of portions of concrete slab that are demolished. Currently, there has been no activity at the Plating Shop since the submittal of the revised Clean Closure Plan and the Contingent Closure Plan by Versar, Inc. in September 2000.

In July 2003, the Navy decided to move the site from the RCRA to the CERCLA program. A PA/SI is the first step in evaluating a site under CERCLA, however, in November 2003 the NSN Tier I Partnering Team determined that the existing documents completed under the RCRA program can be used in lieu of a formal PA/SI. In addition, the Tier I Partnering Team joint-scoped additional soil investigation activities. The additional investigation was conducted in December of 2004. The results of the investigation showed that there were concentrations of one VOC, SVOCs, and metals above the residential and industrial RBCs.

In May 2005, the NSN Tier I Partnering Team agreed to conduct and interim removal action to address the site soils. An EE/CA is currently prepared for the interim removal action.

2.2 Solid Waste Management Units

The SWMUs are described in this section. These SWMUs are listed as SSAs or AOCs in the FFA (see Sections 1.4.3.4 and 1.4.3.5). The following site descriptions include physical

characteristics, previous investigations, detected contaminants, and future remediation plans for each site. The objectives of the investigations are to determine the extent of contamination at each SWMU, to develop and evaluate economically feasible remedial alternatives for remedial action at contaminated SWMUs, and to close out qualified sites. A ROD for SWMUs 12 and 16 has been completed which supported no action; therefore, SWMUs 12 and 16 are not included in this section.

2.2.1 SWMU 14—Q-50 Satellite Accumulation Area

The Q-50 Satellite Accumulation Area (SWMU 14) is located in the northeast corner of NSN, as shown in Figure 2-10. SWMU 14 consisted of a concrete storage pad surrounded by a grass-covered field. The pad served as a 90-day hazardous waste accumulation area where wastes generated through various waste streams were processed (sampled, identified, labeled, and packaged) before being shipped to eventual disposal. The original concrete pad for the accumulation area has since been removed. A new pad was installed west of the original location and is used for temporary storage of investigation-derived waste materials.

In addition to the accumulation area, the peninsula at Sewell's Point is a man-made landmass formed from two distinct periods of fill activities. The first landfill activities began in the early 1950s, when the channels were dredged to allow for construction of the northernmost series of piers at the site. The resulting dredge material was used to create much of the land at Sewell's Point. The second period of filling occurred between 1974 and 1978, when the eastern portion of the site was formed from the disposal of construction debris. This landfill was later designated as Site 9, the Q Area Landfill, and reportedly used for the disposal of non-hazardous construction debris. Site 9 was originally designated for No Further Action in the *Site 9 Q-Area Landfill Close-Out Report, Naval Base, Norfolk, Norfolk, Virginia* by Baker Environmental, Inc. in December 1997. However, because Site 9 and SWMU 14 are co-located, the Site 9 soil and groundwater are being evaluated as part of a remedial investigation to determine the potential impact of contamination from SWMU 14.

Sampling and analysis of the surface soil were performed in 1995 during the RRR study. Additional surface soil and groundwater sampling was performed in 1996 during the Phase II RRR study. VOCs, SVOCs, pesticides, and PCBs were detected in the soil and groundwater.

A SWMU Supplemental Investigation conducted in July 1998 (CH2M HILL, October 1998) detected several VOCs, SVOCs, PCBs, and metals in the groundwater at levels above the RBCs. As a result of these findings, three phases of remedial investigations have been conducted in 1999, 2000, and 2001 to assess the extent of the fill material and groundwater impacts. In order to fill data gaps identified by the NSN Tier I Partnering Team, additional investigations were completed in December 2002. The results of all the investigations are presented and discussed in the Final SWMU 14 RI Report (CH2M HILL, August 2004). As a result of the RI, it was recommended that the ecological risk assessment progress into the Step 4 phase.

Replacement of the revetment along the shoreline in the area of the site, to repair storm damage from Hurricane Isabel, is currently underway. Therefore, the Team has agreed to delay the Step 4 ecological risk assessment until the completion of the revetment project. Additionally, the NSN Partnering Team has agreed that the revetment, along with the

paved parking lot, will be considered part of a presumptive remedy for the site soils and the sediment under the revetment.