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Draft

Workplan and Sampling and Analysis Plan for the Background Soil Investigation

St. Juliens Creek Annex
Chesapeake, Virginia

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia

LANTDIV CLEAN II Program
Contract No. N62470-95-D-6007
CTO-015

September 2000

Prepared by

CDM Federal Programs Corporation

Submitted by

CH2MHILL

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Acronyms

AOC	Area Of Concern
ASTM	American Society of Testing Methods
bgs	below ground surface
BOA	Basic Ordering Agreements
BTAG	Biological Technical Assistance Group
CLP	Contract Laboratory Program
COPC	Constituent of Potential Concern
DO	Dissolved Oxygen
DQO	Data quality Objective
Eh	Oxidation-Reduction Potential
EPA	Environmental Protection Agency
EPIC	EPA Photographic Interpretation Center
FSP	Field Sampling Plan
GIS	Geographic Information System
HASP	Health and Safety Plan
IDW	Investigation Derived Waste
IDWMP	Investigation Derived Waste Master Plan
IRP	Installation Restoration Program
LANTDIV	U.S. Naval Facilities Engineering Command, Atlantic Division
LCPAH	Low Concentrations Polynuclear Aromatic Hydrocarbon
LQAP	Laboratory Quality Assurance Plan
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NFEC	Naval Facilities Engineering Command
NTR	Navy Technical Representative
PAHs	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated BiPhenyls
PPE	Personal Protective Equipment
PWC	Public Works Center
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control

SAP	Sampling and Analysis Plan
SCS	Soil Conservation Service
SJCA	St. Juliens Creek Annex
SOP	Standard Operating Procedures
SVOCs	Semivolatile Organic Compounds
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TCL	Target Compound List
TOC	Total Organic Carbon
USEPA	United States Environmental Protection Agency
VDEQ	Virginia Department of Environmental Quality
VOC	Volatile Organic Compounds
WP	Work Plan

Section 1

Introduction

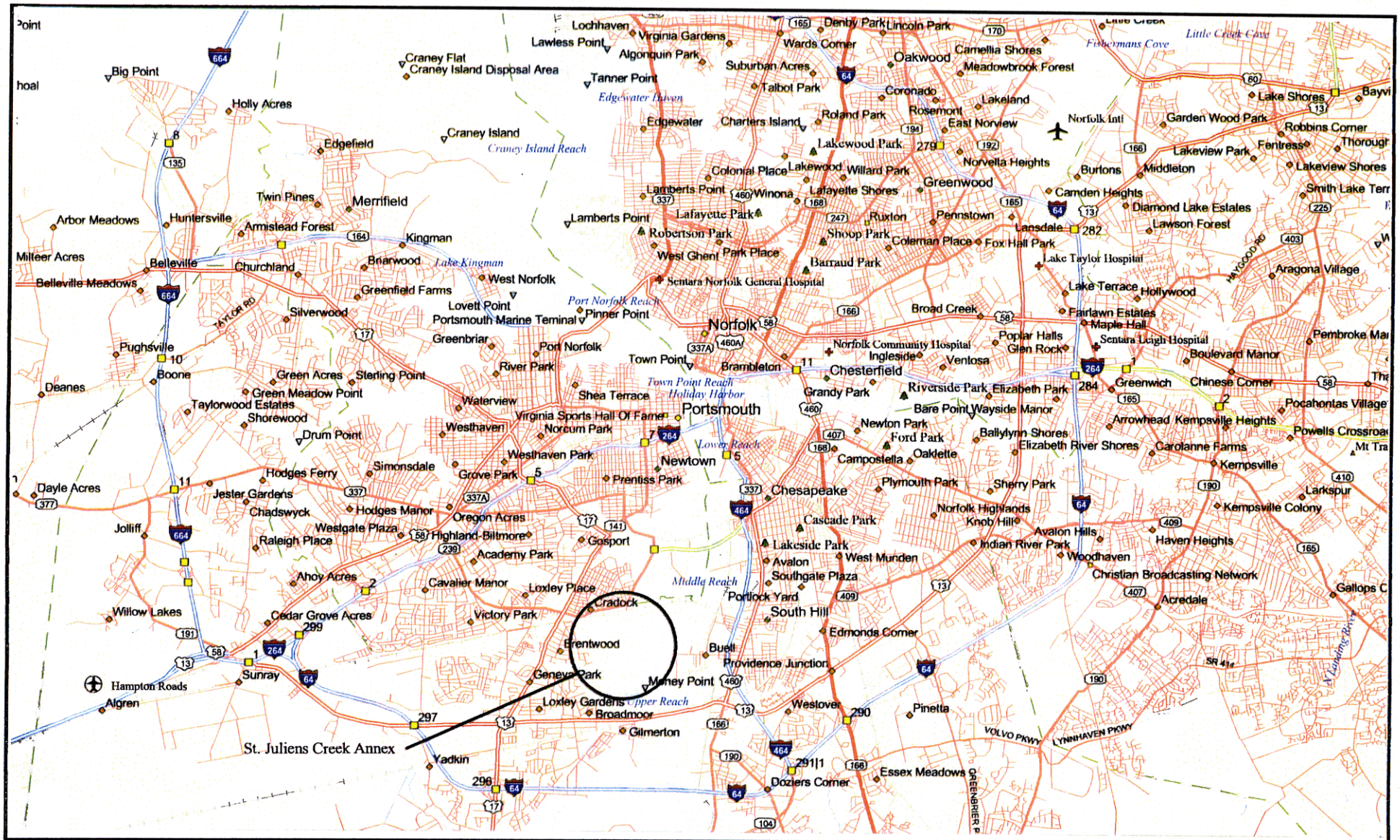
This work plan describes the work necessary to conduct a background soil investigation at the St. Juliens Creek Annex, Chesapeake, Virginia, and is based on a scope of work provided by Naval Facilities Engineering Command (NFEC) U.S. Naval Facilities Engineering Command, Atlantic Division (LANTDIV) on March 26, 1998 as part of Navy Contract N62470-95-D-6007 Comprehensive Long-Term Environmental Action Navy (C.L.E.A.N.), District III, Contract Task Order – 015. The purpose of this Work Plan is to outline the procedures that will be used to establish background conditions in soil for application to site sampling data to identify release-related site constituents of concern and human health and ecological risks.

The general background and physical setting of St. Juliens Creek Annex (SJCA) is described in Sections 2.0 and 3.0 of the Final Master Project Plan, prepared by CDM Federal in July, 2000. A regional location map of St. Juliens Creek is provided as Figure 1-1 and a facility map is provided as Figure 1-2. Previous investigations at St. Juliens Creek have revealed elevated levels of some metals, volatile organic compounds (VOCs), pesticides, and polynuclear/aromatic hydrocarbons (PAHs) in the soils and groundwater at several IR Site locations. However, the investigations have not differentiated the degree to which these constituents were attributed to either site conditions or background conditions associated with naturally occurring constituents and anthropogenic sources. The background sampling data, conducted as part of this field effort, will be used to establish the range in background concentrations (natural and anthropogenic) of metals, pesticides, and PAHs in the surface and subsurface soils at SJCA.

The background quality of groundwater, as well as reference sediment and surface water quality is the subject of an ongoing investigation at SJCA. In 1999, three monitoring wells screened in the Yorktown Aquifer and four monitoring wells screened in the Water Table Aquifer were installed and sampled. In addition, surface water and sediment samples were collected from 10 locations along St. Juliens Creek and Blows Creek. These locations were sampled twice: once in the spring and once in the fall. Samples from all media were analyzed Target Analyte List (TAL) metals and Target Compound List (TCL) organics. Sediment samples were also analyzed for total organic carbon (TOC), soil pH, and grain size, and classified using (ASTM Method D2487). Field water-quality measurements such as pH, Eh, dissolved oxygen (DO), conductivity, salinity, and temperature were measured in groundwater and surface water samples.

The rationale that supports the sampling tasks and specific sampling locations associated with this soils background investigation are presented in Section 2 of this Work Plan. Section 3 describes the technical approach to project tasks and Section 4 presents general information regarding project management and staff organization. Section 5 documents the anticipated subcontract services required for completion of tasks documented in this Work Plan and Section 6 presents the schedule for the completion of these tasks. The Final Master Work Plan for St. Juliens Creek Annex, Chesapeake, Virginia (CDM Federal, July 2000) is referenced for site background and physical setting information in Section 1, and for field

sampling procedures in the site-specific plan checklists which are included as Attachment A to this Work Plan.

