01.04 - 10/1/01 - 00154

Final

Background Investigation Report

St. Juliens Creek Annex
Chesapeake, Virginia

Prepared for

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

Contract No. N62470-95-D-6007
CTO-0150

October 2001

Prepared by

CH2MHILL

Baker
Environmental, Inc.

CDM
Federal Programs Corp.

Changed Pages for
Final Background Investigation Report,
St. Juliens Creek Annex, Chesapeake, Virginia

Replace the following changed pages of the Draft Background Investigation Report with the enclosed Final Report pages:

Draft pages to Remove	Final pages to Insert
Cover and Spine	Cover and Spine
Title page	Title page
Table of Contents	Table of Contents
Executive Summary Pg. ES-1 and ES-2	Executive Summary Pg. ES-1, ES-2 and ES-3
Section 1 Pg. 1-1	Section 1 Pg. 1-1
Section 2 pgs. 2-1, 2-2, and 2-5	Section 2 pgs. 2-1, 2-2, and 2-5
Section 3 pgs. 3-1 through 3-8	Section 3 pgs. 3-1 through 3-8
Section 4 pgs. 4-4 and 4-5	Section 4 pgs. 4-4 through 4-7
Section 5 pgs. 5-1 and 5-2	Section 5 pgs. 5-1 and 5-2

Contents

1.0 INTRODUCTION 1-1

1.1 ST. JULIENS CREEK ANNEX DESCRIPTION AND HISTORY 1-1
1.2 PHYSICAL SETTING 1-2
1.3 REGIONAL AND SITE SPECIFIC GEOLOGY AND HYDROGEOLOGY 1-2
1.4 BACKGROUND SOIL TYPES 1-5
1.5 PREVIOUS BASE WIDE INVESTIGATIONS 1-5

2.0 SITE INVESTIGATION AND FIELD ACTIVITIES 2-1

2.1 SOIL SAMPLING RATIONALE AND SAMPLING LOCATIONS 2-1
2.2 BACKGROUND SOIL SAMPLING LOCATIONS 2-2
2.2.1 Soil Samples Munden-Tetotum Association (I) 2-3
2.2.2 Soil Samples in Dragston-Augusta Association (II) 2-3
2.2.3 Soil Samples in Bohicket Association (IV) 2-3
2.2.4 Soil Samples in Urban-Udorthents (Developed Land) (V) 2-4
2.2.5 Soil Samples in Dredge Fill Area (VI) 2-4
2.3 GROUNDWATER SAMPLING LOCATIONS 2-4
2.4 TECHNICAL APPROACH AND FIELD INVESTIGATION ACTIVITIES 2-5
2.4.1 Field Sampling Activities 2-5
2.4.1.1 Soil Sampling 2-5
2.4.1.2 Monitoring Well Installation 2-6
2.4.1.3 Groundwater Sampling 2-6

3.0 ANALYTICAL RESULTS 3-1

3.1 GROUNDWATER ANALYTICAL RESULTS 3-1
3.1.1 TAL Total and Dissolved Metals 3-1
3.1.1.1 Dissolved Metals 3-1
3.1.1.2 Total Metals 3-1
3.1.2 TCL Volatile Organic Compounds 3-2
3.1.3 TCL Semivolatile Organic compounds 3-2
3.2 SOIL ANALYTICAL RESULTS 3-3
3.2.1 Munden-Tetotum Association (I) 3-3
3.2.1.1 Metals 3-3
3.2.1.2 PAHs 3-4
3.2.1.3 Pesticides 3-4
3.2.2 Soil Samples in Dragston-Augusta Association (II) 3-4
3.2.2.1 Metals 3-4
3.2.2.2 PAHs 3-4
3.2.2.3 Pesticides 3-5
3.2.3 Soil Samples in Bohicket Association (IV) 3-5
3.2.3.1 Metals 3-5
3.2.3.2 PAHs 3-5
3.2.3.3 Pesticides 3-6
3.2.4 Urban-Udorthents (Developed Land) (V) 3-6
3.2.4.1 Metals 3-6
3.2.4.2 PAHs 3-6
3.2.4.3 Pesticides 3-7
3.2.5 Soil Samples in Dredge Fill Area (VI) 3-7
3.2.5.1 Metals 3-7
3.2.5.2 PAHs 3-7
3.2.5.3 Pesticides 3-8
3.2.6 pH and TOC 3-8

Contents (Cont'd)

4.0 STATISTICAL ANALYSIS OF BACKGROUND DATA 4-1

4.1 GROUNDWATER 4-1
4.2 SOIL 4-2
4.2.1 Statistical Screening Summary 4-2
4.2.2 Comparison of Soil Type and Soil Depth 4-3
4.2.3 Parameter Distributions & Point-Interval Estimates 4-3
4.3 USE OF BACKGROUND DATA 4-4
*4.3.1 Constituents Reported as Undected ..... 4-**Error! Bookmark not defined.***
*4.3.2 Parameters with "B" Qualified Results ..... 4-**Error! Bookmark not defined.***

5.0 SUMMARY 5-1

Appendices

APPENDIX A - LITHOLOGIC DESCRIPTIONS OF BACKGROUND SOIL SAMPLES
APPENDIX B - SOIL BORINGS AND MONITORING WELL COMPLETION LOGS
APPENDIX C - ANALYTICAL RESULTS FOR BACKGROUND GROUNDWATER AND SOILS
APPENDIX D - BOXPLOTS FOR SOILS BACKGROUND DATA

Executive Summary

This Background Investigation Report for St Juliens Creek Annex (SJCA), Chesapeake, Virginia has been prepared by CH2M HILL under the Comprehensive Long Term Environmental Action Navy (CLEAN) Contract No. N62470-95-D6007, Contract Task Order (CTO) 150. The objective of the background investigation is to establish background concentrations of metals, pesticides, and PAHs in surface and subsurface soil, and groundwater for use in comparison to Installation Restoration (IR) Program site data to better identify release-related constituents of concern. These are the parameters most commonly found to occur naturally or from anthropogenic sources.

To establish background soil and groundwater quality, sampling locations were identified in non-impacted areas that represent underlying hydrogeologic conditions, and areas indicative of anthropogenic background conditions at St Juliens Creek Annex. In order to establish background groundwater quality, samples were collected from four water table aquifer (Columbia Aquifer) monitoring wells and three Yorktown Aquifer background wells. Co-located surface and subsurface soil samples were collected from 50 locations, 10 locations in each of five soil types. The five soil types identified for sampling are: Munden-Tetotum, Dragston-Augusta, Bohicket , Urban-Udorthents, and Dredge Fill. A total of 50 surface and 50 subsurface soil samples were collected. Surface soils were collected from the surface to a depth of 6 inches. Subsurface soil samples were collected between 1 and 3 feet. Background soil samples were collected for analysis of metals, pesticides, and polynuclear aromatic hydrocarbons. Groundwater samples were analyzed for the full suite of Target Compound List organic and Target Analyte List metals (total and dissolved).

Groundwater samples were generally of high quality in comparison to applicable water quality standards, and are consistent with groundwater quality characteristics of the Columbia Aquifer in southeast Virginia as described in the general literature. Analytes detected which exceeded potentially applicable water quality standards or risk-based guidance concentrations were the metals arsenic, iron, and manganese. Two of four organic compounds (acetone and bis(2-ethylhexyl)phthalate) detected in groundwater are common laboratory contaminants and are considered artifacts of the analytical process.

One sample, MW1S, contained estimated trace levels of trichloroethene and cis-1,1dichloroethene. The source for theses potential contaminants in the sample from this well is unknown. Although analytical results from this sample were used in calculating summary statistics for groundwater (mean and upper confidence level), confirmation sampling is recommended for continued use as a background well. Additional sampling of all background monitoring wells is needed for more detailed statistical analysis of groundwater quality(i.e. determining upper tolerance limits). A re-evaluation of background groundwater quality using results from future sampling and a review of site upgradient wells for possible inclusion in characterizing background groundwater quality is warranted.

Background soil data were statistically evaluated to identify comparable data sets with respect to soil type and sample depth. Statistical comparisons among soil types and sample

depths were conducted with results from the parameters detected in one or more samples. Comparisons relied upon both explicit statistical tests and graphical displays (box plots). For many parameters, analytical results could be pooled for Munden-Tetotum soils and Dragston-Augusta soils. Bohicket, Urban-Udorthents, and Dredge Fill samples are statistically different populations and the data sets are treated separately. For each of the soil type data sets, statistical analysis also identified those parameters for which surface and subsurface soils are comparable. Central tendency (mean) and upper tolerance limits were determined for the subgroups (soil type and soil depth).

Analytical results of background soil samples showed that pesticides and polynuclear aromatic hydrocarbons are present in soils, reflective of potential anthropogenic influence on soil quality. In general, metal concentrations are lower in Munden-Tetotum and Dragston-Augusta soils than in either Bohicket, Urban-Udorthents, or Dredge Fill. Arsenic consistently exceeded residential RBCs in both surface and subsurface samples, and occasionally also exceeded the industrial RBC. Iron exceeded the residential RBC sporadically in surface and subsurface samples. Although detected in several surface and subsurface samples, only one pesticide (4,4-DDE) in one sample (SS11) exceeded the residential RBC. The highest concentration and greatest frequency of detection of the PAHs, in both surface and subsurface samples, is in Dredge Fill soils. With the exception of Dredge Fill soil samples, PAHs are detected more frequently in surface than in subsurface soils. Additionally, PAHs are more prevalent in Bohicket and Urban-Udorthents than in Munden-Tetotum or Dragston-Augusta soils. The PAHs benzo(a)pyrene, benzo(b)flouranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceeded the residential RBC in several samples.

The statistical analysis of background data will be used to better identify and assess site-related contamination. For site data collected as part of the Site Screening Process, a risk screening evaluation will be conducted through a qualitative comparison to established risk screening criteria (Federal and State criteria). For data collected as part of a Remedial Investigation, a quantitative risk assessment will be conducted. For parameters that pose a potential risk (risk screening) or are identified risk drivers through the quantitative risk assessments, background data will be used to identify release-related constituents of concern and for risk management.

For site constituents of potential concern or identified risk drivers, background data can be used by comparison of site constituent concentrations with the background UTLs. Maximum concentrations of site constituents less than background UTLs may indicate that there has not been a site release, and no further action should be considered. If maximum concentration(s) of constituent(s) of concern exceed the background UTL, then population to population comparisons, as well as site and background central tendency comparisons should be conducted. If site and background populations are not statistically different, consideration should be given to the location and distribution of the maximum concentration(s) as representative of a "hot spot", and may provide information on the overall extent or absence of contamination at a site.

Executive Summary

This Background Investigation Report for St Juliens Creek Annex (SJCA), Chesapeake, Virginia has been prepared by CH2M HILL under the Comprehensive Long Term Environmental Action Navy (CLEAN) Contract No. N62470-95-D6007, Contract Task Order (CTO) 150. The objective of the background investigation is to establish background concentrations of metals, pesticides, and PAHs in surface and subsurface soil, and groundwater for use in comparison to Installation Restoration (IR) Program site data to better identify release-related constituents of concern. These are the parameters most commonly found to occur naturally or from anthropogenic sources. Background information for surface water and sediment is addressed through upgradient/upstream reference samples on a project specific basis; surface water and sediment sampling was not conducted as part of this background study.

To establish background soil and groundwater quality, sampling locations were identified in non-impacted areas that represent underlying hydrogeologic conditions, and areas indicative of anthropogenic background conditions at St Juliens Creek Annex. In order to establish background groundwater quality, samples were collected from four water table aquifer (Columbia Aquifer) monitoring wells and three Yorktown Aquifer background wells. Co-located surface and subsurface soil samples were collected from 50 locations, 10 locations in each of five soil types. The five soil types identified for sampling are: Munden-Tetotum, Dragston-Augusta, Bohicket , Urban-Udorthents, and Dredge Fill. A total of 50 surface and 50 subsurface soil samples were collected. Surface soils were collected from the surface to a depth of 6 inches. Subsurface soil samples were collected between 1 and 3 feet. Background soil samples were collected for analysis of metals, pesticides, and polynuclear aromatic hydrocarbons. Groundwater samples were analyzed for the full suite of Target Compound List organic and Target Analyte List metals (total and dissolved).

Groundwater samples were generally of high quality in comparison to applicable water quality standards, and are consistent with groundwater quality characteristics of the Columbia Aquifer in southeast Virginia as described in the general literature. Analytes detected which exceeded potentially applicable water quality standards or risk-based guidance concentrations were the metals arsenic, iron, and manganese. Two of four organic compounds (acetone and bis(2-ethylhexyl)phthalate) detected in groundwater are common laboratory contaminants and are considered artifacts of the analytical process.One sample, MW1S, contained estimated trace levels of trichloroethene and cis-1,1dichloroethene. The source for theses potential contaminants in the sample from this well is unknown. Although analytical results from this sample were used in calculating summary statistics for groundwater (mean and upper confidence level), confirmation sampling is recommended for continued use as a background well. Additional sampling of all background monitoring wells is needed for more detailed statistical analysis of groundwater quality(i.e. determining upper tolerance limits). A re-evaluation of background groundwater quality using results from future sampling and a review of site upgradient wells for possible inclusion in characterizing background groundwater quality is warranted.