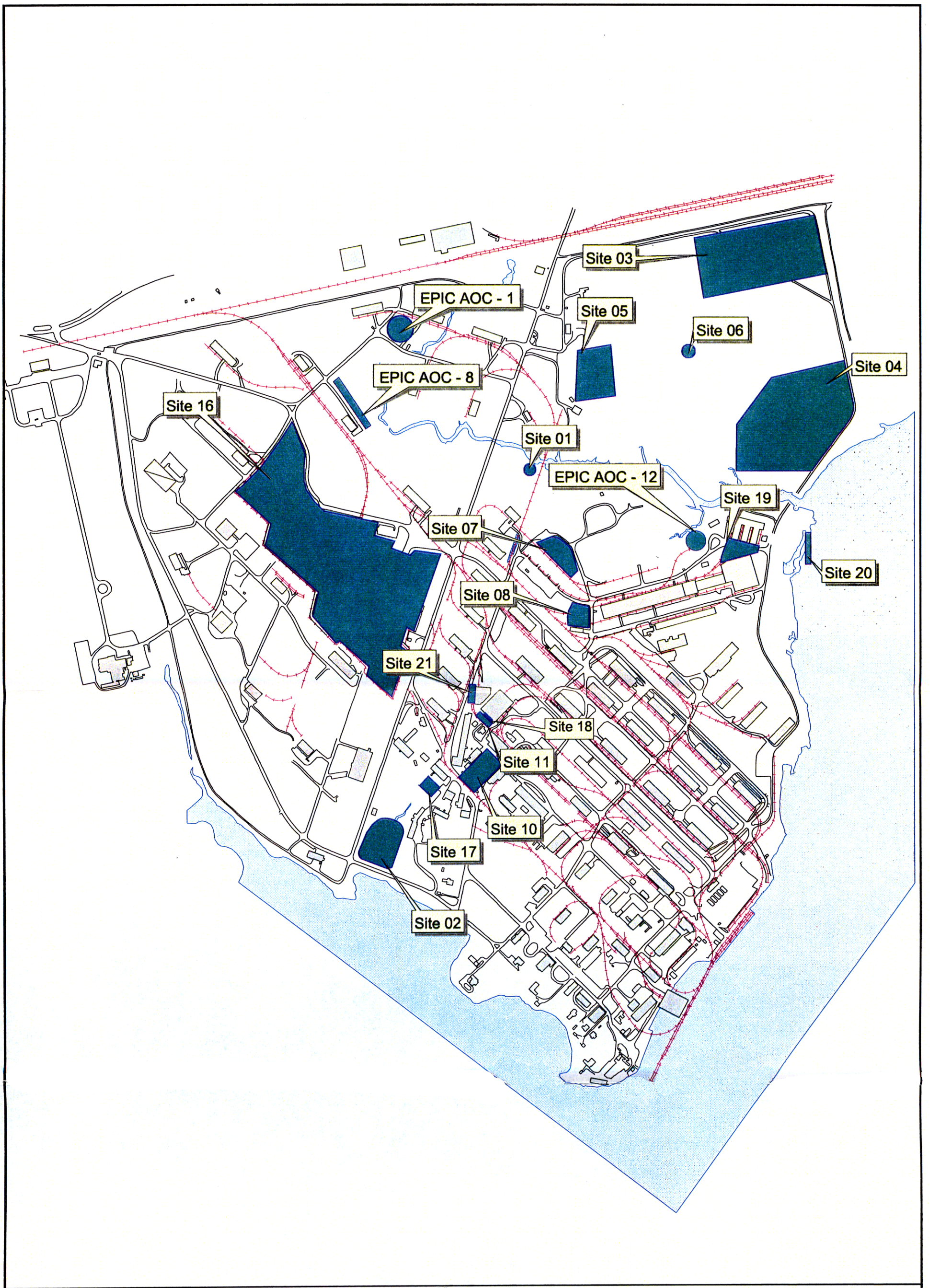


Location of St. Juliens Creek Annex

N
W E
S

Figure 1-1
Installation Location Map
Background Soil Investigation
St. Juliens Creek Annex

CDM Federal Programs Corporation



LEGEND

- Buildings
- Roads
- Railroad
- Surface Water
- Sites/AOCs Identified for Investigation (per Site Management Plan, July 2000)

N
W E
S

0 500 1000 1500 Feet

Figure 1-2
Site Location Map
Background Soil Investigation
St. Juliens Creek Annex

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Section 2

Sampling Rationale and Sampling Locations

This Section presents the rationale and sampling locations for the background investigation at St. Juliens Creek Annex. The information collected for this background investigation will be used to supplement information collected in remedial investigations and risk assessments and to assess if additional site investigations, institutional controls, or remediation is required. In an effort to more accurately identify site related contamination and assess potential risks of exposure to site contaminants, it is essential to identify the concentrations of naturally occurring constituents (inorganic elements or chemicals that represent underlying geochemical conditions that have not been influenced by human activity) in site media. It is also essential to distinguish between site-related contamination and the presence of anthropogenic compounds (natural and man-made substances present in the environment as a result of human activities, but not related to site sources). Background samples, collected and analyzed in the same manner as other site samples, provide baseline measurements to distinguish site releases and to determine the degree of environmental risk present at a site.

The specific goal of the sampling effort at SJCA is to establish background concentrations of metals, pesticides, and PAHs in surface and subsurface soil. Background samples will be collected for analysis of metals, pesticides, and PAHs, constituents that are generally considered naturally occurring or potentially anthropogenic constituents for which background concentrations can be established. The background analyses will be statistically evaluated to determine the range in concentrations of naturally occurring and anthropogenic constituents and statistically compared to site contaminants. When background analyses indicate that site-specific and naturally occurring background chemical concentrations are not statistically different, it is concluded that their presence in site media is not representative of a contaminate release from the site and is not considered a constituent of concern. The data collected in this effort will be used to supplement data collected during previous investigations and used in future risk management evaluations at St. Juliens Creek Annex.

An initial site reconnaissance will be conducted to ensure selected areas for background sampling are not presently impacted by site activities or in close proximity to potential source areas. Samples will not be collected from areas of known contamination.

To establish background soil quality, non-impacted areas that represent the underlying soil conditions were identified for background sampling locations. Additionally, areas indicative of anthropogenic background conditions were also identified. These areas include fill areas comprised of dredged sediments and native soil areas.

Aerial photographs were reviewed to identify dredged fill areas and past land use. To ensure that background soils and IRP (and other) Site soils are of similar soil composition, the Soil Conservation Service (SCS) *Soil Survey Report for Norfolk Naval Shipyard and St. Juliens Creek Annex, Portsmouth, Virginia, (1983)* was reviewed to identify site soil characteristics. Based on these reviews, six general categories of soil types were identified: 1) Munden-Tetotum Association, 2) Dragston-Augusta Association, 3) Nimmo, 4) Bohicket ,

5) Urban-Udorthents, and 6) dredge fill. The distribution of the Soil Associations identified by the SCS, and the IRP sites and Areas of Concern (AOCs) are shown in Figure 2-1. The dredge fill area, located in the northeast corner of SJCA, was identified from EPIC photographs. The SCS soil survey maps classify both this area and the eastern, developed, side of the Base as Urban-Udorthents. This soil association is defined as areas where 70 percent of the land is covered with asphalt, concrete, buildings, etc. or where soils have been altered by excavation. However, the dredge fill is likely to have a different composition from the soil that is in the developed part of the Base, therefore it will be considered a separate soil type for the purposes of this background soil investigation.

Per discussions with the Navy, no background soil samples will be collected from the Nimmo Association because at SJCA only one site (Site 16) is located on that association and there are few undisturbed areas from which to select background locations. Therefore, background soils samples will be collected from the remaining four associations and the dredge fill material.

For this background study, per discussions with the Navy, ten locations within each soil type have been selected for sampling. At each location both surface and subsurface soil will be collected. Within each soil type the background soil sampling locations have been distributed across the site in order to collect representative samples.