Background soil data were statistically evaluated to identify comparable data sets with respect to soil type and sample depth. Statistical comparisons among soil types and sample depths were conducted with results from the parameters detected in one or more samples. Comparisons relied upon both explicit statistical tests and graphical displays (box plots). For many parameters, analytical results could be pooled for Munden-Tetotum soils and Dragston-Augusta soils. Bohicket, Urban-Udorthents, and Dredge Fill samples are statistically different populations and the data sets are treated separately. For each of the soil type data sets, statistical analysis also identified those parameters for which surface and subsurface soils are comparable. Central tendency (mean) and upper tolerance limits were determined for the subgroups (soil type and soil depth).

Analytical results of background soil samples showed that pesticides and polynuclear aromatic hydrocarbons are present in soils, reflective of potential anthropogenic influence on soil quality. In general, metal concentrations are lower in Munden-Tetotum and Dragston-Augusta soils than in either Bohicket, Urban-Udorthents, or Dredge Fill. Arsenic consistently exceeded residential RBCs in both surface and subsurface samples, and occasionally also exceeded the industrial RBC. Iron exceeded the residential RBC sporadically in surface and subsurface samples. Although detected in several surface and subsurface samples, only one pesticide (4,4-DDE) in one sample (SS11) exceeded the residential RBC. The highest concentration and greatest frequency of detection of the PAHs, in both surface and subsurface samples, is in Dredge Fill soils. With the exception of Dredge Fill soil samples, PAHs are detected more frequently in surface than in subsurface soils. Additionally, PAHs are more prevalent in Bohicket and Urban-Udorthents than in Munden-Tetotum or Dragston-Augusta soils. The PAHs benzo(a)pyrene, benzo(b)flouranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceeded the residential RBC in several samples.

The statistical analysis of background data will be used to better identify and assess site-related contamination. For site data collected as part of the Site Screening Process, a risk screening evaluation will be conducted to identify constituents of potential concern (COPCs) through a qualitative comparison to established risk screening criteria (Federal and State criteria). After COPCs are identified through the initial screening, background concentrations are evaluated to determine if any constituents are ubiquitous to the site and not indicative of a release. Maximum concentrations of site parameters considered COPCs are compared to the background upper tolerance level (UTL). If the maximum concentration of a constituent initially identified as a COPC based on the qualitative screening is greater than the background UTL, the constituent will be considered a COPC and additional qualitative risk screening conducted. For each COPC, an apparent hazard index (AHI) or apparent cancer risk (ACR) is then calculated. Following this calculation, the individual AHIs for non-cancer risks are summed and designated the "Cumulative AHI," or "CAHI" and the individual ACRs for cancer risks are summed and designated the "Cumulative ACR," or "CACR." The CACR for cancer risk is then multiplied by 10^{-6}. If the CAHI for non-cancer risk is less than the screening criterion of 1 and the CACR for cancer risk is within the acceptable 10^{-4} to 10^{-6} risk range, no constituents of concern are identified. If the calculated CAHI or CACR exceed the applicable screening criteria, those constituents that are included in the CAHI or CACR calculation are considered PCOCs.

For remaining parameters with maximum concentration(s) greater than background UTL resulting in a CAHI or CACR in the range indicative of potential risk, then population-to-population comparisons, are conducted. Professional judgement will incorporate site history and operations, current site conditions, and conceptual site models for exposure pathways and receptors. Risk management decisions can then be made by the Navy in partnership with the EPA and DEQ as well as assess site conditions for determination of no further action, limited "hot spot" remedial measures, or whether a remedial investigation is warranted for the site.

For data collected as part of a Remedial Investigation, a quantitative risk assessment is conducted in accordance with Navy and EPA guidance. For parameters that are identified risk drivers, background data is used for risk management at the conclusion of the quantitative risk assessment process. Best estimates of background central tendency (e.g., mean in normally or log normally distributed data or median where data follow neither theoretical distribution), and UTLs, including a two-sided 95% confidence interval for the estimates, are used as part of the uncertainty analysis and incorporated into an overall summary of site risks for use in the risk management process.

1.0 Introduction

This report describes the field activities and presents findings of the background investigation of soil and groundwater at the St. Juliens Creek Annex (SJCA), Chesapeake, Virginia. The report is prepared under the Naval Facilities Engineering Command (NFEC) U.S. Naval Facilities Engineering Command, Atlantic Division (LANTDIV) Navy Contract N62470-95-D-6007 Navy Comprehensive Long-term Environmental Action Navy (CLEAN), District III, Contract Task Orders -0015 and –0150. The technical approach is based on the "Final Master Project Plan, Naval Station Norfolk, St. Juliens Creek Annex, Chesapeake, Virginia", dated July 2000. Site specific procedures were followed as outlined in "Final Field Sampling Plan, Relative Risk Ranking System, Data Collection Plan: Addendum for Background Determination, St. Juliens Creek Annex Site, Chesapeake, Virginia", dated March 1999, and "Final Work Plan and Sampling and Analysis Plan St. Juliens Creek Annex, Chesapeake, Virginia", dated January 2001. Background information for surface water and sediment is addressed through upgradient/upstream reference samples on a project specific basis; surface water and sediment sampling was not conducted as part of this background study. Objectives of the background investigation were to:

- Distinguish site-related contamination from background levels due to naturally occurring (those chemicals expected at a site in the absence of human influence) or anthropogenic (chemicals that are present in the environment due to man-made, nonsite sources) sources in order to determine the presence or absence of site contamination and effectively assess site risks.
- Provide baseline measurements of background concentrations to determine the statistical differences in soil quality between soil types in natural, non-impacted areas and urban soil areas.

This report is divided into five sections. Provided in Section 1 are the Annex's history and general information. Section 2 describes field activities conducted to accomplish project objectives; Section 3 summarizes the laboratory analytical results; Section 4 discusses statistical analysis of background data; and Section 5 summarizes background investigation conclusions. Figures and tables referenced throughout the text are provided at the end the report.

1.1 St. Juliens Creek Annex Description and History

The SCJA facility is situated at the confluence of St. Juliens Creek and the Elizabeth River in the City of Chesapeake, located in southeastern Virginia (Figure 1-1). SCJA began operations as a naval ammunitions facility in 1849. For a majority of its history, the SCJA facility has been used for the storage and transportation of ammunitions and ordinances. The current primary mission of the SCJA facility is to provide a radar testing range and various administrative and warehousing facilities for the nearby Norfolk Naval Shipyard and other local Navy activities. SCJA also provides administrative offices, light industrial shops and storage facilities for tenant naval commands.

Processes and operations at the SCJA facility have included general ordnance operations involving wartime transfer of ammunitions to various other U.S. Naval facilities throughout

the United States and abroad. In addition, the Annex has been involved in specific ordnance operations and processes including those involving black powder operations, smokeless powder operations, projectile loading operations, mine loading, tracer mixing, testing operations, and decontamination operations.

The SCJA facility has also been involved in non-ordnance operations, including degreasing operations, paint shops, machine shops, vehicle and locomotive maintenance shops, pest control shops, battery shops, print shops, electrical shops, boiler plant operations, washrack operations, potable and salt water fire protection systems, and fire training operations. Many of these operations have been discontinued, including locomotive maintenance, printing, and pest control.

Materials stored at the SCJA facility have included oil, ordnance materials, non-ordnance chemicals, and disaster preparedness chemicals. Various parts of the facility are used to store small amounts of waste before transfer to accumulation points.

1.2 Physical Setting

The SCJA facility is situated at the confluence of St. Juliens Creek and the Southern Branch Elizabeth River in the city of Chesapeake, located in southeastern Virginia. The facility covers approximately 490 acres and includes 221 buildings, 653 feet of wharf, a central heating plant, numerous non-operational industrial facilities, and miscellaneous structures including a housing area (Figure 1-2). A Virginia Power Company power line runs diagonally across the facility in a northwest-southeast trending direction, splitting the area roughly in half.

The facility is bordered to the north by the Norfolk and Western Railroad, the City of Portsmouth, and residential areas, to the west by residential areas, to the south by St. Juliens Creek, and to the east by the Southern Branch Elizabeth River. According to the 1982 U. S. Geological Survey (USGS) Norfolk South Quadrangle topographic map, a large industrial waste pond was located adjacent to the property boundary in the northeast portion of the Annex . Most of the surrounding areas are developed, and include residences, schools, recreational areas, and shipping facilities for several large industries. The Norfolk Naval Shipyard is located approximately three miles north. Some undeveloped land is located in various areas surrounding the facility.

1.3 Regional and Site Specific Geology and Hydrogeology

The geology and hydrogeology of Southeastern Virginia has been discussed by several authors: Cederstrom (1957), Oaks and Coch (1973), Siudyla et al. (1981), Hamilton and Larson (1988), Meng and Harsh (1988), and Harsh and Laczniak (1990) and are the primary references for this report.

The SCJA facility is a low-lying wedge of land between the Southern Branch of the Elizabeth River and St. Juliens Creek. Elevations range from sea level along the banks of the two bordering waterways, and along Blows Creek located in the northern part of the facility, to 15 feet above mean sea level (msl) northeast of Blows Creek. A northwest-southeast

trending ridge generally bisects the area, dividing the St. Juliens Creek drainage basin to the southwest and the Blows Creek drainage basin to the northeast.

The SCJA facility is located in the outer Atlantic Coastal Plain Physiographic Province. A wedge of marine and non-marine sediments deposited during Late Cretaceous, Tertiary, and Quaternary time dips and thickens to the east and extends approximately 20 miles east to the Atlantic Ocean. Historical Coastal Plain sedimentation and deposition were controlled by fluctuations in sea level on a subsiding continental margin. These sediments overlie pre-Cretaceous crystalline basement rock. The Annex is underlain by over 2,000 feet of gently dipping Recent to Lower Cretaceous sandy sediments.

Based on the generalized regional column presented by Meng and Harsh, 1988, geologic units present beneath the Annex include, from youngest to oldest:

- Holocene (Recent) deposits
- Undifferentiated Pleistocene deposits of the Columbia Group (Sand Bridge and Norfolk Formations),
- The Miocene to Pliocene Chesapeake Group of formations (including Yorktown Formation),
- The Paleocene to Eocene Pamunkey Group of formations (Nanjemoy Formation),
- Late Cretaceous undifferentiated sediments
- Early to Late Cretaceous Potomac Formation

Corresponding to the regional geologic formations and groups listed above are 17 hydro-stratigraphic units: 9 aquifers separated by 8 aquitards or confining units. Of these regional hydrostratigraphic units, the youngest three are most relevant to the activities at SJCA, because only these three are likely to be affected by facility operations. The hydrostratigraphic units are, from youngest to oldest:

- Holocene to Pleistocene Columbia Aquifer
- Late Pliocene Yorktown Confining Unit
- Late Miocene to Pliocene Yorktown-Eastover Aquifer
- Miocene St. Marys Confining Unit and St. Marys-Choptank Aquifer
- Miocene Calvert Confining Unit and Chickahominy-Piney Point Aquifer
- Late Paleocene to Early Eocene Nanjemoy-Marlboro Clay Confining Unit and Aquia Aquifer
- Early Paleocene Brightseat Confining Unit and Brightseat Aquifer (not present in Portsmouth/Chesapeake region)
- Late to Early Cretaceous Upper, Middle, and Lower Potomac Confining Unit and Upper, Middle, and Lower Potomac Aquifers

The Columbia Group is approximately 60 feet thick in southeastern Virginia. The unconfined water-table aquifer at the Annex is the uppermost portion of the Columbia Aquifer. The Columbia Aquifer is comprised of most of the surface geologic units, including the Sand Bridge and Norfolk Formations. The upper 20 to 40 feet make up the unconfined Columbia Aquifer, which is comprised of beds and lenses of sand and some gravel, shell, silt, sandy clay, and clay. The Sand Bridge Formation is made up of tidal channel clayey sand facies and a shoal lagoonal silty sand facies. The tidal channel facies is made up of clayey sand, silt, and clay to well sorted fine to medium sand. The Norfolk

Formation, which underlies the Sandbridge Formation, is made up of an upper member of brackish marine silty sand and fluvial-estuarine silty sand, and a lower member of clean quartz sand and fine gravel. The sand and shell beds, and sand and shell lenses, the major water-bearing strata, are heterogeneous and discontinuous due to complex marine-estuarine environments in which they were deposited.

The Columbia Aquifer is recharged primarily by infiltration of precipitation and minimally by stream infiltration. Because the potentiometric surface of the Columbia Aquifer roughly reflects the topography, groundwater flow in the upland areas is generally from areas of higher elevation to areas of lower elevation. The low hydraulic conductivity of the Yorktown confining unit below the Columbia Aquifer results in minimal seepage through the confining unit into the Yorktown Aquifer from above. However, there is the potential for downward seepage where the confining unit between the Columbia Aquifer thins or is discontinuous.

The depth of shallow groundwater at the Annex is usually 5 feet or less below ground surface, and is shallower near the surface water bodies. The shallow groundwater flows from elevated areas and discharges into the various surrounding surface water bodies such as drainage ditches, Blows Creek, St Juleins Creek, and the Southern Branch of the Elizabeth River.

The clayey sand facies of the Sand Bridge Formation occurs on the eastern portion of the Annex facility, and the silty sand facies occurs on the western portion of the facility. The alluvial sand and marsh sediments occur along both Blows Creek and St. Juliens Creek. Boring logs from 1946 to 1978 indicated mostly sandy soils; silty and clayey soils were observed in the remainder of the logs. The Norfolk and Yorktown Formations underlie the surficial deposits on the Annex.

Blows Creek and St. Juliens Creek receive the majority of surface water runoff from the Annex. Both creeks flow east to empty into the Southern Branch of the Elizabeth River. The remaining runoff from the Annex flows directly into the Southern Branch of the Elizabeth River, or is diverted into storm drains that empty either into the Southern Branch Elizabeth River or St. Juliens Creek. The Southern Branch of the Elizabeth River flows through a highly industrialized area which includes oil storage and cresol facilities, and fertilizer plants. The river, which is part of the Intracoastal Waterway, is used by many recreational boaters during the summer and by larger commercial and naval craft throughout the year. The Southern Branch of the Elizabeth River flows north to discharge into the James River, which flows into the Chesapeake Bay. The entire downstream portion of surface water is tidally influenced.

The SCJA facility was initially placed within the boundaries of the 100-year flood plain. However, a 1984 Environmental Assessment Addendum indicated that according to the 1983 National Flood Insurance Program flood maps, the 100-year flood level for the originally proposed SCJA facility is 8.5 feet above msl. Elevations for the majority of the Annex property are above 8.5 feet msl and therefore does not lie within the 100-year flood plain. Areas within the 100-year flood plain include those adjacent to St. Juliens Creek, Blows Creek, and the southern border of the Elizabeth River.

1.4 Background Soil Types

Six general categories of soil types were identified based on a review of the Soil Conservation Service (SCS) *Soil Survey Report for Norfolk Naval Shipyard and St. Juliens Creek Annex, Portsmouth, Virginia, (1983)* and aerial photographs which identified dredged fill areas and past land use. The six general categories of soil types identified are: 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 is shown in Figure 1-3. The Installation Restoration Program (IRP) sites and Areas of Concern (AOCs) are shown in Figure 1-2. There are no CERCLA IRP or AOCs within the Nimmo soils. The dredge fill area, located in the northeast corner of SCJA, was identified from EPA Photographic Interpretation Center (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.

1.5 Previous Base Wide Investigations

Previous base wide investigations completed through the IRP include the Initial Assessment Study (IAS), dated August 1981 and a Relative Risk Ranking (RRR) System Data Collection Report, dated April 1996. In addition, USEPA Region III conducted two assessments at the Annex: a Preliminary Assessment (PA), dated 1983, and a Phase II RCRA Facility Assessment (RFA), dated March 1989.

In 1981, the U.S. Navy conducted the IAS as part of the Naval Assessment and Control of Installation Pollutants (NACIP) Program. The purpose of the IAS was to identify and assess sites that posed a potential threat to human health or the environment because of contamination from past handling of and operations involving hazardous materials. Results of this study revealed that low level concentrations of ordnance materials were determined to exist throughout the facility. However, the sites identified were determined not to pose a threat to human health and the environment, and no confirmation study was conducted. No sampling was conducted as part of the study.

In 1983, NUS Corporation, Superfund Division (NUS), conducted a PA at seven sites at the facility. These sites included: Cross and Mine (Solid Waste Management Unit [SWMU] #9); Building 249 (SWMU #13); Dump A (SWMU #1); Dump B (SWMU #2); Dump B Incinerator (SWMU #3); Dump C (SWMU #5); and Dump D (SWMU #6). Each site was monitored for volatile organic compounds (VOCs) and radiation with an organic vapor meter and radiation meter, respectively. No sampling was conducted as part of the PA. NUS did not observe significant signs of contamination at the sites evaluated. However, the PA report mentioned that various locations on the facility were contaminated with low level residues of pesticide and herbicide materials. In 1989, A.T. Kearney, Inc. and K.W. Brown & Associates, Inc. prepared a Phase II RFA. The RFA included a preliminary review of all available relevant documents and a visual site inspection (VSI), including 34 SWMUs and Areas of Concern (AOCs). Eleven of the SWMUs and AOCs were recommended for RCRA Facility Investigation (RFIs). No sampling was conducted during the RFA.

In April 1996, CH2M Hill submitted to the Department of the Navy an RRR System Data Collection Report for SCJA. The report contained results from sampling conducted at 21 sites at the Annex where no sampling data had previously been available. The goal of the sampling effort was to gather data for the Navy to perform assessments of the sites using the Navy's RRR System.

Twelve potential AOCs were identified for investigation during the joint EPA, VDEQ, and Navy review of historical aerial photography (EPIC Study) of the facility in June 1999. In November 1999, a work-in –progress/site visit with representatives of the Navy, CDM Federal, VDEQ, and the EPA-BTAG was conducted to evaluate the twelve "EPIC AOC" locations, and review current and past conditions (based on EPIC photographs) to determine if sampling was warranted at any of these EPIC AOCs. In addition, the group reviewed site conditions and historical photography of the IRP sites to be included in the Site Screening Assessment (SSA), and those sites planned for Site Investigations. The Navy, EPA, and VDEQ conducted an additional site visit on February 2, 2000 to confirm this determination. Descriptive information on these EPIC AOC sites can be found in the Site Management Plan.

2.0 Site Investigation and Field Activities

This section discusses the technical approach and investigation efforts that were conducted to establish background soil and groundwater quality at SJCA, and presents the rationale for selection of sample locations.

2.1 Soil Sampling Rationale and Sampling Locations

The information collected for this background investigation will be used to supplement information collected in remedial investigations (RI) and risk assessments (RA) and aid in determining 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 not influenced by human activity) in site media. It is also essential to distinguish between site-related contamination and potential anthropogenic compounds present in the environment as a result of human activities, but not related to site sources. Background soil samples, collected and analyzed in the same manner as other site samples, provide baseline measurements for comparison to site data to better distinguish site releases and the degree of environmental risk present at a site.

The specific goal of the sampling effort at SJCA was to establish background concentrations of metals, pesticides, and polynuclear aromatic hydrocarbons (PAHs) in surface and subsurface soil and also background concentrations of total organic carbons (TOC) and pH levels in surface soils. Background soil samples were collected for analysis of metals, pesticides, and PAHs. These compounds are generally considered naturally occurring or potentially anthropogenic constituents. Other compounds such as volatile organic compounds (VOCs) are not considered anthropogenic, therefore not included in the background soil sample analyses. If detected in site samples, these compounds could be considered site-related. Petroleum compounds detected in site samples will be addressed under Navy petroleum programs. Groundwater samples were analyzed for the full suite of Target Compound List (TCL) organics and Target Analyte List (TAL) metals (total and dissolved).

The background analyses are statistically evaluated in Section 4 to determine the range in concentrations of naturally occurring and anthropogenic constituents. This data will be used to statistically compare levels of background constituents to those of site contaminants in the various sites within the SCJA facilities. When background analyses indicate that site-specific and naturally occurring background chemical concentrations are not statistically different from site sample results, it is concluded that their presence in site media is not representative of a contaminant release from the site and should therefore not be considered a potential constituent of concern. The data presented in this report will be used to supplement data collected during previous investigations and used in future risk management evaluations at SCJA.

An initial site reconnaissance was conducted in December 2000 to ensure selected areas for background soil sampling are not impacted by site activities or in close proximity to potential source areas. Historical aerial photographs were also reviewed to ensure the background sample locations were not impacted by historical activities. Samples were not 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 non-urban soil areas, and Urban - Udorthent soil areas.

As discussed in Section 1.4 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 (Figure 1-3). With Partnering Team consensus, no background soil samples were collected from the Nimmo Association because there are currently no CERCLA IRP sites or AOCs located within this soil type. Site 16 (DRMO Storage Yard) is located within that association however the DRMO facility is not part of the CERCLA IR program. Additionally, there are few undisturbed areas in the Nimmo soils from which appropriate background locations could be identified. Therefore, background soils samples were collected from the remaining four associations and the dredge fill material.

As presented in the approved Background Investigation Work Plan, ten locations within each soil type were sampled. At each location both surface and subsurface soil was collected, except as noted in specific cases. Within each soil type the background soil sampling locations have been distributed across the area for the greatest coverage to collect the most 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.

2.2 Background Soil Sampling Locations

To characterize the background soils indicative of the natural and anthropogenic conditions, background samples were collected from the following soil types:

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

The locations of all the background soil samples are shown in Figure 2-1. Co-located surface soil samples (0 to 6 inches) and subsurface soil samples (1 to 3 feet) were collected at each background location. These sample depths as discussed in the approved Work Plan provide

representative background concentrations and are applicable for risk management decisions.

2.2.1 Soil Samples Munden-Tetotum Association (I)

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 1-3, 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 facility along Craddock Street, as well as along the northwest boundary of SJCA. No background soil sample locations were selected from areas along Craddock Street, due to the presence of IRP sites in these areas (Site 2 and the Burning Grounds).

Four samples were collected from the area along the northwest boundary of SJCA, three were collected from the wooded area at the western end of St. Juliens Creek Road, and one was collected from the wooded area north of Building 169 approximately 200 feet west of Craddock Street. A review of aerial photographs indicates that there has 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 facility 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.

2.2.2 Soil Samples in Dragston-Augusta Association (II)

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 1-3, this soil association is found 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 were collected from the northern occurrence of the Dragston-Augusta soils. The locations were selected in the northern and eastern edges of the area, away from 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 sampling locations are at least 500 feet from the fenced boundary of non-CERCLA Site 16.

2.2.3 Soil Samples in Bohicket Association (IV)

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 1-3, 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 were collected from this southern occurrence of the Bohicket Association. The sampling locations are along Blows Creek, predominantly on the south side of the creek.

2.2.4 Soil Samples in Urban-Udorthents (Developed Land) (V)

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 1-3, this soil association is found in the southeastern portion of the site. Generally this area has been developed since before 1939. The ten locations sampled 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 the sites.

2.2.5 Soil Samples in Dredge Fill Area (VI)

The Dredge Fill Area, identified from the 1939 and 1949 aerial photographs as interpreted by EPIC, is in the northeast of the facility (Figure 1-3). 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 feet 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. Four of the ten locations were sampled in April 1999 as upgradient/background surface soils (SJSS04-SS19-000, SJSS04-SS20-000, SJSS04-SS21-000, and SJSS04-SS22-000) as part of the ongoing RI activities associated with Landfill C and Landfill D. These sample locations were re-located during the February 2001 sampling event and a subsurface sample was collected from each location. For consistency in the background investigation, these 1999 surface samples were re-identified as SBK -SS47, -SS48, -SS49, and -SS50. Co-located subsurface samples locations are identified as SBK -SB47, -SB48, -SB49, and -SB50.

2.3 Groundwater Sampling Locations

Based on preliminary water level data collected during previous investigations, both shallow and deep groundwater generally flows toward the Elizabeth River. Local variations in groundwater flow results from topographic and surface water influences. Along the shoreline of St. Juliens Creek: shallow and deep groundwater discharge to St. Juliens Creek. In the northeast region of the Annex, shallow groundwater flow appears to have a westward component perhaps due to local mounding or tidal influence of the Southern Branch of the Elizabeth River.

Three new monitoring well pairs (one shallow in the Columbia aquifer and one deep in the Yorktown aquifer) and one shallow monitoring well were installed in the northwest region of the Annex. All shallow and deep groundwater monitoring wells were located hydraulically upgradient of the 21 sites addressed by the RRR System, in locations that are not expected to be influenced by site activities. The shallow and deep monitoring wells were paired to provide a vertical profile of groundwater quality and to define vertical gradients. The wells were installed at depths ranging from 13 to 14 feet below ground surface (bgs) for shallow wells and 35 to 53 feet bgs for deep wells.

One round of samples was collected from all newly installed background monitoring wells. Additionally, the existing upgradient monitoring well pair at Site 2 (MW1S/1D) was also sampled.

2.4 Technical Approach and Field Investigation Activities

2.4.1 Field Sampling Activities

The background sampling protocols and procedures are discussed in detail in the Master Project Plan, the Field Sampling Plan Addendum for Background Determination, and Background Soil Work Plan. Sampling protocols and procedures are summarized below.

2.4.1.1 Soil Sampling

The background soil investigation involved the collection of 50 co-located surface and sub-surface soil samples. Surface and subsurface soil sampling locations are presented on Figure 2-1. All of these samples were collected during the February 2001 sampling event except for the four surface samples collected in the Dredge Fill as discussed in Section 2.2.5.