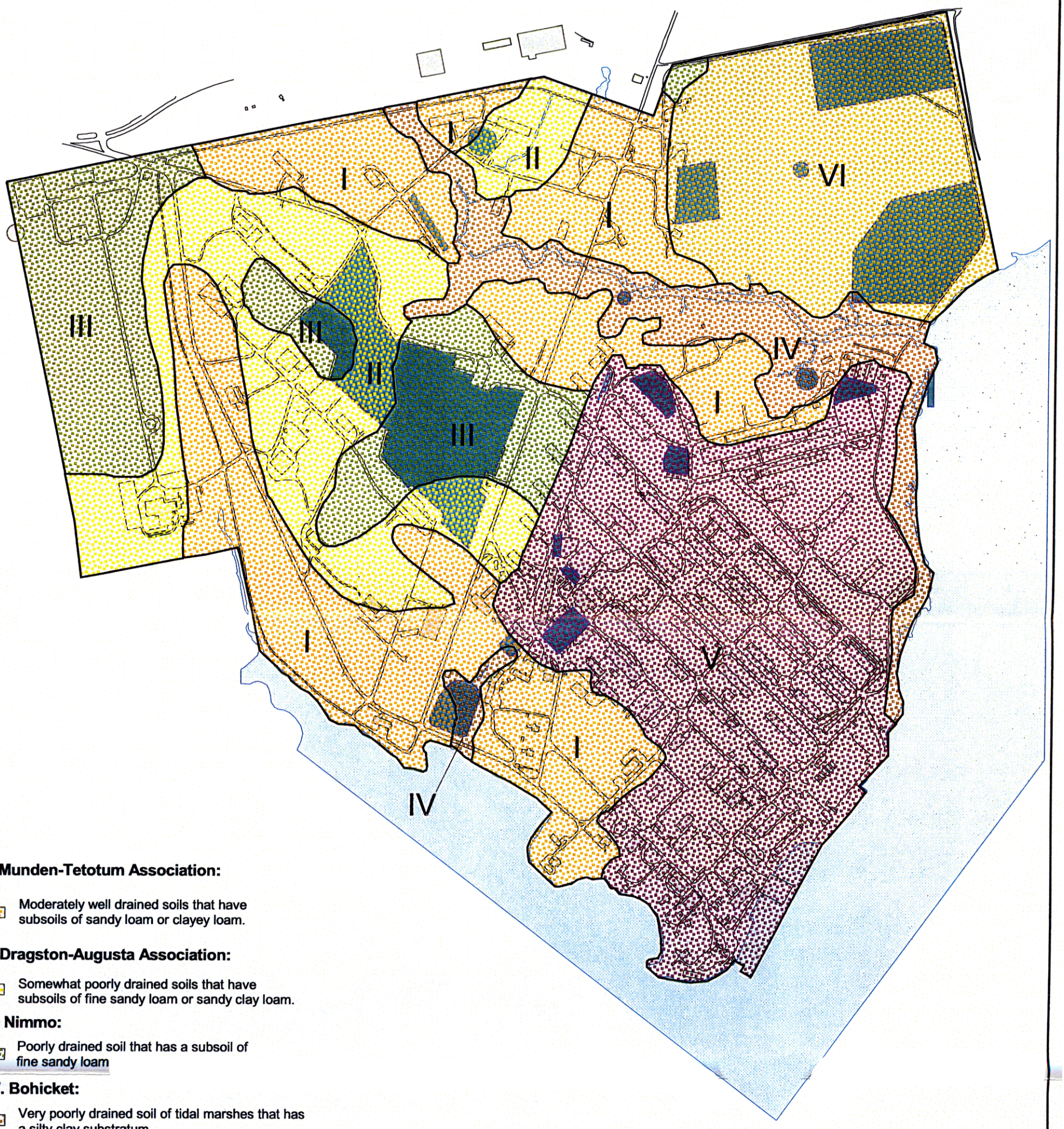
Sampling locations were also selected based on a review of aerial photographs from 1937 to 1990 to confirm their appropriateness as a background location, i.e., located away from potential past and present contaminant source areas. In general, present day grassy and wooded areas were preferentially selected. Locations will be adjusted based on observations made during a site visit. Where possible, background soil samples will be collected near large older trees. Soil sample locations were also selected in the vicinity of existing background well locations.

2.1 Soil Sampling Locations

To characterize the background soils indicative of the natural and anthropogenic conditions, background samples will be collected from the following Soil types:

- Munden-Tetotum Association,
- Dragston-Augusta Association,
- Bohicket Association ,
- Urban-Udorthents (Developed Land), and
- Dredge fill.

The planned locations of all the background soil samples are shown in Figure 2-2. Co-located surface soil samples (0 to 6 inches) and subsurface vadose-zone soil samples (1 to 3 feet) will be collected at each background location. These sample depths are intended to provide representative background concentrations and correspond to the soil sampling depths used to assess direct contact and construction worker risk exposure pathways.



I. Munden-Tetotum Association:

Moderately well drained soils that have subsoils of sandy loam or clayey loam.

II. Dragston-Augusta Association:

Somewhat poorly drained soils that have subsoils of fine sandy loam or sandy clay loam.

III. Nimmo:

Poorly drained soil that has a subsoil of fine sandy loam

IV. Bohicket:

Very poorly drained soil of tidal marshes that has a silty clay substratum

V. Urban-Udorthents:

Areas where 70 percent of the land is covered with asphalt, concrete, buildings, etc., or where soils have been altered by excavations.

VI. Dredge Fill

Deposition of hydraulic dredge fill.

LEGEND

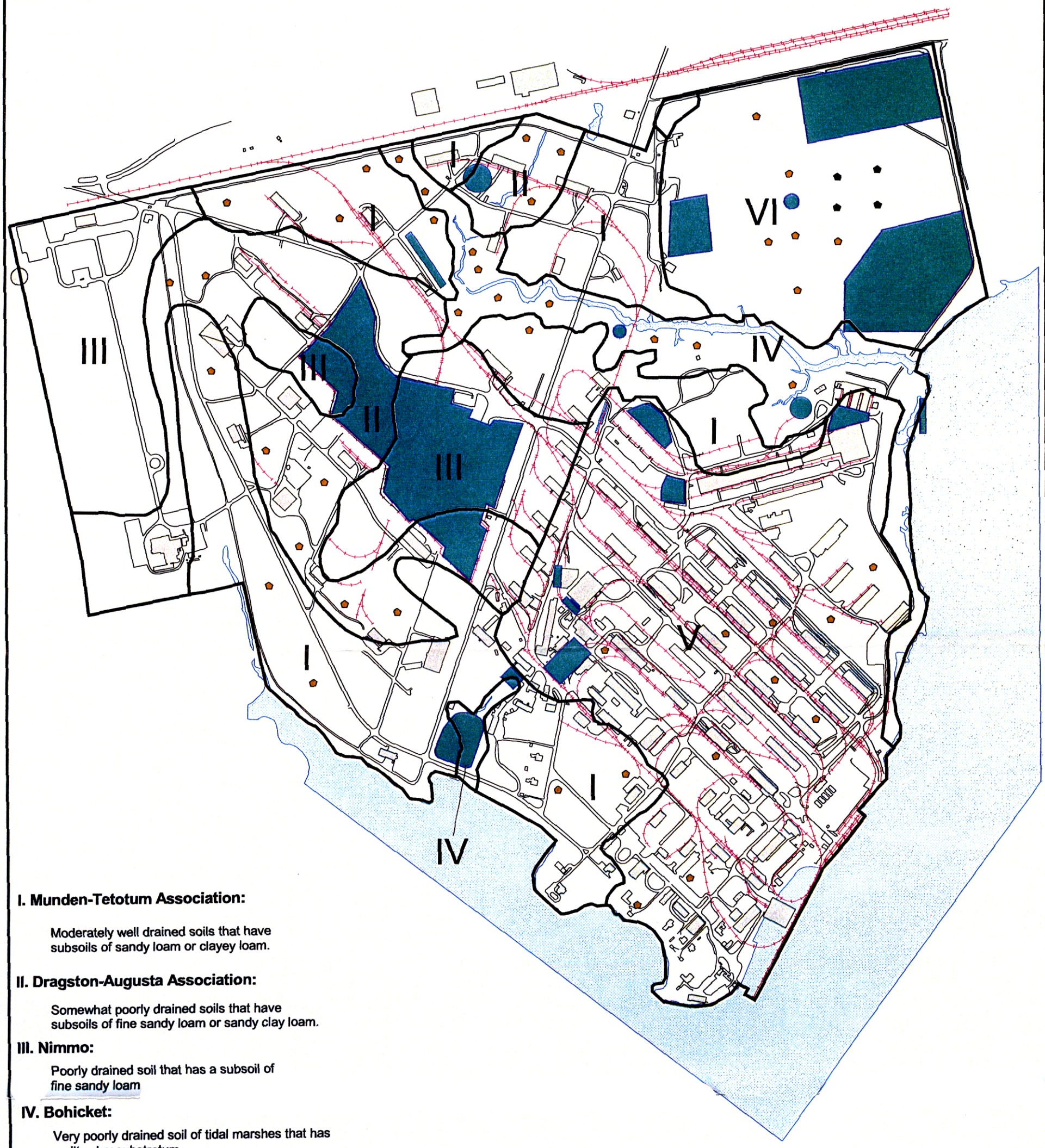
- Buildings
- Roads
- Surface Water
- Sites/AOCs Identified for Investigation (per Site Management Plan, July 2000)

N
W E
S

0 500 1000 1500 Feet

Figure 2-1
Soil Associations
Background Soil Investigation
St. Juliens Creek Annex

CDM Federal Programs Corporation



I. Munden-Tetotum Association:

Moderately well drained soils that have subsoils of sandy loam or clayey loam.

II. Dragston-Augusta Association:

Somewhat poorly drained soils that have subsoils of fine sandy loam or sandy clay loam.

III. Nimmo:

Poorly drained soil that has a subsoil of fine sandy loam

IV. Bohicket:

Very poorly drained soil of tidal marshes that has a silty clay substratum

V. Urban-Udorthents:

Areas where 70 percent of the land is covered with asphalt, concrete, buildings, etc., or where soils have been altered by excavations.

VI. Dredge Fill

Deposition of hydraulic dredge fill.

LEGEND

- Buildings
- Roads
- Railroad
- Surface Water
- Sites/AOCs Identified for Investigation (per Site Management Plan, July 2000)
- Proposed Soil Sampling Locations
- Soil Sampling Locations Sampled During RI Activities

N W E S

0 500 1000 1500 Feet

Figure 2-2
Proposed Soil Sampling Locations
Background Soil Investigation
St. Juliens Creek Annex

CDM Federal Programs Corporation

2.1.1 Soil Samples Munden-Tetotum Association

The Munden-Tetotum Association is defined by the SCS as moderately well-drained soils that have a subsoil of sandy loam or clayey loam. As shown on Figure 2-1, this soil association is found in the southwest edge of SJCA (on either side of St. Juliens Creek Road), in the north central portion of the site along Craddock Street, as well as along the northwest boundary of SJCA. No background soil sample locations have been selected from areas along Craddock Street, due to the presence of IRP sites in these areas (Site 2 and the Burning Grounds).