Surface soils were collected from the surface to a depth of 6 inches bgs. Subsurface soils were collected between 1 and 3 feet bgs. Samples were collected using a direct push technology (DPT) truck mounted rig (Geoprobe®) with the exception of SBK-SS/SB02, SBK-SS/SB03 and all the Bohicket Association soil type samples (SBK-SS/SB21 through 30) due to obstructed access for the rig and/or swampy soil conditions. These samples were collected with a stainless steel hand auger. All samples were homogenized in a stainless steel bowl prior to placement in laboratory-prepared sample bottles. Samples were packed on ice for shipment to STL-Pittsburgh Laboratory, Inc. All soil samples collected were analyzed for Target Compound List (TCL) pesticides, PAHs, and Target Analyte List (TAL) metals and cyanide. Surface soil samples were also analyzed for TOC and pH. Analysis of TCL pesticides and TAL metals were performed according to Contract Laboratory Program (CLP) methods (CLP OLM04 and CLP ILM04, respectively). Analysis of PAHs were performed according to EPA SW-846 Method 8270M (modified to achieve low detection limits through the use of Selective Ion Monitoring SIM)); TOC by Walhley-Black method; and pH by EPA method 9054. Analytical results are discussed in Section 3.

Additional volume of all samples were collected for lithologic descriptions which were recorded in soil boring log (Appendix A). Soils were classified according to the Unified Soil Classification System (USCS). Descriptions included color, grain size, hardness, density, USCS group symbol, moisture content, and any other observations.

The location of the four April 1999 surface soil samples associated with the RI for Site 3 were identified using a Magellan GPS ColorTRAK® for collection of subsurface soil at those same locations. After the completion of sampling activities, sample locations were surveyed using a PRO XRS GPS® unit.

2.4.1.2 Monitoring Well Installation

Three shallow and deep monitoring well clusters (BK-MW1S/D, BK-MW2S/D, and BK-MW3S/D) and one shallow monitoring well (BK-MW4S) were installed along the western and northern parameters of the SJCA facilities in April 1999 (Figure 2-1). The shallow monitoring wells were screened within the uppermost Columbia Aquifer and the deep monitoring wells were screened within the upper Yorktown Aquifer. Continuous split spoon samples were collected from the well borings for lithologic characterization. Well construction and lithologic logs for the background monitoring wells are provided in Appendix B.

Shallow wells were installed using 6-inch ID hollow-stem augers. Wells BK-MW1S, -MW2S, and –MW3S are screened from 3 to 13 feet bgs, and SBK-MW4S is screened from 4 to 14 feet bgs. The wells are constructed with 2-inch schedule 40 PVC and 0.010-inch slotted screens. The annular space surrounding the well was packed with DSI #1 sand from 1.5 to 2 feet above the screen, and sealed with hydrated bentonite chips.

A 6-inch schedule 40 PVC isolation casing was installed from the surface to the confining clay layer (between 17 and 18.5 feet bgs) in each deep monitoring well. Isolation casings were installed using 10-inch ID hollow-stem augers. The isolation casings were given a minimum of 24 hours for the grout to cure before completing the well to depth using water rotary. A 6-inch nominal rotary bit was used. Wells BK-MW1D, -MW2D, and –MW3D were screened from 44 to 53 feet bgs, 45 to 55 feet bgs, and 35 to 45 feet bgs, respectively, with 2-inch schedule 40 PVC and 0.010-inch slotted screens. The wells casings were constructed of 2-inch PVC pipe, and the well was completed with a stick-up protective casing and 4 ft x 4 ft x 4 in concrete pad. The well was developed thoroughly before sampling and surveyed for ground casing elevation. Monitoring well construction details are summarized on Table 2-1. Well construction logs are provided in Appendix B.

2.4.1.3 Groundwater Sampling

The seven background monitoring wells were sampled May 1999. Monitoring wells were purged and sampled using a Grundfos® Redi-Flo2 submersible pump. The volume of water held in each monitoring well was calculated using information from the well completion logs and static water levels. The pump was used to purge at least three well volumes and continued until groundwater parameters had stabilized to within 10 percent for at least three consecutive readings. Water quality parameters of pH, conductivity, turbidity, temperature, and salinity were measured using a Horiba U-10 water quality meter and oxidation/reduction potential (ORP) was measured using an Orion QuickCHECK® ORP meter. Following purging, groundwater samples were collected directly from disposable tubing into laboratory-prepared sample bottles and immediately packed on ice for overnight shipment to the laboratory. Samples were collected for analysis of TCL VOCs (low concentration), TCL SVOCs, TAL metals (filtered and unfiltered), and cyanide.

Analysis of organic and inorganic samples were performed according to CLP methods (CLP OLC02, CLP OLM04 , and CLP ILM04. Analytical results are discussed in Section 3.

3.0 Analytical Results

Complete analytical results for groundwater and soil samples are provided in Appendix C. A summary table of constituents detected in groundwater is provided in Table 3-1, constituents detected in surface soil is provided in Table 3-2, and constituents detected in subsurface soil is provided in Table 3-3. Constituents exceeding screening criteria are highlighted in the tables.

3.1 Groundwater Analytical Results

3.1.1 Total and Dissolved Metals

3.1.1.1 Dissolved Metals

Fifteen of the 23 dissolved metals quantified were detected in one or more filtered samples. These analytes included, aluminum, arsenic, barium, beryllium, calcium, chromium, cobalt, iron, lead, magnesium, manganese, nickel, potassium, sodium, and zinc. Following data validation using EPA Contract Laboratory Program protocols, copper was reported qualified with a "B" in all detected samples due to blank contamination and treated as a non-detect. With the exception of chromium, all of these dissolved metals were detected in samples from the shallow monitoring wells.

Eleven dissolved metals were detected in one or more deep monitoring well samples. These analytes include aluminum, barium, calcium, chromium, iron, magnesium, manganese, nickel, potassium, sodium, and zinc. Arsenic, beryllium, cobalt, and lead were not detected in samples from the deep monitoring wells. Dissolved chromium was detected in one deep well sample, SJSBK-MW1D-001 (2.1 J ug/L).

No dissolved metal sample results from the water table aquifer exceeded primary maximum contaminant level (MCL) criteria. Tap water risk based concentrations (RBC) values for shallow groundwater samples were exceeded for arsenic, iron, and manganese in one or more samples. Arsenic was detected in two samples and exceeded the tap water RBC in both. Average arsenic concentration was calculated to be 2.1 ug/L. Average detected iron concentration in shallow groundwater was 7,514 ug/L, below the tap water RBC of 11,000 ug/L. Tap water RBC for manganese (730 ug/L) was exceeded in one shallow groundwater sample MW1S (1,040 ug/L). The average detected concentration for manganese was 442 ug/L. Virginia Groundwater Standards (VGWS) were exceeded in one or more shallow groundwater samples for iron, manganese, and zinc.

No dissolved metal sample results from the Yorktown aquifer exceeded the primary MCL or tap water RBC. The VGWS was exceeded for dissolved manganese and iron in all deep groundwater samples.

3.1.1.2 Total Metals

Fifteen of the 23 total metals and cyanide quantified were detected in one or more unfiltered samples. These analytes included, aluminum, arsenic, barium, beryllium, calcium, cobalt,

iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc. All of these total metals were detected in samples from the shallow monitoring wells. Eleven analytes were detected in one or more deep monitoring well samples. These analytes included, aluminum, barium, calcium, iron, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc. Alumium, arsenic, cobalt, and lead were not detected in samples from the deep monitoring wells. Total copper was reported qualified with a "B" in all detected samples due to blank contamination and is considered a false positive detection; these results are treated as non-detects.

No total metal sample results for the water table (Columbia) aquifer exceeded primary MCL criteria. Arsenic was detected in one shallow groundwater sample (MW4S at 2J ug/L), exceeding the tap water RBC (0.045 ug/L). Iron exceeded the tap water RBC (11,000 ug/L) and the VGWS (300 ug/L) in one or more shallow groundwater samples. Average iron concentration for shallow groundwater from background monitoring wells is 6,927 ug/L. Manganese exceeded the tap water RBC in one shallow groundwater sample (MW1S ; 912 ug/L) and the VGWS (50 ug/L) in all shallow groundwater samples, with an average concentration of 416 ug/L. Zinc exceeded the VGWS (50 ug/L) in one sample (MW1S ; 89.7 ug/L). Exceedance of VGWS for these parameters are typical for the water table aquifer of southeastern Virginia.

No total metal sample results from the Yorktown aquifer exceeded the primary MCL or tap water RBC. The VGWS was exceeded for manganese and iron all deep groundwater samples.

Comparison of total and dissolved metal results shows that for a few metals the reported dissolved concentration is slightly greater (less than 10 %) than the reported total concentration. This apparent discrepancy is not uncommon and reflects a degree of uncertainty in the sample preparation (digestion), analytical process, or associated sampling process (exposure to air, filtration procedure, or natural sample variability). These data are useable and validated using EPA CLP protocols.

3.1.2 Volatile Organic Compounds

Cis-1,2-dichloroethene and trichloroethene were detected in one shallow groundwater sample, MW1S, at estimated concentrations of 0.2 J ug/L and 0.8 J ug/L, respectively. Acetone was detected in one shallow groundwater sample (MW4S) at a concentration of 30.5 ug/L. These results do not exceed the MCL or tap water RBC. The possible source for detection of cis-1,2-dichloroethene and trichloroethene is unknown.

All reported results for carbon disulfide, chloroform, and methylene chloride in both shallow and deep groundwater samples were qualified "B" due to blank contamination and are treated as non-detects. Although acetone was not qualified "B", acetone is also a common laboratory contaminant. All reported concentrations were near or below their quantitation limits.

3.1.3 Semivolatile Organic compounds

The only SVOC detected in any groundwater sample was bis(2-ethylhexyl) phthalate detected in MW3D at an estimated concentration of 1 J ug/L. This does not exceed any

applicable water quality standard. Bis(2-ethylhexyl) phthalate is also a common laboratory contaminant and is considered an artifact of sampling and analysis.

3.2 Soil Analytical Results

Twenty one of the 23 metals quantified were detected in one or more soil samples. These metals are: aluminum, antimony, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, vanadium, and zinc. Cadmium and thallium and cyanide were not detected in soils.

Only the four background surface soil samples collected in 1999 were analyzed for VOCs. Acetone was the only VOC detected, and was reported in these four surface soil samples (SS47, SS48, SS49, and SS50) at concentrations ranging from 17 ug/Kg to 74 ug/Kg. Because acetone is a common laboratory contaminant, these reported detects may be an artifact of the analytical process.

Only the four background surface soil samples collected in 1999 were analyzed for the full suite of SVOCs. In addition to PAHs, the only SVOC detected in these 1999 samples was bis(2-ethylhexyl)phthalate, which is a common laboratory contaminant. The background soil samples collected in February 2001 were analyzed for PAHs. All 16 of the PAHs quantified were detected in one or more background soil samples; these are: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, benzo(g,h,i)perylene, benzo(k)flouranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, flourene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene.

Twelve of the 21 pesticides quantified were reported in one or more background soil samples at detectable levels. The pesticides include: 4,4 DDE, 4,4 DDT, 4,4 DDD, aldrin, dieldrin, endosulfan I, endosulfan II, endrin, endrin aldehyde, alpha chlordane, delta-BHC, and gamma chlordane. PCBs analyses were only conducted on the four 1999 surface soil samples. Aroclor-1254 was reported in these four samples at estimated concentrations ranging from 9J ug/Kg to 14J ug/Kg. No other PCBs were detected.

All validated results qualified "B" due to blank contamination are considered false positive results and are treated as non-detects.

3.2.1 Munden-Tetotum Association (I)

3.2.1.1 Metals

Of the 21 metals detected in background soils, 19 were detected in Munden-Tetotum surface soils, and 17 in subsurface soils. Antimony and silver were not detected in either surface or subsurface samples, and beryllium and selenium were also not found in subsurface soil. The metals detected with a frequency greater than 75 percent from the 10 Munden-Tetotum soil sample locations include aluminum, arsenic, barium, calcium, chromium, copper, iron, lead, magnesium, manganese, vanadium, and zinc.

Sample results were compared to EPA Region III residential and industrial RBCs. Arsenic exceeded the residential RBC (0.43 mg/Kg) in eight of the surface soil samples (1.6 to 9.4 mg/Kg) and in eight of the subsurface soil samples (1.1 to 6.9 mg/Kg). The industrial RBC

for arsenic was also exceeded in two (SS04 and SS06) of these surface samples and in three (SB01, SB04, and SB10) of these subsurface samples. All other metals were reported at concentrations less than the residential RBC.

3.2.1.2 PAHs

Thirteen of the PAHs were detected in one or more surface soil samples from the Munden-Tetotum soils. The frequency of detection ranged from 0.05 to 0.33, with most PAHs detected in less than 25 percent of the samples. Chrysene and fluoranthene were the compounds most frequently detected. The residential RBC was exceeded in one sample (SS01) for benzo(a)pyrene with a reported concentration of 150 mg/Kg. Acenaphthene, fluorene, and naphthalene, were not detected in surface soils.

No PAHs were detected in subsurface soil samples from the Munden-Tetotum soils.

3.2.1.3 Pesticides

Nine pesticides were detected in these surface soils; these are: 4,4 DDE, 4,4 DDT, 4,4 DDD, dieldrin, endosulfan II, endrin, endrin aldehyde, alpha chlordane, and gamma chlordane. The pesticides 4,4 DDE and 4,4 DDT were detected in 67 percent and 57 percent of these samples, respectively. None of the pesticides detected in Munden-Tetotum surface soils exceeded the residential RBC.

With the exception of 4,4 DDD the same pesticides were detected in Munden-Tetotum subsurface soils. The most frequently detected (5 of 10 samples) pesticide was 4,4 DDE, with the remaining pesticides being detected in only one or two samples. Eight of the pesticides were detected in sample SB10.

3.2.2 Soil Samples in Dragston-Augusta Association (II)

3.2.2.1 Metals

Of the 21 metals detected in background soils, 19 were detected in Dragston-Augusta surface soils, and 17 in subsurface soils. Beryllium and silver were not detected in either surface or subsurface samples, and antimony and selenium were also not found in subsurface soil. The metals detected with a frequency greater than 75 percent include aluminum, arsenic, barium, calcium, chromium, copper, iron, lead, magnesium, manganese, vanadium, and zinc from the ten Dragston-Augusta soil sample locations. Aluminum, barium, iron, lead, magnesium, manganese, vanadium, and zinc were detected in 96 percent to 100 percent of the samples.

Arsenic was the only metal detected in samples above RBCs. Seven out of ten surface samples, ranging from 2 mg/Kg to 4 mg/Kg, exceeded residential RBC, and two also exceeded the industrial RBC (SS15 at 4 mg/Kg and SS16 at 3.9 mg/Kg). In the subsurface samples arsenic was detected in eight samples ranging from 1.1 mg/Kg to 4.7 mg/Kg, all exceeding the residential RBC. Of these one also exceeds the RBC for industrial soils, sample SS15 at 4.7 mg/Kg.

3.2.2.2 PAHs

Eleven of the PAHs were detected in one or more surface soil samples from the Dragston-Augusta soils. The frequency of detection ranged from 0.20 to 0.60, with most PAHs

detected in less than 50 percent of the samples. Benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, benzo(k)flouranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, and pyrene were the compounds most frequently detected. No PAHs were detected in four surface samples, SS18-20 and SS11. The residential and industrial RBCs were not exceeded in any of the surface soil samples.

No PAHs were detected in subsurface soil samples from the Dragston-Augusta soils.

3.2.2.3 Pesticides

Six pesticides were detected in these surface soil samples; these are: 4,4-DDE, 4,4-DDT, 4,4-DDD, endosulfan I, endrin aldehyde, and alpha chlordane. The pesticides 4,4-DDE and 4,4-DDT were detected in 80 percent of these samples. The residential RBC for 4,4-DDE was exceeded in SS11. No other pesticide exceedances occurred in Dragston-Augusta surface soil samples.

Only beta-BHC was detected in Dragston-Augusta subsurface soils. The detection occurred in one sample SS15, and did not exceed the residential RBC.

3.2.3 Soil Samples in Bohicket Association (IV)

3.2.3.1 Metals

Of the 21 metals detected in background soils, 19 were detected in Bohicket Association surface soils. Antimony and silver were not detected in the surface samples. Aluminum, arsenic, barium, calcium, chromium, copper, iron, lead, magnesium, manganese, sodium, vanadium, and zinc were detected in all ten surface soil samples. Arsenic ranged from 1.7 mg/Kg to 32.5 mg/Kg (SS21) with an average concentration of 8.8 mg/Kg, and exceeded the residential RBC in all ten of the samples and the industrial RBC was exceeded in five of the surface soil samples (SS21 and SS27-SS30). Iron exceeded the residential RBC in samples SS28 and SS29.

Of the 21 metals detected in background soils, 20 were detected in Bohicket Association subsurface soils. Antimony was not detected in the samples. Aluminum, arsenic, barium, calcium, chromium, copper, iron, lead, magnesium, manganese, vanadium, and zinc were detected in all ten surface soil samples. Arsenic exceeded the residential RBC in all ten of the samples and the industrial RBC was exceeded in five of the surface soil samples (SB21, SB25, and SS27-SS29). Iron exceeded the residential RBC in samples SS21 and SS29.

3.2.3.2 PAHs

All 16 of the PAHs were detected in one or more surface soil samples from the Bohicket soils. In the remaining samples the frequency of detection for most of the PAHs is approximately 0.40. Benzo(a)pyrene, chrysene, fluoranthene, and pyrene were the compounds most frequently detected. The residential RBC for Benzo(a)pyrene was exceeded in three surface soil samples (SS21, SS27, and SS30). In SS21, the residential RBC was also exceeded for dibenz(a,h)anthracene. None of the surface soils exceeded industrial RBCs for the PAHs in Bohicket surface soils.

The detections in the subsurface soil displayed a similar pattern to the surface soil sample detections. All 16 were detected in SB21; none were detected in SB23 and SB24. Benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, and pyrene were detected in 60% or more of the subsurface samples. The residential RBCs for benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene were exceeded in SB21. The residential RBC for benzo(a)pyrene was exceeded in SB29. In SB30, levels of benzo(a)anthracene, benzo(a)pyrene, and dibenz(a,h)anthracene exceeded the residential RBCs.

3.2.3.3 Pesticides

Ten pesticides were detected in the Bohicket surface soils. The most frequently detected analytes were 4,4-DDE, 4,4-DDT, and 4,4-DDD, which were found in 50 to 90 percent of the samples. Other pesticides were detected in only one or two samples. None of the pesticides detected in Bohicket Association surface soils exceeded the residential RBCs.

Pesticides were detected in five of the subsurface samples (SB21, SB22, and SB24-SB26). The pesticides detected were 4,4-DDE, 4,4-DDT, 4,4-DDD, endosulfan I, and gamma chlorodane. None of the pesticides detected in Bohicket Association subsurface soils exceeded the residential RBCs.

3.2.4 Urban-Udorthents (Developed Land) (V)

3.2.4.1 Metals

Of the 21 metals detected in background soils, 18 were detected in Urban-Udorthents surface soils, and 16 in subsurface soils. Beryllium, selenium, and silver were not detected in either surface or subsurface samples, and antimony was also not found in subsurface soil. The metals detected with a frequency greater than 75 percent from the 10 Urban-Udorthents soil sample locations include aluminum, arsenic, barium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, sodium, vanadium, and zinc.

Sample results were compared to EPA Region III residential and industrial RBCs. Arsenic exceeded the residential RBC in all of the surface soil samples (1.3 to 5.1 mg/Kg) and all of the subsurface soil samples (0.85 to 6.0 mg/Kg). The industrial RBC for arsenic was also exceeded in five of these surface samples and five of these subsurface samples. All other metals were reported at concentrations less than the residential RBC.

3.2.4.2 PAHs

All 16 of the PAHs were detected in one or more surface soil samples from the Urban-Udorthents soils. The frequency of detection for most of the PAHs in surface soil is 0.75. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, benzo(g,h,i)perylene, benzo(k)flouranthene, fluoranthene, and pyrene were the compounds most frequently detected. No PAHs were detected in two surface samples, SS35 and SS40. The residential RBC was exceeded in three surface soil samples (SS32, SS33, and SS34) for benzo(a)pyrene at concentrations ranging from of 170 mg/Kg to 300 mg/Kg. The residential RBC was also exceeded in two samples (SS32; 97 ug/Kg and SS34; 110 ug/Kg) for dibenz(a,h)anthracene. None of the surface soils exceeded industrial RBCs for the PAHs in Urban-Udorthents soils.

Twelve PAHs were detected in subsurface soil samples from the Urban-Udorthents soils. Most of these were detected in two samples, SB34 and SB 37 and were reported at estimated concentrations below the practical quantitation limit. None of the subsurface soils exceeded residential RBCs for the PAHs in Urban-Udorthents soils.

3.2.4.3 Pesticides

Five pesticides were detected in Urban-Udorthents surface soils (4,4 DDE, 4,4 DDT, 4,4 DDD, , alpha chlordane, and gamma chlordane). The pesticides 4,4 DDE, 4,4 DDD and 4,4 DDT were detected in seven of the ten samples. Alpha chlordane (23J ug/Kg) and gamma chlordane (5.3 ug/Kg) were detected in surface sample (SS32). Three pesticides (4,4 DDE, 4,4 DDT, 4,4 DDD) were detected in subsurface soil sample SB37, and 4,4 DDE was detected in the duplicate sample of SB34. None of the surface or subsurface soils exceeded residential RBCs for pesticides in Urban-Udorthents soils.

3.2.5 Soil Samples in Dredge Fill Area (VI)

3.2.5.1 Metals

All of the 21 metals were detected in dredge fill surface soils, and 19 in subsurface soils. Beryllium and silver was not detected in subsurface samples. The metals detected in all dredge fill samples include aluminum, arsenic, barium, calcium, iron, lead, magnesium, manganese, and vanadium. Metals detected in 80 to 90 percent of the dredge fill samples include chromium, copper, nickel, and zinc.

Sample results were compared to EPA Region III residential and industrial RBCs. Arsenic exceeded the industrial RBC in all of the surface soil samples (8.7 to 23.6 mg/Kg) and in nine of the subsurface soil samples (2.8 to 11.9 mg/Kg). Iron exceeded the residential RBC is all but one (SS46) surface sample and in five subsurface samples. All other metals were reported at concentrations less than the residential RBC.

3.2.5.2 PAHs

All 16 PAHs were detected in one or more surface soil samples from the Dredge Fill Area soils. Twelve of the PAHs were detected in all 10 surface soil samples. The 12 PAHs are acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)flouranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene. Benzo(a)pyrene exceeded the residential RBC in all ten surface soil samples (SS41-SS50); two (SS48 and SS50) exceeded the industrial RBC also . Benzo(a)anthracene exceeded the residential RBC in two samples, SS48 and SS50. Benzo(b)fluoranthene exceeded the residential RBC in samples SS41, SS43, SS44, and SS48-SS50. Dibenz(a,h)anthracene exceeded the residential RBC in samples SS41-SS45. Indeno(1,2,3-cd)pyrene was detected above the residential RBC in samples SS41, SS43, SS44, SS48, and SS50.

All 16 PAHs were detected in subsurface soil samples from the Dredge Fill Area soils. Nine of the PAHs were detected in all 10 surface soil samples. The 9 PAHs are benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)flouranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, and pyrene. Benzo(a)pyrene exceeded the residential RBC in 8 surface soil samples (SB41-SB45, SB47,

SB49, and SB50); one (SB50) exceeded the industrial RBC also. Benzo(a)anthracene exceeded the residential RBC in sample SS50. Benzo(b)fluoranthene exceeded the residential RBC in two samples, SS43 and SS50. Dibenz(a,h)anthracene exceeded the residential RBC in samples SS41-SS44, SS49, and SS50; the industrial RBC was also exceeded in SS50. Indeno(1,2,3-cd)pyrene was detected above the residential RBC in sample SS50.

3.2.5.3 Pesticides

Three pesticides, 4,4-DDE, 4,4-DDT, 4,4-DDD, were detected in the Dredge Fill Area surface soil samples. 4,4-DDT was detected in 90 percent of these samples; the others were detected in less than 50% of the samples. Residential RBCs were not exceeded by pesticides in the Dredge Fill Area surface soil samples.

Dieldrin was detected in two of the Dredge Fill Area subsurface soil samples. 4,4-DDE and 4,4-DDT were only detected in one sample, SS43. The detected chemicals did not exceed the industrial or residential RBCs.

3.2.6 pH and TOC

Total organic carbon and pH were measured in surface soils to provide information on potential contaminant mobility applicable to the risk assessment process. Surface soil pHs ranged from 4.0 to 8.1 with an average of 5.50.

Total organic carbon in surface soil samples ranged from 1 mg/kg to 138,000 mg/kg. Average concentration of TOC for fill samples was 26,396 mg/kg.

4.0 Statistical Analysis of Background Data

To establish background groundwater and soil quality, analytical results are evaluated to provide descriptive statistics to quantify the mean and variability of the data. Statistical analyses were conducted on soil sample results to assess the significance of sample depth and soil type in establishing background soil quality. Because of the limited number of groundwater samples, summary statistics were determined to describe background groundwater quality at SJCA.

4.1 Groundwater

Groundwater samples were collected from four background wells screened in the upper portion of the Columbia Aquifer and three wells screened in the Yorktown Aquifer. Well pairs MW1, MW2, and MW3 are screened in sediments underlying Mundem-Tetotum soils. Well pair MW4 is screened in sediments underlying Nimmo soil. Groundwater samples were analyzed for 149 parameters, including 23 dissolved metals, 23 total metals and cyanide, 60 semivolatile and 41 volatile organics and pH. Thirty-two of the 149 parameters quantified were detected in groundwater samples from the Columbia Aquifer and 24 of the 149 parameters quantified were detected in samples from the Yorktown Aquifer. The number of parameters detected for each analytical class is summarized as follows:

Analytical Class	Columbia	Yorktown
Dissolved Metal	14	11
Metal	15	11
Semivolatile Organic	0	1
Volatile Organic	3	0
Water Chemistry	0	1

Because groundwater data is limited to one monitoring event (May 1999) consisting of four samples from the Columbia Aquifer and three samples from the Yorktown Aquifer, there is an insufficient number of samples available to establish upper tolerance limits for background groundwater quality. Groundwater quality summary statistics for each aquifer have been developed and include frequency of detection, minimum and maximum detected concentrations, minimum and maximum detection limits, average concentration, median concentration, and upper confidence limit. For constituents reported as a non-detect, one-half the detection limit was used to calculate summary statistics. Summary statistics for background groundwater quality are provided in Table 4-1 (Columbia Aquifer) and Table 4-2 (Yorktown Aquifer).