Four samples will be collected from the area of the site located along the northwest boundary of SJCA, three will be collected from the wooded area at the western end of St. Juliens Creek Road, and one will be collected from the wooded area north of Building 169 approximately 200 feet west of Craddock Street. A review of aerial photographs indicates that there as been some clearing of trees in these areas between 1939 and 1990, but no construction on, or excavation of, the soil. The remaining two sample locations are in grassy areas within the eastern half of the site that was developed prior to 1939. No construction or excavation activities are evident from aerial photographs taken between 1939 and 1990. There are no known solid waste management areas or contaminant releases in close proximity to the selected background locations.

2.1.2 Soil Samples in Dragston-Augusta Association

The Dragston-Augusta Association is defined by the SCS as somewhat poorly-drained soils that have subsoils of fine sandy loam or sandy clay loam. As shown on Figure 2-1, this soil association is found only west of Craddock St. and mostly south of Blows Creek, although there is a relatively small area north of Blows Creek. In general, the western half of SJCA, where the association occurs, was developed between 1939 and 1949. The 1949 aerial photograph shows that this area was heavily wooded, with the exception of a clearing (possible waste disposal area) just north of Blows Creek. This clearing, located north of Blows Creek and identified as AOC 1, is partially within the Dragston-Augusta soil association. Three background soil samples will be collected from the northern occurrence of the Dragston-Augusta soils, however the locations will be at the northern and eastern edges of the area, to avoid any areas potentially impacted by site activities.

The remaining seven sampling locations are in the southwest portion of SJCA, in areas that are grassy or lightly wooded. This area was cleared of trees between 1958 and 1964. All of the planned sampling locations are at least 500 feet from the fenced boundary of Site 16.

2.1.3 Soil Samples in Bohicket Association

The Bohicket Association is defined by the SCS as very poorly-drained soils of tidal marshes that have a silty clay substratum. As shown on Figure 2-1, this soil association is found along Blows Creek and on the northeast corner of the intersection of Craddock St. and St. Juliens Creek Road. The majority of the latter area is Site 2, Landfill B, which includes a central pond that is connected to St. Juliens Creek via a culvert. No background soil samples are scheduled to be collected from this southern occurrence of the Bohicket Association. The planned sampling locations are along blows creek, predominantly on the south side of the creek.

2.1.4 Soil Samples in Urban-Udorthents (Developed Land)

The Urban Udorthents soils are defined by the SCS as areas where 70% of the land is covered with asphalt, concrete, buildings or where soils have been altered by excavations. As noted earlier, for this study, the area defined as Urban Udorthents by the SCS, has been subdivided into those areas developed with buildings and roads, and those areas that have been filled with hydraulic dredge spoil material. As shown on Figure 2-1, this soil association is found in the southeastern portion of the site. Generally this area has been developed since before 1939. The ten locations selected for soil sampling in this area are located on grassy areas between buildings. Although there are several IRP sites and AOCs in this developed area, none of the sample locations are immediately adjacent to them.

2.1.5 Soil Samples in Dredge Fill Area

The Dredge Fill Area, identified from the 1939 and 1949 aerial photographs as interpreted by EPIC, is in the northeast portion of the site. Use of this area for deposition of hydraulic dredge fill appears to have ceased, in at least the western portion of the fill area, by 1939. The northeast and southeast corners of the fill area later were used as a waste disposal areas (Site 3, Landfill C and Site 4 Landfill D). The Landfill D boundary is fairly apparent at the site and is marked by an approximate 5 ft elevation increase over the adjacent dredge spoil area. In addition the Landfill has small trees and brush on it. The boundary of Landfill C is less defined, but examination of the aerial photographs indicate relatively limited activity, mostly adjacent to a dirt road that crosses the area diagonally from northwest to southeast. Between 1964 and 1974, a radar testing facility was constructed on a portion of Landfill C.

The majority of the dredge fill area is grassy and open. Ten soil sampling locations are distributed throughout the dredge fill area, and are located no closer that 200 feet to the edge of Landfill D and no closer than 300 feet from the Site boundary shown on Figure 2-1. In addition, no samples will be collected within 300 feet of the road that crosses the corner of the dredge fill area. Four of the ten locations were previously sampled as part of the ongoing RI activities associated with Landfill C and Landfill D resulting in the collection at only six locations as part of this investigation.

Section 3

Technical Approach and Investigation Procedures

This section details the technical approach developed to perform the sampling activities for the background investigation. See Section 2 for the rationale developed for the selection of background sampling locations.

The tasks to be implemented for the background investigation include: project planning, field investigation, sample analysis and validation, data evaluation, and preparation of a Background Investigation Report. Procedures to be implemented will be addressed in site specific project plans. To simplify the process of developing site specific project plans, a Final Master Work Plan (WP), including a Master Field Sampling Plan (FSP), Master Quality Assurance Project Plan (QAPP), Investigation-Derived Waste Master Plan (IDWMP), and Master Health and Safety Plan (HASP) have been prepared for Installation Restoration Program (IRP) activities to be performed at St. Juliens Creek Annex (Master Project Plans, St. Juliens Creek Annex, Chesapeake, Virginia, July 2000). The Master Project Plans provide the details for sampling and analysis protocols to be followed and general types of activities to be accomplished for implementation of field activities at St. Juliens Creek Annex. Preparation of site specific plans is simplified through reference to the Master Plan documents.

Site-specific plans are in the form of checklists that supplement the detailed protocols and Standard Operating Procedures (SOPs) presented in the Master Work Plan documents. The checklists are presented in Attachment A, and present information specific to sampling areas selected for the background investigation. The Work Plan checklists (FSP, QAPP, HASP, and IDWMP) are based on the existing Master Work Plans. Information regarding the site history of St. Juliens Creek Annex, facility background, previous investigations, and hydrology and geology are presented in the Master Work Plan. During the field planning meeting all sampling procedures will, be reviewed and their location in the Final Master FSP will be identified. A copy of the Final Master Work Plan and Final Master FSP will be available in the field during all sampling activities.

3.1 Project Planning

This task consists of project management, meetings and the preparation of this work plan.

3.1.1 Project Management

The project management activities include daily technical support and guidance, budget and schedule review and tracking, preparation and review of invoices, personnel-resource planning and allocation, subcontractor coordination, preparation of monthly progress reports, and communication and coordination of events with LANTDIV and the Annex. Project management will occur over the duration of the project.

3.1.2 Work Plan

A Master Work Plan (WP), a Master Sampling and Analysis Plan (SAP), and a Master Health and Safety Plan (HASP) have been prepared for the activities to be performed for IRP investigations at St. Juliens Creek (Final Master Project Plan, St. Juliens Creek Annex, July 2000). The Master SAP consists of three documents: the Master Field Sampling Plan (FSP), the Master Quality Assurance Project Plan (QAPP), and the Master Investigation-Derived Waste Management Plan (IDWMP). LANTDIV has agreed that one set of Master plans will provide the background information needed to understand base-wide site conditions, the approach to be used for investigations and general types of activities to be accomplished.

Site-specific details will be provided in the site-specific plans. The site-specific plans will supplement the Master Plans and will present information specific to each site. The site-specific work plans (HASP, FSP, QAPP, and IDWMP) are presented as checklists of items based on the existing Master Work Plans (including other supporting documentation, and additions/deviations from the Master Plan). A set of site specific plans has been developed for the Background Soil Investigation, and is included as Attachment A to this Work Plan.

The following presents a description of each element of the site-specific work plan.

- Site-Specific Work Plan: The site-specific Work Plan describes the site background; previous investigations and analytical results; location of the site in relation to the entire Base; discussion of field activities to be performed at the site; staff organization and task order management; and the task order schedule.

- Site-Specific Field Sampling Plan Checklist: The site-specific FSP checklist describes the field tasks to be performed; the field measurements to be taken; the sampling program (i.e. nomenclature); sampling locations; and applicable standard operating procedures (SOPs).

- Site-Specific Quality Assurance Project Plan Checklist: The site-specific QAPP checklist describes the data quality objectives (DQOs); samples to be collected and analyses to be performed; analytical quantitation limits; quality assurance/quality control (QA/QC) acceptance criteria; data reduction, validation, and reporting; internal QC procedures (field and laboratory); and corrective action.

  The QAPP describes the Quality Assurance and Quality Control procedures used for conducting sampling and analytical activities. In addition, field sampling will not begin at any site until the Navy Technical Representative (NTR) receives confirmation that laboratory QAPP requirements have been met for the sites. The subcontracted analytical laboratory will conform to their approved Laboratory Quality Assurance Plan (LQAP).

- Site-Specific Investigation-Derived Waste Plan Checklist: The site-specific IDWMPs will describe procedures used for the handling and disposal of waste materials generated during the background investigation. These waste materials are expected to be minimal, and will include personal protective equipment and decontamination fluids. The plan also describes the potential means of disposal, if deemed necessary.

- Site-Specific Health and Safety Plan Checklist: The site-specific HASP addresses activity-specific precautions, such as HAZWOPER-regulated tasks; hazards of concern; contaminants of concern; personnel; instrumentation required; and decontamination procedures.

  The HASP will be reviewed and approved by both the NTR and the Safety/Health Officer of the facility. This plan governs all aspects of the project. To prevent accidents, the onsite portion of the study shall not begin until this plan has been approved by the NTR.

3.2 Field Investigation

This task involves efforts related to fieldwork support, the field investigation, and surveying.