Groundwater data was also compared to Risk Based Concentrations criteria for tap water and Federal Drinking Water Maximum Contaminant Levels. No constituents were detected at concentrations exceeding the MCL. Table 4-3 summarizes the number of detected results in the Columbia Aquifer that exceed criteria and identifies the parameters whose detection limits also exceed these criteria. Detected parameters in the Columbia Aquifer that exceed the RBC for tap water are limited to dissolved and total arsenic, iron,

and manganese. Detection limits which exceed the tap water RBC include thallium and several of the semivolatile and volatile organic compounds. No detected parameter exceeded criteria in the Yorktown Aquifer. Although some parameter detection limits exceed the most conservative criteria, all samples were analyzed using CLP analytical methods appropriate for the CERCLA program.

Additional background data is needed to further statistically characterize background groundwater quality, and determine upper tolerance limits for use in comparison to site data. It is anticipated that an additional round of samples will be collected from the background monitoring wells, and that these samples will be collected during the winter months to reflect potential seasonal variation in groundwater quality. Additionally, upgradient wells installed at IRP sites will be reviewed for possible inclusion in the data set for characterizing background groundwater quality.

4.2 Soil

Soil samples for the SJCA background investigation were collected from 50 locations within five different soil types. Analytical results from co-located surface and subsurface soil samples collected from ten locations in each of the soil types (Munden-Tetotum Association, Dragston-Augusta Association, Bohicket Association, Urban-Udorthents, and Dredge Fill) were statistically evaluated to characterize background soil quality at SJCA.

The approach for statistical analysis of the soil data involved identifying parameters detected in one or more samples and determining the frequency of detection. Box plots were constructed and reviewed to identify the extent to which soil type and/or sample depth appear to effect concentration levels of the analyzed parameters. Box plots are provided in Appendix D.

Statistical comparisons among soil types and sample depths were conducted with results from the parameters detected in one or more samples. Comparisons relied upon both explicit statistical tests and graphical displays (box plots). The Mann Whitney test was used to identify parameter-specific data sets with comparable populations with respect to soil type and sample depth. Once parameter-specific data sets of comparable populations with respect to soil type and sample depth were partitioned, each parameter-specific data set was evaluated for distribution and point-interval estimation.

The Shapiro-Wilk goodness-of-fit test was used within individual partitions (soil type/sample depth) to determine if data follow a theoretical distribution. Estimates of central tendency and upper tolerance limits, with two-sided confidence intervals were then determined for each parameter–specific partition.

4.2.1 Statistical Screening Summary

Table 4-4 provides a summary of results for all background soils, independent of sample depth or soil type. The statistical screening limits evaluations to a set of parameters that have been detected in one or more samples. Table 4-4 includes a summary of the minimum and maximum of reported non-detects and detects, and a comparison to residential and industrial RBCs.

4.2.2 Comparison of Soil Type and Soil Depth

Differences between soil types and soil depth for Munden-Tetotum and Dragston-Augusta soils were based upon review of the box plots and parameter specific results pooled where appropriate. The box plots show that the remaining soil types, Bohicket , Urban-Udorthent , and Dredge Fill should be considered separately, therefore the results for these soil types should not be pooled. Further comparisons of soil types and sample depths were made using the Mann-Whitney test. The probabilities of the test statistic is compared to 0.05. Test results which would occur fewer than 5 times out of 100 are considered to indicate that the subgroups differ.

Results of the Mann-Whitney tests are provided in Table 4-5, and provides comparisons between soil types and sample depths. The parameter-specific test statistic gives the probability that the populations are comparable, and results from pooling Munden-Tetotum and Dragston-Augusta represent a common population. Where probabilities are less than 0.05, the soils are handled separately. For example, cobalt, chromium, and iron concentrations in Munden-Tetotum and Dragston-Augusta soils are significantly different while concentrations of the remaining parameters are comparable.

The probabilities (Mann-Whitney tests) that surface and subsurface sample results for the pooled Munden-Tetotum and Dragston-Augusta, Munden-Tetotum separately, Dragston-Augusta separately, Bohicket, Urban-Udorthents, and Dredge Fill soils, are comparable are shown in Table 4-5. For example, silver levels in the pooled Munden-Tetotum and Dragston-Augusta soils differ between sample depths while arsenic levels do not. The appropriate parameter-specific data partitions for soil depth and soil type are illustrated by the "X" in Table 4-5.

Overall, Bohicket and Urban-Udorthents soils are more homogeneous between surface and subsurface sample depths where as the pooled Munden-Tetotum and Dragston-Augusta partition, Munden-Tetotum separately, Dragston-Augusta separately, and dredge fill materials exhibit greater differences with depth. This is most evident for the pesticides and PAHs, in Bohicket and Urban-Udorthents soils where surface and subsurface populations are comparable. Conversly, for the metals, differences in soil depths are significant in approximately half of the parameters detected in the Munden-Tetotum and Dragston-Augusta partitions and dredge fill.

4.2.3 Parameter Distributions & Point-Interval Estimates

Comparison of soil type and sample depth results in 279 parameter-specific partitions which are evaluated for distribution and point-interval estimation. Point interval estimates for each parameter-specific partitioned (soil type/soil depth) data set include the mean concentration, the upper confidence limit (UCL), lower confidence limit , and the upper tolerance limit (UTL) with upper and lower UTL bound estimates. A summary of statistical analysis of the background data sets (parameter-specific partitions with respect to soil type and depth) is provided in Appendix E.

Results of Shapiro-Wilk distribution testing are shown in Table 4-6. It should be noted that trends within analytical class and/or soil type may reflect additional factors beyond the soil types and sample depths evaluated. For example, probability plots of Bohicket soils, which are comparatively homogeneous across depths but exhibit neither normal nor lognormal

distributions, exhibit a bimodal distribution. Explanation of this tendency might be differential particle sizes and/or spatial location along the creek bank.

The best estimate of central tendency (mean concentration) for each parameter-specific partition is provided in Table 4-7. The upper 95th tolerance limit for each parameter -specific partition combination is provided in Table 4-8.

4.3 Use of Background Data

The statistical analysis of background data will be used to better identify and assess site-related contamination and for use in the risk management process. Within the CERCLA process, sites are initially addressed in the Site Screening Process (SSP) or Site Investigation (SI) process to determine if a site release has occurred and to qualitatively evaluate site risks. Where a site release is indicated or known to have occurred and the risk present at the site warrants further investigation, sites are addressed in the Remedial Investigation process and risks are quantitatively evaluated. The approach for using background data focuses on application within these CERCLA processes and is discussed below.

4.3.1 Site Screening or Site Investigation Process

For site data collected as part of the Site Screening/Site Investigation Process, background data can be used to determine if a site release has occurred. First, a qualitative risk screening evaluation through comparison of site data to risk screening criteria (Federal and State) will identify constituents of potential concern. This qualitative risk evaluation will include a comparison using the most current EPA Region III Risk Based Concentrations to site detected concentrations. The non-carcinogenic RBCs reflected in the Region III table are based on hazard quotients (HQ) of 1, which does not account for exposure of multiple constituents on a common target organ. Therefore, RBCs based on non-carcinogenic effects will be adjusted to account for a HQ of 0.1 by dividing the reported RBCs by ten. Groundwater data will first be screened using the MCL, then the tap water RBC at a HQ of 0.1.

After constituents of potential concern (COPCs) are identified through the initial screening, background concentrations are evaluated to determine if any constituents are ubiquitous to the site and not indicative of a release. Maximum concentrations of site parameters considered potential constituents of concern are compared to the background upper tolerance level (UTL). Background upper tolerance levels, which define an upper bound of concentrations that could be expected in areas not impacted by the site, can be used to identify samples that potentially exceed background conditions. If the maximum concentrations found at a site are less than the background UTL, then site parameter concentrations are not considered reflective of a site release. If the maximum concentration of a constituent initially identified as a COPC based on the qualitative screening is greater than the background UTL, the constituent will be considered a COPC and additional qualitative risk screening conducted.

For each COPC, an apparent hazard index (AHI) or apparent cancer risk (ACR) is then calculated by dividing the constituent concentration by the tap water RBC (not adjusted to an HQ of 0.1 for non-cancer effects, as done for the initial screening, but based on the value in the RBC table for both cancer and non-cancer endpoints) for groundwater and the

residential soil RBC for soil. Following this calculation, the individual AHIs for non-cancer risks are summed and designated the "Cumulative AHI," or "CAHI" and the individual ACRs for cancer risks are summed and designated the "Cumulative ACR," or "CACR." The CACR for cancer risk is then multiplied by 10^{-6}. If the CAHI for non-cancer risk is less than the screening criterion of 1 and the CACR for cancer risk is within the acceptable 10^{-4} to 10^{-6} risk range, no constituents of concern are identified. If the calculated CAHI or CACR exceed the applicable screening criteria, those constituents that are included in the CAHI or CACR calculation are considered PCOCs.

For remaining parameters with maximum concentration(s) greater than background UTL resulting in a CAHI or CACR in the range indicative of potential risk, then population-to-population comparisons, are conducted. If site and background populations are not statistically different, consideration is then given to the location of the maximum concentration(s) as potentially representative of a "hot spot". These specific locations are identified in order to assess whether exceedence locations cluster in an area or are interspersed throughout the portion of the site being evaluated. Spatial interpretation of UTL exceedences requires judgmental decisions but is an indication of whether elevated levels suggest a random process as opposed to a specific release. Professional judgement will incorporate site history and operations, current site conditions, and conceptual site models for exposure pathways and receptors. Risk management decisions can then be made by the Navy in partnership with the EPA and DEQ as well as assess site conditions for determination of no further action, limited "hot spot" remedial measures, or whether a remedial investigation is warranted for the site.

Ecological evaluations as part of the Site Screening Assessment Process begins with a site conceptual model to assess potential receptors and pathways for contaminant migration for site media. If the site conceptual model suggests the potential for ecological risk, available site data are qualitatively compared to BTAG screening values. For soil, maximum and mean concentrations of site detected parameters exceeding BTAG screening values are qualitatively compared to background soil upper tolerance limits and central tendency statistics, respectively. Based on this qualitative review, the Navy in partnership with the EPA and DEQ will use professional judgement for risk management in the Site Screening Process. If site-specific surface water/sediment reference (upstream/upgradient) data are available, similar qualitative comparisons can be made and site conceptual models revised as appropriate within the Site Screening Process.

Within the CERCLA Remedial Investigation Process, use of background data for comparison to site data will be addressed in the uncertainty section of the respective human health and ecological risk assessments. Until further Navy guidance is released regarding the use of background data in Remedial Investigation quantitative risk assessments, this data will only be used at the end of the quantitative risk assessment as part of the uncertainty section of the risk assessments.

4.3.2 Remedial Investigations

For data collected as part of a Remedial Investigation, a quantitative risk assessment is conducted in accordance with Navy and EPA guidance. For parameters that are identified risk drivers, background data is used for risk management at the conclusion of the

quantitative risk assessment process. In this approach, parameters that may not be related to a site release are carried through the risk assessment process. Once site risks have been quantified, uncertainties in the risk assessment process are addressed. Background quality of environmental media is one of several factors that can contribute to the uncertainty of the risk assessment. Best estimates of background central tendency (e.g., mean in normally or log normally distributed data or median where data follow neither theoretical distribution), and UTLs, including a two-sided 95% confidence interval for the estimates, are used as part of the uncertainty analysis and incorporated into an overall summary of site risks for use in the risk management process.

In the uncertainty analysis, the mean/median background concentration is compared to the mean/median site concentration for parameters that are identified risk drivers. Using this conservative approach of comparing central tendency estimates for site and background concentrations, it is apparent that if the mean/median site concentrations are less than the mean/median background concentrations, then it can be concluded that a site release has not occurred and risk management is warranted. A risk management summary will be addressed either as part of the conclusion of the Remedial Investigation or in the Feasibility Study for the site.

In addition to central tendency comparisons, background samples are also used in population-to-population comparisons between the on-site and background sample results to determine if the sampled areas differ, overall. Typical methods applied include parametric or non-parametric comparisons of the two populations, as performed with a t-test or Mann-Whitney test, respectively. Population-to-population analysis of background and site data will determine if the two populations are statistically similar or statistically different. If the two populations are statistically similar, then it is reasonable to conclude that a site release has not occurred and risk management is warranted.

Because central tendency comparisons are conservative, use of background UTLs in the uncertainty analysis and risk management process is justifiable. The exceedence of a parameters background mean/median concentration does not presume that there has been a site release. For those parameters, comparison of site concentrations to background UTLs are conducted to further evaluate if a site release has occurred and better understand uncertainty in the risk assessment. The population-to-population comparisons are of greater relevance for parameters where background UTLs are exceeded in one or more on-site samples. While possible, it is unlikely that population-to-population comparisons will show statistically significant differences if no individual on-site values exceed the background UTL.

As previously mentioned, an overall summary of site risks and the management of site risks will be presented in the conclusions of the Remedial Investigation or in the Feasibility Study for the site. The approach for the use of background data to assess uncertainty in the risk assessment is conservative. Management of site risks requires professional judgement and will be conducted by the Navy in partnership with the EPA and VDEQ and is based on the overall summary of site risks, site operational history, and current site conditions.

4.3.3 Constituents Reported as Undetected

Comparison of non-detected results from background data with respect to on-site sample results is appropriate to assess relative levels associated with reported detection limits. Presumably, the detection limits from on-site and reference samples would have achieved the same level of analytical sensitivity. In which case, if all on-site samples are reported as non-detects, at comparable or lower limits of detection, it may be concluded that the on-site results do not differ from background and a release has not occurred. In the Remedial Investigation process, detection limits higher than risk screening criteria are carried through the quantitative risk assessments process.

Interpretation is more difficult when on-site samples contain one or more results that have been detected. In some cases, particularly organic quantification, it is not uncommon for parameters that are identified as "present" in the sample to be reported at concentration less than the practical quantitation limit (typically qualified as estimated or "J" values by the analytical lab). In most of these cases, the constituent is not a substantive problem in terms of potential site contamination. Second, at the other end of the spectrum, if all results for one of these parameters has been reported as detected in all on-site samples, at levels which are substantively above the reported detection limit, comparisons to background conditions are necessary to determine if on-site impacts should be considered. In statistical analyses of site and background data, one-half the value of the non-detected result is used.

For situations where only a portion of on-site results have been reported as detected, the interpretation is more complex. While statistical tests, particularly the nonparametric methods, can be used to identify statistically significant differences in the populations, it is important to identify spatially where detections occur. The decision as to whether the detections represent a release will, ultimately, depend upon comparison to background and the magnitude and spatial distribution of the detected and nondetected levels.

4.3.4 Parameters with "B" Qualified Results

For parameters that have been reported as detections qualified to note that the parameter was also detected in a quality control blank sample, the results are treated as non-detects. However, the value qualified with a "B" may be substantively different from detection limit values (qualified "U") for the same parameter. In these cases, it would be conservative to use the minimum reported nondetect (qualified "U") as a comparative value for on-site samples. In statistical analyses of site and background data, one-half the value of the "B" qualified result is used.

5.0 Summary

Background soil and groundwater quality were evaluated for use in comparison with CERCLA IR Site data to identify potential release-related contaminants of concern at St. Juliens Creek Annex. Because of the limited number of groundwater samples, background groundwater quality is described by summary statistics of the analytical results. A summary of background groundwater quality is provided on Tables 4-1 (Columbia Aquifer) and 4-2 (Yorktown Aquifer). Background soil data were statistically evaluated to identify comparable data sets with respect to soil type (soil types; Munden-Tetotum, Dragston-Augusta, Bohicket , Urban-Udorthents, and Dredge Fill) and sample depth (surface 0-0.5′ and subsurface 1′ to 3′) . For many parameters, analytical results could be pooled for Munden-Tetotum soils and Dragston-Augusta soils. Bohicket, Urban-Udorthents, and Dredge Fill samples are statistically different populations and the data sets are treated separately. For each of the soil type data sets, statistical analysis also identified those parameters for which surface and subsurface soil are comparable. Central tendency (mean) and upper tolerance limits were determined for the subgroups (soil type and soil depth), as appropriate. A summary of background soil mean concentration and upper tolerance limits are provided in Tables 4-7 and 4-8, respectively.

Groundwater samples were generally of high quality in comparison to applicable water quality standards, and are consistent with groundwater quality characteristics of the Columbia Aquifer in southeast Virginia as described in the general literature. Analytes detected which exceeded the potentially applicable water quality standards or risk-based guidance concentration were the metals arsenic, iron, and manganese. Two of the four organic compounds (acetone and bis(2-ethylhexyl)phthalate detected in groundwater are common laboratory contaminants. One sample, MW1s, contained estimated trace levels of trichloroethene and cis-1,1dichloroethene. Future sampling of background groundwater may be conducted; results from future sampling as well as a review of site upgradient wells may warrant inclusion and re-evaluation of background groundwater quality.

Statistical analysis of background soil samples showed that metal concentrations are generally lower in Munden-Tetotum and Dragston-Augusta soils than in either Bohicket Urban-Udorthents, or Dredge Fill. Arsenic consistently exceeded residential RBCs in both surface and subsurface samples, and occasionally also exceeded the industrial RBC. Iron exceeded the residential RBC sporadically in surface and subsurface samples. Although detected in several surface and subsurface samples, only one pesticide (4,4-DDE) in one sample (SS11) exceeded the residential RBC. The highest concentration and greatest frequency of detection of the PAHs, in both surface and subsurface samples, is in Dredge Fill soils. With the exception of Dredge Fill soil samples, PAHs are detected more frequently in surface than in subsurface soils. Additionally, PAHs are more prevalent in Bohicket and Urban-Udorthents than in; Munden-Tetotum and Dragston-Augusta . The PAHs benzo(a)pyrene, benzo(b)flouranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceeded the residential RBC in several samples, most frequently in Dredge Fill surface soils.

Upper tolerance limits and central tendency statistics are established for soil in appropriate subgroups (soil type/sample depth) for use as in comparison to IR Site data. These background data can be used to better identify and assess site-related contamination and more accurately identify and manage site risks. For site data collected as part of the Site Screening Assessment Process, a risk screening evaluation will be conducted to identify constituents of potential concern through a qualitative comparison to established risk screening criteria (Federal and State criteria). Maximum concentrations of site parameters considered potential constituents of concern are compared to the background upper tolerance level (UTL). If the maximum concentration is greater than the background UTL, an apparent hazard index or apparent cancer risk is then calculated and summed. If the calculated cumulative apparent hazard index or apparent cancer risk exceed the applicable screening criteria, those constituents are considered PCOCs. For parameters with maximum concentration(s) greater than background UTL resulting in an apparent hazard index or apparent cancer risk in the range indicative of potential risk, then population-to-population comparisons, are conducted. Professional judgement will incorporate site history and operations, current site conditions, and conceptual site models for exposure pathways and receptors. Risk management decisions can then be made by the Navy in partnership with the EPA and DEQ as well as assess site conditions for determination of no further action, limited "hot spot" remedial measures, or whether a remedial investigation is warranted for the site.

For data collected as part of a Remedial Investigation, a quantitative risk assessment is conducted in accordance with Navy and EPA guidance. For parameters that are identified risk drivers, background data is used for risk management at the conclusion of the quantitative risk assessment process. Best estimates of background central tendency (e.g., mean in normally or log normally distributed data or median where data follow neither theoretical distribution), and UTLs, including a two-sided 95% confidence interval for the estimates, are used as part of the uncertainty analysis and incorporated into an overall summary of site risks for use in the risk management process.

5.0 Summary

Background soil and groundwater quality were evaluated for use in comparison with CERCLA IR Site data to identify potential release-related contaminants of concern at St. Juliens Creek Annex. Because of the limited number of groundwater samples, background groundwater quality is described by summary statistics of the analytical results. A summary of background groundwater quality is provided on Tables 4-1 (Columbia Aquifer) and 4-2 (Yorktown Aquifer). Background soil data was statistically evaluated to identify comparable data sets with respect to soil type (soil types; Munden-Tetotum, Dragston-Augusta, Bohicket , Urban-Udorthents, and Dredge Fill) and sample depth (surface 0-0.5′ and subsurface 1′ to 3′) . For many parameters, analytical results could be pooled for Munden-Tetotum soils and Dragston-Augusta soils. Bohicket, Urban-Udorthents, and Dredge Fill samples are statistically different populations and the data sets are treated separately. For each of the soil type data sets, statistical analysis also identified those parameters for which surface and subsurface soil are comparable. Central tendency (mean) and upper tolerance limits were determined for the subgroups (soil type and soil depth), as appropriate. A summary of background soil mean concentration and upper tolerance limits are provided in Tables 4-7 and 4-8, respectively.

Groundwater samples were generally of high quality in comparison to applicable water quality standards, and are consistent with groundwater quality characteristics of the Columbia Aquifer in southeast Virginia as described in the general literature. Analytes detected which exceeded the potentially applicable water quality standards or risk-based guidance concentration were the metals arsenic, iron, and manganese. Two of the four organic compounds (acetone and bis(2-ethylhexyl)phthalate detected in groundwater are common laboratory contaminants. One sample, MW1s, contained estimated trace levels of trichloroethene and cis-1,1dichloroethene. Future sampling of background groundwater may be conducted; results from future sampling as well as a review of site upgradient wells may warrant inclusion and re-evaluation of background groundwater quality.

Statistical analysis of background soil samples showed that metal concentrations are generally lower in Munden-Tetotum and Dragston-Augusta soils than in either Bohicket Urban-Udorthents, or Dredge Fill. Arsenic consistently exceeded residential RBCs in both surface and subsurface samples, and occasionally also exceeded the industrial RBC. Iron exceeded the residential RBC sporadically in surface and subsurface samples. Although detected in several surface and subsurface samples, only one pesticide (4,4-DDE) in one sample (SS11) exceeded the residential RBC. The highest concentration and greatest frequency of detection of the PAHs, in both surface and subsurface samples, is in Dredge Fill soils. With the exception of Dredge Fill soil samples, PAHs are detected more frequently in surface than in subsurface soils. Additionally, PAHs are more prevalent in Bohicket and Urban-Udorthents than in; Munden-Tetotum and Dragston-Augusta . The PAHs benzo(a)pyrene, benzo(b)flouranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceeded the residential RBC in several samples, most frequently in Dredge Fill surface soils.

Upper tolerance limits and confidence intervals are established for soil in appropriate subgroups (soil type/sample depth) for use as in comparison to IR Site data. These background data can be used to better identify and assess site-related contamination and more accurately identify and manage site risks. Further investigation of background groundwater quality is recommended to increase the background data set for statistical analysis. Consideration will also be given to using data from existing upgradient site wells.

For site constituents of potential concern or identified risk drivers, background data can be used by comparison of site constituent concentrations with the background UTLs. Maximum concentrations of site constituents less than background UTLs may indicate that there has not been a site release, and no further action should be considered. Population to population comparisons and central tendency comparisons of site and background data may provide information on potential "hot spots" and the overall extent or absence of contamination at a site.

References

A.T. Kearney, Inc. and K.W. Brown & Associates, Inc., 1989. Phase II RCRA Facility Assessment of the St. Juliens Creek Annex Facility, Chesapeake, Virginia. March.

Barker, W.J., and E.D. Bjorken. 1978. Geology of the Norfolk South Quadrangle, Virginia.

Baker Environmental, Inc. June 1997. Draft Final, Evaluation Report, Environmental Photographic Interpretation Center Study Analysis, Norfolk Naval Shipyard, Portsmouth, Virginia

CDM Federal 2000. Master Project Plan, Naval Station Norfolk, St Juliens Creek Annex, Chesapeak, Virginia. July 2000.

CH2M HILL. March 1996. Final Sampling and Analysis Plan, Relative Risk Ranking System Data Collection, St. Julien's Creek Annex to the Norfolk Naval Base, Chesapeake, Virginia.

CH2M HILL. April 1996. Final Relative Risk Ranking System Data Collection Report, St. Julien's Creek Annex to the Norfolk Naval Base, Chesapeake, Virginia.

CH2M HILL, Feburary, 1999a. Supplemental Field Investigation Plan, Landfill B and Burning Grounds, St. Juliens Creek Annex Site, Chesapeake, Virginia.

CH2M HILL, Feburary, 1999b. Supplemental Field Investigation Plan, Landfill C and Landfill D, St. Juliens Creek Annex Site, Chesapeake, Virginia.

CH2M HILL, Inc. Work Plan, Remedial Investigation and Feasibility Study, Landfill C (Site 3) and Landfill D (Site 4), St. Juliens Creek Annex, Chesapeake Virginia. May 1997.

EPA. February 1995. Aerial Photographic Site Analysis, Norfolk Naval Shipyard: Annex Areas, Norfolk, Virginia. Environmental Monitoring Systems Laboratory. TS-PIC-94161

EPA. December 1995. Engineering Forum Issue, Determination of Background Concentrations of Inorganics in Soils and Sediments at Hazardous Waste Sites. OSWER Publication 9360.0-32. EPA/540/5-96/500.

Hamilton, P.A. and Larson J.P., 1998 "Hydrogeology and Analysis of the Groundwater Flow System in the Coastal Plain of Southeastern, Virginia", US Geological Survey Water Resources Investigation Report 87 4240.

Meng and Harsh, 1988, "Hydrogeologic Framework of the Virginia Coastal Plain", US Geological Survey Professional Paper 1404-C

Navy Engineering and Environmental Support Activity, 1981. Navy Assessment and Control of Installations Pollutants: Initial Assessment Study of St. Juliens Creek Annex, Norfolk Naval Shipyard, Portsmouth, VA, NEESA 13-001. August.