3.2.1 Field Work Support

Fieldwork support includes subcontractor procurement, mobilization, and utility clearance. As part of the initial field mobilization to St. Juliens Creek Annex, CH2M HILL will procure for CDM Federal direct-push technology (Geoprobe®), analytical laboratory, and data validation services for work at the Base. The subcontracted analytical laboratory will be approved by the Navy. Mobilization of equipment and supplies will be brought to the site when the CDM Federal field team mobilizes for field activities. Demobilization activities will consist of general site restoration prior to the return transport of field equipment and crew. It is anticipated that minimal IDW (equipment decontamination liquids and PPE) will be generated during field activities since direct-push technology (Geoprobe®) is being used for soil sampling. No contaminated materials are anticipated to be encountered in these background locations.

Utility clearances will be performed prior to the start of any subsurface investigation activities at the site. CDM Federal will coordinate subsurface utility clearances with Miss Utility, a utility clearance subcontractor, and the Public Works Center (PWC) at Norfolk Naval Base or private utilities clearing company is required. CDM Federal will ensure that all appropriate contacts have been made with Base personnel and that clearances have been given for proposed subsurface sampling locations, including marking of utilities near the areas of proposed subsurface sampling locations, prior to the initiation of field operations.

3.2.2 Field Sampling Activities

A description of the field activities to be conducted for the background study is provided in this section. The Background Investigation consists of the collection and analysis of 46 surface soil samples, and 46 subsurface soil samples from the 46 proposed soil sampling locations as shown on Figure 2-2. Sampling protocols and procedures are discussed in detail in the Master Project Plans and summarized below.

Soil Sampling Procedures

The number of samples to be collected for establishing background conditions and methods of analysis are presented in Table 3-1. QA/QC samples are also identified in the table, and are discussed in greater detail in subsequent sections.

TABLE 3-1
Summary of Background Investigation Samples
St. Juliens Creek Annex, Chesapeake, Virginia

Parameter	Method	No. of Samples	Equipment Rinseate Blanks (Aqueous)	Field Blanks	Field Duplicates	Matrix Spike/ Duplicate	Total Number Soil of Samples	Total Number of Aqueous Samples
Soil Samples								
Low-concentration PAHs (LCPAH)	Method 8310	92	12	NA	10	5	107	12
TCL Pesticides	CLP OLM03	92	12	NA	10	5	107	12
TAL Metals and Cyanide	CLP ILM04	92	12	NA	10	5	107	12
TOC (surface soil only)	EPA 415.1	46	NA	NA	5	3	54	0
pH (surface soil only)	SW846 9045	46	NA	NA	5	3	54	0

Notes:
NA = Not Applicable
CLP = Contract Laboratory Program (most recent version)
TCL = Target Compound List
TAL = Target Analyte List
TOC= Total Organic Carbon; for surface soil only; useful for risk assessment and natural attenuation
Equipment Rinseate blanks – one per matrix per day; blank for filtered samples is a filtration blank
Field Blanks – since sampling is conducted base-wide no field blank will be collected
Field Duplicates – one per every ten samples per matrix/media
Matrix Spike/Matrix Spike Duplicates – One per 20 samples per matrix (not required for low-concentration analyses by CLP OLC02)

Details regarding the required containers, preservatives, and holding times for groundwater and soil samples are presented in Section 2 of the Master Field Sampling Plan. A summary of sample containers, preservatives, and holding times to be used for the background investigation are presented in Table 2-7 of the Master Field Sampling Plans.

Soil Sampling Techniques

The background investigation involves the collection of co-located surface and subsurface soil samples. Surface soil samples will be collected using a stainless-steel trowel and stainless steel mixing bowl. Surface soils will be collected from the surface to a depth of 6 inches below ground surface (bgs). A direct push technique (Geoprobe®) will be employed for collecting the subsurface soil samples. Subsurface samples will be collected from a depth of 1 to 3 feet, and will be retained in acetate sleeves. The applicable Standard Operating Procedures (SOPs) for the collection of soil samples are presented in the Master Project Plans and are specifically referenced in the Field Sampling Plan checklist.

Sampling Equipment Decontamination

All non-disposable sampling equipment will be decontaminated immediately after each use. The applicable SOPs for the decontamination of personnel and equipment are presented in the Master Project Plans and are referenced in the Site-Specific Field Sampling Plan checklist.

Surveying

A subcontracted surveyor licensed in the State of Virginia will provide horizontal coordinates for the soil sampling locations. All survey data will be tied to the Virginia State Planar coordinate system.

3.1.3 Sample Designation

Sampling locations and sampled media collected during the background investigation will be assigned unique designations to allow the sampling information and analytical data to be entered into the St. Juliens Creek Annex Geographic Information System (GIS) Data Management System. The following sections describe the sample designation specifications.

Specifications for Field Location Data

Field station data consists of information assigned to a physical location in the field where a sample is collected. For example, a soil boring that has been installed will require a name that will uniquely identify it with respect to other soil boring locations, or other types of sampling locations. The station name provides for a key in the database to which any samples collected from that location can be linked to form a relational database.

A listing of the location identification numbers will be maintained by the field team leader, who will be responsible for enforcing the use of the standardized numbering system during all field activities. Each station will be designated by an alphanumeric code that will identify the station location by facility, site type, site number, location type, and sequential location number. The schema that will be used to identify field station data is documented in Section 3 of the Master Field Sampling Plan and summarized in Table 3-2.

TABLE 3-2
Summary of Sample Identification Schema

First Segment	Second Segment		Third Segment
Naval Installation	Site Number	Sample Type	Sample Location,Sample Depth (Soil), Sampling Round (Water), Qualifier
AA	ANN	AA	NNNNN

Notes: "A"= alphabetic "N"= numeric

Installation:

SJ = St. Juliens Creek Annex

Site Number:

Site Number is assigned to a defined area (e.g. Site 17). Site numbers are associated with particular environmental programs as defined by Site Type. Base-wide and background do not have site numbers associated with them..

Sample Type:

SB = Subsurface Soil Sample Location

SS = Surface Soil Sample Location

SD =

SW =

MW =Monitoring Well

TB = Trip Blank
EQ = Equipment Blank
FB = Field Blank

Sample Location:

Sequential Location Number

Qualifier:

P = Duplicate sample

Sample Round (Water)

NNN = last 2 digits of year
A = quarter of the year sampled:
A = 1st Quarter
B = 2nd Quarter
C = 3rd Quarter
D = 4th Quarter

Sample Depth (soil)

00 = surface to 0.5 ft bgs
01 = 1 to 3 ft bgs
02 = 2 to 4 ft bgs
04 = 4 to 6 ft bgs
06 = 6 to 8 ft bgs
08 = 8 to 10 ft bgs
10 = 10 to 12ft bgs

Electronic Deliverable File Format

This effort includes checking the data from the laboratory and converting it into an electronic format that can be readily incorporated into the GIS Data Management system for St. Juliens Creek Annex. An offsite laboratory will analyze the background investigation samples and tabulate the results in an electronic format specified by CH2M HILL. The data validator will add data validation qualifiers to the table of analytical results. In addition to the hard copy data package deliverable, CDM Federal will receive an electronic file from the data validator in a table format that will facilitate downloading into a database. A summary of the analytical data electronic deliverable format is presented below.

Analytical Data Electronic Deliverable

Analytical data must be delivered in Microsoft Excel.

Field Name	Field Type	Description
Sample_ID	A	The CDM Federal sample ID (taken from the Chain of Custody)
Sample_Analysis	A	The analysis performed on the sample. We classify our samples into six main groups: VOA, SVOA, METAL, PEST/PCB, WCHEM (for TOC), and FMETAL (for filtered samples).
Date_Analyzed	D10	The date the sample was analyzed.
Date_Received	D10	The date the sample was received in the lab.
Date_Collected	D10	The date the sample was collected.
Lab_Sample_ID	A	The lab sample ID.
Dilution_Factor	N	The dilution factor used, if applicable.
SDG_Number	A	The SDG number.
CAS_Number	A6-A2-A1	CAS Number of the compound being analyzed (Note that the CAS number must consist of three number segments of defined length, separated by dashes). For TOC, use TOC as a CAS Number. For pH, use PH as a CAS Number.
Chem_Name	A	The compound being analyzed.
Ana_Value	N	The analytical result.
Std_Qual	A	The lab qualifiers, if any (e.g., U, UJ, B)
DV_Qual	A	The data validation qualifier (e.g., J, R)
Units	A	The unit of the result (e.g., MG/L)
Detect_Limit	N	The detection limit for the compound.
Method	A	Analytical method used to analyze the sample fraction.

3.3 Sample Analysis and Validation

CDM Federal will be track sample analysis and obtain results from the laboratory. The analytical data generated during the investigation field program will be validated by an independent data validation subcontractor according to EPA standard procedures. Quality control samples to be collected during the background investigation are shown on Table 3-1. A detailed discussion of quality control procedures for field investigations at St. Juliens Creek Annex is presented in the Master Quality Assurance Project Plan.

3.3.1 Sample Analysis

All soil analyses will be conducted at a contracted laboratory that fulfills all requirements of the U.S. Navy's QA/QC Program Manual and EPA's CLP. A signed certificate of analysis will be provided with each laboratory data package, along with a certificate of compliance certifying that all work was performed in accordance with the applicable federal, state, and local regulations. All analyses will be performed following the highest level of Navy guidance. Analyses will include the proper ratio of field QC samples recommended by NFESC guidance for the DQOs.

Field Quality Control Procedures

Quality control duplicate samples and blanks are used to provide a measure of the internal consistency of the samples and to provide an estimate of the components of variance and the bias in the analytical process.

Blanks

Blanks provide a measure of cross-contamination sources, decontamination efficiency, and other potential errors that can be introduced from sources other than the sample. ASTM Type II water will be used for blanks. Four types of blanks can be generated during sampling activities: trip blanks, field blanks, equipment rinsate blanks, and temperature blanks.

Trip blanks are used to indicate if there is VOC contamination during shipment to the field, from storage in the field, or from shipment from the field to the analytical laboratory. No trip blanks are required for this investigation because none of the samples are being analyzed for volatile organic compounds.

No field blanks will be collected for the background investigation. Field blanks are used to determine if there is any influence from ambient conditions in the sampling area location imparted to the sample, and to determine the chemical quality of water used for such procedures as decontamination and blank collection. Because sampling is being conducted base-wide, the collection of a field blank would only be applicable to the sample location where the field blank is collected. However if windy and/or dusty field conditions occur, a field blank will be collected at one location where there is most likely to be ambient air contamination.

One equipment blank per sample medium will be obtained for each day of sampling. Equipment blanks will give an indication of the efficiency of decontamination procedures.

A temperature blank will be included in each cooler containing samples for CLP analyses so that the laboratory can record the temperature without disturbing the samples. The temperature blank will be labeled, but will not be given a sample number nor will be listed as a sample on the Chain of Custody (COC) form.

Duplicates

Field duplicate samples will be collected at a frequency of 1 per 10 field samples per matrix. The location from which the duplicates are taken will be randomly selected. Each duplicate sample will be split evenly into two sample containers and submitted for analysis as two independent samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Matrix spike/matrix spike duplicate (MS/MSD) samples will be collected at a frequency of 1 for every 20 field soil samples collected. Analytical results of these samples indicate the impact the matrix (soil) has on extracting the analyte for analysis. MS/MSD samples give an indication of the laboratory's analysis accuracy and precision within the sample matrix. Data validators will use these results to evaluate the accuracy of the analytical data.

3.3.2 Data Validation

Analytical results will be validated by CH2M HILL subcontractors approved by the Navy. Data validators will use EPA Region III guidance. Data that should be qualified will be flagged appropriately. Results for QA/QC samples will be reviewed and the data will be qualified further, if necessary. Finally, the data set as a whole will be examined for consistency, anomalous results, and reasonableness.

3.4 Data Evaluation

Analytical data will be collected during this investigation in the form of laboratory analytical results and data validation results. This task also includes the evaluation of validated laboratory data and field-generated data. The data evaluation will include statistical evaluation of the analytical data to meet the following objectives: (1) determine the distribution of the data set, (2) identify any data outliers and (3) establish the background concentrations for comparison to future site data. Naval Facilities Engineering Command and USEPA Guidance will be utilized in the statistical evaluations. The following statistical methods will be used to evaluate the data.

To determine if the data are normally distributed the Shapiro Wilke W Test (if sample size < 50) or D'Agostino Test (if sample > 50) will be utilized. If the data are not normally distributed, each data point will be transformed to natural logs and the log transformed data set will be tested for normality using the above tests (indicating if the data are lognormal).

Statistical outlier tests will be used to identify potential outliers for further evaluation. Following EPA guidance (EPA 1996), five steps will be used to evaluate the data sets for outliers: (1) identify extreme values that may be potential outliers, (2) apply statistical test, (3) scientifically review statistical outliers and decide on their disposition, (4) conduct data analysis with and without statistical outliers, and (5) document entire process. A measurement will not be deleted from a data set solely on the basis of a statistical outlier. A statistical outlier test such as the Dixon Extreme Value Test or the Discordance Outlier Test (EPA, 1998) will be used to identify potential outliers.

The background data may be used in two ways to evaluate if site data is statistically similar to the background data. Site data can be compared to an upper limit of the background concentrations (a threshold value), and site data sets can be statistically compared to background data sets. If the site data is compared against a threshold value, this threshold value will be set at the 95 percent upper confidence limit on the mean of the background data. This method should be used as a trigger for additional investigation of whether the constituent is a COPC and should not be used as the only criterion applied to determine if a constituent is a COPC.

The statistical method that will be used to compare site data to background data depends on the distribution of both data sets. If the site data and the background data are either both normally or lognormally distributed, then the Student t-Test will be used to determine if they are statistically similar. If the distributions are not the same, the non-parametric Mann-Whitney U-test will be used to evaluate if the data are statistically similar.

To determine that an adequate number of sample locations has been achieved for the statistical evaluation performed at the site, the number of samples required for the statistical evaluations will be calculated using the methodology presented in the *Handbook for Statistical Analysis of Environmental Background Data* (Naval Facilities Engineering Command, July 1999).

3.5 Background Investigation Report

A Draft Background Investigation Report will be prepared for submittal to the EPA, VDEQ, and BTAG. Based on the agency review comments on the evaluation of the results presented in the Draft Report, a Final Report will be prepared. The report will include the following:

- An introductory section summarizing the project objectives
- The rationale for the sampling locations
- A summary of the analytical data
- A description of the statistical methods used to evaluate the data, and
- A summary table of the upper confidence level background concentrations of all the analyzed constituents for each evaluated soil type.

Section 4

Project Management and Staffing

4.1 Project Management

Project management will include overall coordination of all work to be performed at the site. The management structure for CH2M HILL is designed so that there is one central administrative point of contact, the Activity Manager, and multiple technical project managers who will manage the technical tasks as their expertise is required. The Activity Manager will maintain close contact with the LANTDIV NTR.

The Activity Manager will oversee and coordinate each project to maintain overall project schedule and will coordinate the monthly progress report effort. The Activity Manager will maintain routine communication with the LANTDIV NTR and provide general program support, interaction with client and regulatory agencies, and documentation of decisions on technical issues that might affect future work at the Base.

The responsibilities of the technical project managers include such activities as the preparation and submittal of Navy CLEAN daily reports, daily technical support and oversight, budget and schedule review and tracking, preparation and review of invoices, personnel-resource planning and allocation, and project-specific coordination with LANTDIV, the Activity, and subcontractors.

4.2 Project-Specific Organization

The Activity Manager, Mr.John Tomik, will be the primary point of contact for the project and will provide guidance to the Project Manager. The Project Manager, Mr. Dave Schroeder of CDM Federal, will be responsible for such activities as budget and schedule review and tracking, preparation and review of invoices, personnel-resource planning and allocation, and coordination with LANTDIV, Naval Base, Norfolk, the Annex, and subcontractors. The Background Soil field investigation tasks will be performed by supporting field personnel. The project organization is depicted in Figure 4-1.

CH2M HILL and CDM Federal will notify LANTDIV and the Annex about which CDM Federal personnel will mobilize to the site before initiating field activities. CDM Federal also will notify appropriate Annex personnel to acquire site access and utility clearances. The NTR, Mr. Tim Reisch, will be advised of all site activities and schedules before site operations begin.

Figure 4-1: Project Organization

Section 5

Contractual Services

This section documents the anticipated subcontract services required for completing the tasks documented in this work plan. CH2M HILL will use existing BOAs with to procure subcontractors for this work. BOAs will be negotiated with new subcontractors as needed.

The sampling program will require subcontract services from the following

- IDW Subcontractor
- Direct Push Technology Subcontractor
- Surveyor
- Analytical Laboratory
- Data Validation

Section 6

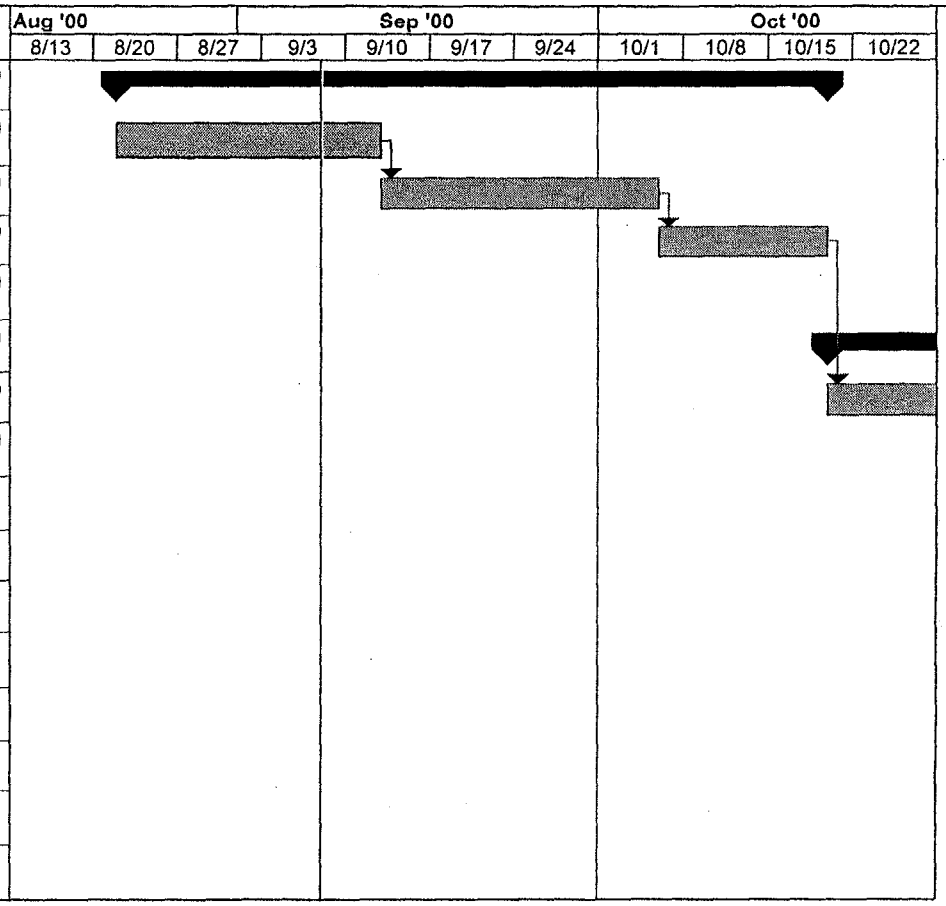
Project Schedule

This section describes the project schedule and the due dates of deliverables.

The project will be performed in accordance with the schedule and milestones presented in Figure 6-1.

Figure 6-1
Background Soils Investigation
Schedule

Task Name	Start	Finish
Work Plans	**Tue 8/22/00**	**Thu 10/19/00**
Develop Draft Work Plan	Tue 8/22/00	Tue 9/12/00
Navy, EPA, and VDEQ Review of Draft Work Plans	Wed 9/13/00	Thu 10/5/00
Prepare Final Work Plans	Fri 10/6/00	Thu 10/19/00
Submit Final FSP	Thu 10/19/00	Thu 10/19/00
Field Investigation	**Fri 10/20/00**	**Thu 12/14/00**
Procure Subcontractors/Mobilize	Fri 10/20/00	Thu 11/30/00
Conduct Field Investigation	Tue 12/5/00	Thu 12/14/00
Data Evaluation	**Thu 12/14/00**	**Sat 2/10/01**
Laboratory Analysis	Thu 12/14/00	Thu 1/11/01
Data Validation/Management	Thu 1/11/01	Sat 2/10/01
Reporting	**Fri 1/12/01**	**Tue 5/29/01**
Draft Site Assessment Report	Fri 1/12/01	Wed 2/21/01
Navy, EPA, VDEQ Review of Draft SSA Report	Thu 2/22/01	Mon 4/2/01
Final Site Assessment Report	Tue 4/3/01	Mon 4/16/01
Closeout Report	Wed 4/18/01	Tue 5/29/01

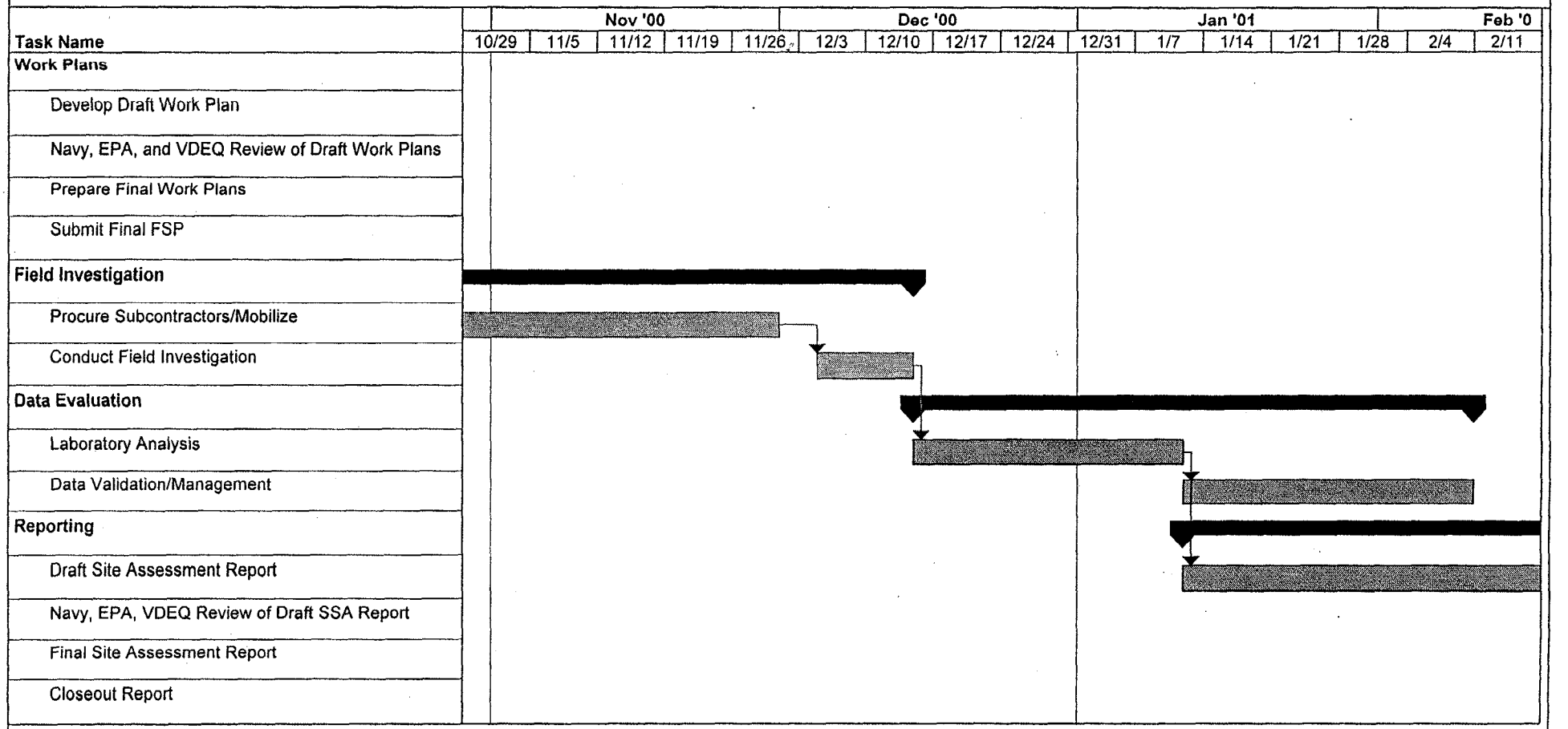


Project: CTO's 015 & 150
Background Soils Investigation

Task

Summary

Figure 6-1
Background Soils Investigation
Schedule

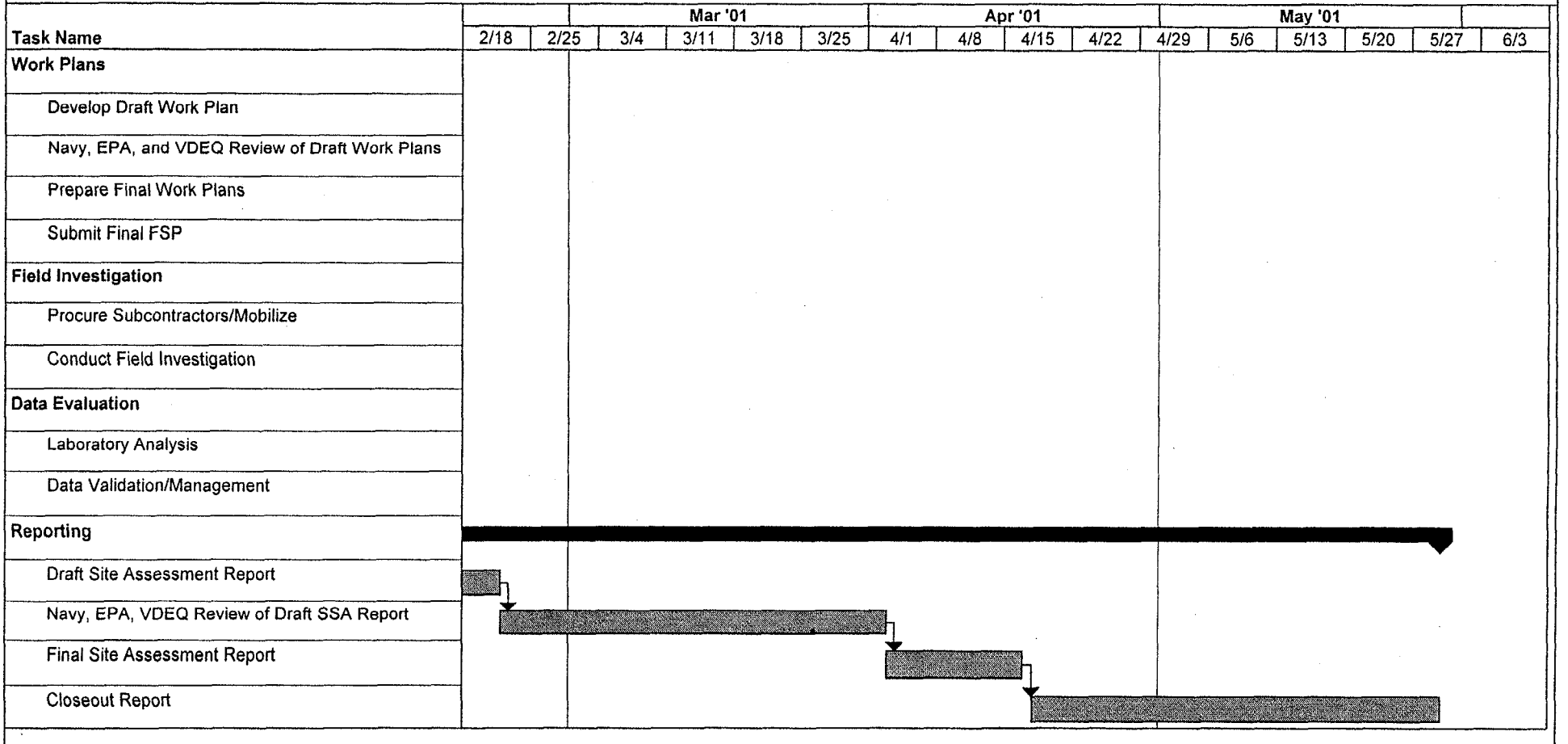


Project: CTO's 015 & 150
Background Soils Investigation

Task

Summary

Figure 6-1
Background Soils Investigation
Schedule



Project: CTO's 015 & 150
Background Soils Investigation

Task

Summary

Table 6-1: Proposed Project Milestones

ATTACHMENT A

Site-Specific Investigation-Derived Waste Plan Checklist For Background Soil Investigation – St. Juliens Creek Annex

This checklist supplements the Master IDW Plan with site-specific information. Once completed for a specific project, it provides necessary IDW information for each investigation. It is to be taken into the field with the Master IDW Plan.

Site: St. Juliens Creek Annex

1. IDW Media:
   - _____ Soil cuttings
   - _____ Well development or purge water
   - X____ Decontamination wastewater
   - X____ PPE or disposable equipment
   - _____ Other _____

2. Expected Regulatory Status:
   - _____ Hazardous
   - X____ Solid Waste
   - _____ Unknown
   - _____ Other _____

3. Site Location: This Site is the St. Juliens Creek Annex, located off of Victory Blvd in Chesapeake,VA.

4. Nature of Contaminants Expected:

_____ Petroleum contamination
_____ Herbicides
_____ Polyaromatic hydrocarbon
_____ PCBs
_____ Pesticides
_____ Metals
X_____ Other: Sampling un-impacted areas, no contamination anticipated.

5. Volume of IDW Expected: 1 (decon water), 2 <1 solvent Drums
   - 1 (PPE) _____ Cubic Yards
   - _____ Tons
   - <5 (solvent) Gallons

6. Compositing Strategy for Sample Collection: One sample from each drum.

7. IDW Storage

   X____ As per Master IDW Plan _____ Other _____

8. Waste Disposal

   X____ As per Master IDW Plan _____ Other _____

Site-Specific Field Sampling Plan Checklist For For Background Investigation – St. Juliens Creek Annex

This checklist supplements the Master Field Sampling Plan with site-specific information. Once completed for a specific project, it provides necessary field sampling information for each investigation. It is to be taken into the field with the Master FSP.

Site: St. Juliens Creek Annex

1. Tasks to be performed:

_____Geophysical surveys
_____Soil gas surveys
_____Surface water and sediment sampling
X_____Surface soil sampling
_____Soil boring installation
X_____Subsurface soil sampling
_____Monitoring well installation and development
_____Monitoring well abandonment
_____Groundwater sampling
_____In-situ groundwater sampling
_____Aquifer testing
_____Hydrogeologic measurements (water levels)
_____Biota sampling
_____Trenching
X_____Land surveying
_____Investigation derived waste sampling
X_____Decontamination
_____Other_____

2. Field measurements to be taken:

_____temperature
_____pH
_____dissolved oxygen
_____turbidity
_____specific conductance
_____organic vapor monitoring
_____geophysical parameters (list):
_____electromagnetic induction
_____ground-penetrating radar
X_____surveying
_____magnetometry
_____global positioning system
_____soil gas parameters (list):
_____combustible gases
_____water-level measurements
_____pumping rate
_____other_____

3. Sampling program (nomenclature, etc.):

X_____As per Section 3.1 of Master FSP
_____Other _____

4. Map of boring and sampling locations **(attach to checklist)**:

5. Table of field samples to be collected: See Table 1 in the Site-Specific QAPP Checklist

6. Applicable SOPs - pages in Master FSP:

Soil Sampling – page 4.1-1

Geoprobe® Soil Sample Collection – page 4.7-1

Logging of Soil Borings – page 4.5-1

Homogenization of Soil and Sediment Samples – page 9.5-1

Field Rinse Blank Preparation – page 9.3-1

Packaging and Shipping Procedures – page 9.6-1

Chain-of-Custody – page 9.7-1

Decontamination of Drilling Rigs and Equipment – page 10.1

Decontamination of Personnel and Equipment - page 10.2-1

7. Site-specific procedures or updates to protocols established in the Master FSP:_____

_____

Site-Specific Health and Safety Plan For Background Investigation – St. Juliens Creek Annex

This checklist must be used in conjunction with the Master HASP. This checklist is intended for use by CDM Federal and CH2M HILL employees only. All CDM Federal and CH2M HILL employees performing tasks under this checklist must read and sign both this checklist and the Master HASP and agree to abide by their provisions (see EMPLOYEE SIGNOFF attached to the checklist).

Site: St. Juliens Creek Annex

Location(s) See Attached Base Map (reference attached map)

This document shall be maintained on site with the Master Health and Safety Plan. It will include as attachments from the Work Plan a site map and the site characterization and objectives for this site.

The procedures described in the Master Health and Safety Plan will be followed unless otherwise specified in this Site-Specific Health and Safety Plan.

1. HAZWOPER-Regulated Tasks

_____Test pit and excavation
_____Soil boring installation
X_____Geoprobe boring
_____Geophysical surveys
_____Hand augering
X_____Subsurface soil sampling
X_____Surface soil sampling
_____Soil gas surveys
_____Sediment sampling
_____Monitoring well/drive point installation
_____Monitoring well abandonment
_____Groundwater sampling
_____Aquifer testing
_____Hydrologic measurements
_____Surface water sampling
_____Biota sampling
_____Investigation-derived waste (drum) sampling and disposal
X_____Observation of loading of material for offsite disposal
_____Oversight of remediation and construction
_____Other_____

2. Hazards of Concern: (Check as many as are applicable. Refer to Section 3 of Master H&S Plan for control measures):

X_____Heat stress
_____Cold stress
X_____Buried utilities, drums, tanks
_____Inadequate illumination
_____Drilling
X_____Heavy equipment
_____Working near water
_____Flying debris
_____Gas cylinders
_____Noise
X_____Slip, trip, or fall hazards
_____Back injury
_____Confined space entry
_____Trenches, excavations
_____Protruding objects
_____Vehicle traffic
_____Ladders, scaffolds
_____Fire
_____Working on water
_____Snakes or insects

_____Poison ivy, oak, sumac _____Radiological

_____Ticks _____Other_____

3. Contaminants of Concern (List if known. Reduce Table 3.8 of the Master HASP to site-specific contaminants, add additional chemicals if necessary, and attach to this checklist): **None Anticipated because work will be conducted in areas expected to be free of contamination.**

_____ _____ _____

_____ _____ _____

4. Personnel (List CDM Federal field team members and telephone numbers):

Field team leader(s)	Lynne France	757/873-8850
Site safety coordinator(s)	Chuck Meyers	703-968-0900
Field team members	_____	_____
	_____	_____

5. Contractors/Subcontractors

X_____Procedures as per Master HASP

_____Other_____

Name:	_____	_____	_____
Contact:	_____	_____	_____
Telephone:	_____	_____	_____

6. Level of personal protective equipment (PPE) required:_____Level D_____
Refer to Table 5.1 of Master HASP, SOPs, and Respiratory Protection, Section 2 of the Site Safety Notebook.

7. Air monitoring instruments to be used: **none required**

_____PID _____FID

_____CGI _____Dust monitor

_____O_2

8. Decontamination procedures:

X____As per Section 7 of Master HASP

_____Other _____

9. List any other deviations or variations from the Master HASP:

10. Emergency Response (Check that all names and numbers are correct on page 47 of Master HASP and attach corrected page to this checklist)

11. Map to hospital (Highlight route to hospital from site and attach to this checklist) **Attached**

12. Emergency Contacts

13. Approval. This prepared site-specific checklist must be approved Chuck Myers/CDM Federal or other authorized representative

    Name_____Title_____Date_____

14. Employee Signoff. All CDM Federal and CH2M HILL employees working at the site must sign the attached Employee Signoff for the checklist as well as for the Master HASP.

Background Soils Investigation Site

HASP Checklist Employee Signoff

The employees listed below have been given a copy of this health and safety plan checklist, have read and understood it, and agree to abide by its provisions.

EMPLOYEE NAME	EMPLOYEE SIGNATURE AND DATE

CDM Federal Programs Corporation

A subsidiary of Camp Dresser & McKee Inc.

consulting
engineering
construction
operations

13135 Lee Jackson Memorial Highway, Suite 200
Fairfax, Virginia 22033
Tel: 703 968-0900 Fax: 703 968-0915