Oaks, R.Q., and Coch, N.K., 1973, Post-Miocene stratigraphy and morphology, southeastern Virginia: Virginia Division of Mineral Resources Bulletin 82, 135 p.

Siudyla, E.A et al 1981 "Groundwater Resources of the Four Cities Area, Virginia "State Water Control Board.

U.S. Environmental Protection Agency (USEPA). July 1, 1998. SDWA National primary Drinking Water Regulations per 40 CFR 131.36.

USEPA. October 1996. "Drinking Water Standards and Health Advisories." Office of Water, Washington, D.C.

USEPA Region III. October 1, 1998. Risk-Based Concentration (RBC) Table.

Virginia Department of Environmental Quality. September 25, 1997. Amendments to the Water Quality Standards.

United States Department of Agriculture, Soil Conservation Service. May 1959. Soil Survey, Norfolk County, Virginia. Series 1953, No. 5.

Table/Appendix Legend

The following are the data qualifier explanations for detects/exceedances in the tables and appendices for the St. Juliens Creek Annex Background Report.

NA – Not Analyzed

B – Analyte not detected above associated blank

J – Reported value is estimated

K – Reported limit may be biased high

L – Reported value may be biased low

U- Analyte not detected

Shaded cells within the tables indicate the analyte exceeded one or more criteria

The sample type explanations are as follows:

S/S – Surface Soil Sample

SUR – Surface Soil Sample

SUB – Subsurface Soil Sample

Table 2-1

Summary of Background Monitoring Well Completion Information

St. Juliens Creek Annex Background Investigation, Chesapeake, Virginia

Well ID	Total Depth Drilled (ft bgs)	Date Installed	Well Diameter (inches)	Screen Interval (ft-bgs)	Sand Pack Interval (ft bgs)	Bentonite Seal Interval (ft bgs)	Annular Grout Interval (ft bgs)	6" Isolation Casing Interval (ft bgs)
SBK-MW1S	14	4/26/99	2	3 – 13	1.5 – 14	0 – 1.5	NA	NA
SBK-MW1D	54	4/24/99	2	44 – 53	42 – 54	39.75 – 42	0 – 39.75	0 – 17
SBK-MW2S	14	4/26/99	2	3 – 13	1.5 – 14	0 – 1.5	NA	NA
SBK-MW2D	56	4/25/99	2	45 – 55	42 – 55	39.75 – 42	0 – 39.75	0 – 18
SBK-MW3S	14	4/27/99	2	3 – 13	1.5 – 14	0 – 1.5	NA	NA
SBK-MW3D	46	4/25/99	2	35 – 45	32 – 46	30 – 32	0 – 30	0 – 18
SBK-MW4S	15	4/26/99	2	4 – 14	2 – 15	0 – 2	NA	NA

Notes:

ft msl = Feet above mean sea level.

ft bgs = Feet below ground surface.

NA = Not Applicable.

Table 3-1
Constituents Detected in Groundwater
St. Juliens Creek Annex Background Investigation

Station ID	RBC-Tap	MCL	SJSBK-MW1D	SJSBK-MW1S		SJSBK-MW2D	SJSBK-MW2S	SJSBK-MW3D	SJSBK-MW3S	SJSBK-MW4S
Sample ID			MW1D-001	MW1S-001	MW1S-001P	MW2D-001	MW2S-001	MW3D-001	MW3S-001	MW4S-001
Sample Date			05/23/01	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99
Chemical Name										
Volatile Organic Compounds (UG/L)										
Acetone	610	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	30.5
Trichloroethene	1.6	5	1 U	0.8 J	0.8 J	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	61	70	1 U	0.2 J	0.2 J	1 U	1 U	1 U	1 U	1 U
Semi-volatile Organic Compounds (UG/L)										
bis(2-Ethylhexyl)phthalate	4.8	6	11 UJ	12 U	11 U	11 U	11 U	1 J	11 U	11 U
Total Metals (UG/L)										
Aluminum	37,000	--	38.2 U	357	797	51.7 J	181 J	133 J	184 J	207
Arsenic	0.045	10	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 J
Barium	2,600	2,000	32.7 J	26.1 J	21.5 J	29.6 J	63.5 J	11.8 J	63.1 J	58.6 J
Beryllium	73	4	0.1 U	0.27 J	0.27 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Calcium	--	--	72,000	27,900	23,700	75,200	21,300	38,600	33,100	142,000
Cobalt	730	--	0.5 U	13.9 J	11.7 J	0.5 U	8.5 J	0.5 U	5.1 J	0.84 J
Iron	11,000	--	419	18,000	15,800	634	374	1,670	715	8,620
Lead	15	15	1 U	1 U	1 U	1 U	1.9 J	1 U	1 U	1.1 J
Magnesium	--	--	12,000	19,600	17,100	5,650	5,990	2,240 J	4,860 J	14,900
Manganese	730	--	226	912	796	117	246	190	121	384
Nickel	730	--	1.1 J	15.1 J	12.4 J	0.9 U	7.9 J	0.9 U	7.6 J	2.7 J
Potassium	--	--	8,490	5,010	4,760 J	4,340 J	1,620 J	1,620 J	1,650 J	3,830 J
Sodium	--	--	39,900	52,700	47,000	35,900	34,200	14,900	18,600	53,900
Vanadium	260	--	0.6 U	0.79 J	0.6 U	0.6 U	1 J	0.68 J	0.79 J	0.91 J
Zinc	11,000	--	4.8 J	89.7	77.4	2.2 J	44.7	3.5 J	9.5 J	43.7
Dissolved Metals (UG/L)										
Aluminum	37,000	--	38.2 U	399	297	63.1 J	38.2 U	38.2 U	38.2 U	69.9 J
Arsenic	0.045	10	2 U	2 U	2 U	2 U	2 U	2 U	2.1 J	2.2 J
Barium	2,600	2,000	27.8 J	24 J	23.3 J	31.2 J	61.7 J	10.1 J	63.2 J	53.2 J
Beryllium	73	4	0.1 U	0.31 J	0.29 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Calcium	--	--	60,700	30,000	30,100	77,700	21,400	34,600	34,800	141,000
Chromium	110	100	2.1 J	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Cobalt	730	--	0.5 U	14.4 J	13.6 J	0.5 U	8 J	0.5 U	4.6 J	0.5 U
Iron	11,000	--	390	21,100	21,200	616	65 J	1,360	110	8,780
Lead	15	15	1 U	2.1 J	1.1 J	1 U	1.1 J	1 U	1 U	1 U
Magnesium	--	--	10,000	22,400	22,400	5,900	5,780	2,000 J	4,890 J	13,700
Manganese	730	--	188	1,040	1,050	122	234	174	120	377
Nickel	730	--	2.3 J	14.3 J	13.5 J	0.9 U	6.9 J	1.1 J	7.2 J	2.2 J
Potassium	--	--	7,200	5,620	5,550	4,540 J	1,600 J	1,480 J	1,610 J	3,910 J
Sodium	--	--	33,700	57,700	57,800	37,900	33,500	13,600	18,400	49,100
Zinc	11,000	--	3.4 J	109	95.1	4.3 J	45.4	10.5 J	9.1 J	25.8
Wet Chemistry (MG/L)										
Phosphorus	7.30E-04	--	0.02 U	0.02 U	0.02 U	0.095	0.02 U	0.051	0.02 U	0.02 U

Table 3-2
Constituents Detected in Surface Soils
St. Juliens Creek Annex Background Investigation

Station ID Sample ID Sample Date	RBC Soil Industrial	RBC-Soil Residential	SJSBK-SS01 SJSBK-SS01-000 02/12/01	SJSBK-SS02 SJSBK-SS02-000 02/14/01	SJSBK-SS03 SJSBK-SS03-000 02/09/01	SJSBK-SS04 SJSBK-SS04-000 02/12/01	SJSBK-SS04 SJSBK-SS04-000P 02/12/01	SJSBK-SS05 SJSBK-SS05-000 02/12/01	SJSBK-SS06 SJSBK-SS06-000 02/13/01	SJSBK-SS07 SJSBK-SS07-000 02/13/01	SJSBK-SS08 SJSBK-SS08-000 02/13/01	SJSBK-SS09 SJSBK-SS09-000 02/13/01	SJSBK-SS10 SJSBK-SS10-000 02/12/01
Chemical Name													
Volatile Organic Compounds (UG/KG)													
Acetone	200,000,000	7,800,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semi-volatile Organic Compounds (UG/KG)													
Acenaphthene	120,000,000	4,700,000	77 U	79 U	81 U	80 U	81 U	81 U	87 U	81 U	84 U	76 U	78 U
Acenaphthylene	--	--	95	79 U	81 U	80 U	81 U	81 U	87 U	24 J	84 U	76 U	78 U
Anthracene	610,000,000	23,000,000	31 J	79 U	81 U	80 U	81 U	81 U	87 U	81 U	84 U	76 U	78 U
Benzo(a)anthracene	7,800	870	190	18 J	81 U	120	81	28 J	46 J	45 J	84 U	76 U	78 U
Benzo(a)pyrene	780	87	150	17 J	81 U	83	55 J	26 J	49 J	42 J	84 U	76 U	78 U
Benzo(b)fluoranthene	7,800	870	120	79 U	81 U	86	66 J	34 J	53 J	34 J	84 U	76 U	78 U
Benzo(g,h,i)perylene	61,000,000	2,300,000	120	79 U	81 U	73 J	42 J	32 J	57 J	37 J	84 U	76 U	78 U
Benzo(k)fluoranthene	78,000	8,700	130	79 U	81 U	65 J	45 J	26 J	38 J	33 J	84 U	76 U	78 U
Chrysene	780,000	87,000	230	23 J	81 U	150	86	42 J	69 J	51 J	84 U	76 U	21 J
Dibenz(a,h)anthracene	780	87	34 J	79 U	81 U	28 J	81 U	81 U	87 U	81 U	84 U	76 U	78 U
Fluoranthene	82,000,000	3,100,000	300	29 J	81 U	180	130	50 J	83 J	58 J	84 U	76 U	26 J
Fluorene	82,000,000	3,100,000	77 U	79 U	81 U	80 U	81 U	81 U	87 U	81 U	84 U	76 U	78 U
Indeno(1,2,3-cd)pyrene	7,800	870	97	79 U	81 U	59 J	36 J	25 J	43 J	32 J	84 U	76 U	78 U
Naphthalene	41,000,000	1,600,000	77 U	79 U	81 U	80 U	81 U	81 U	87 U	81 U	84 U	76 U	78 U
Phenanthrene	61,000,000	2,300,000	98	79 U	81 U	45 J	31 J	81 U	55 J	81 U	84 U	76 U	78 U
Pyrene	61,000,000	2,300,000	420	27 J	81 U	220	120	53 J	83 J	75 J	84 U	76 U	30 J
bis(2-Ethylhexyl)phthalate	410,000	46,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (UG/KG)													
4,4'-DDD	24,000	2,700	2.3 J	3.9 U	4 U	10	14	7.8	4.3 U	2.9 J	4.2 U	3.8 U	3.8 U
4,4'-DDE	17,000	1,900	34	8.6	4 U	350	410	380	31	280	7.6	41 J	3.7 J
4,4'-DDT	17,000	1,900	19	6.2	2.8 J	15	14	13	21 K	86	6	28 J	2.8 J
Aldrin	340	38	2 U	2 U	2.1 U	2 U	2.1 U	2.1 U	2.2 U	2.1 U	2.1 U	1.9 U	2 U
Aroclor-1254	2,900	320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	360	40	3.8 U	3.9 U	4 U	4 U	4 U	4 U	4.3 U	4 U	4.2 U	16 J	3.8 U
Endosulfan I	12,000,000	470,000	2 U	2 U	2.1 U	2 U	2.1 U	2.1 U	2.2 U	2.1 U	2.1 U	1.9 U	2 U
Endosulfan II	12,000,000	470,000	3.8 U	3.9 U	4 U	4 U	4 U	4 U	4.3 U	4 U	4.2 U	36 J	3.8 U
Endrin	610,000	23,000	3.8 U	3.9 U	4 U	2.5 J	4 U	4 U	4.3 U	4 U	4.2 U	35 J	3.8 U
Endrin aldehyde	610,000	23,000	3.8 U	3.9 U	4 U	4 U	2.5 J	4 U	2.2 J	4 U	4.2 U	17 J	3.8 U
alpha-Chlordane	16,000	1,800	2 U	1.2 J	2.1 U	2 U	2.1 U	2.1 U	1.1 J	2.1 U	2.1 U	45	2 U
delta-BHC	--	--	2 U	2 U	2.1 U	2 U	2.1 U	2.1 U	2.2 U	2.1 U	2.1 U	1.9 U	2 U
gamma-Chlordane	16,000	1,800	2 U	2 U	2.1 U	2 U	2.1 U	2.1 U	2.2 U	2.1 U	2.1 U	8.1 J	2 U
Total Metals (MG/KG)													
Aluminum	2,000,000	78,000	4,160	2,470	5,500	2,070	1,160	992	2,920	4,320	3,010	6,170	6,740
Antimony	820	31	0.59 B	0.47 UL	0.48 UL	0.48 UL	0.48 UL	0.49 UL	0.73 B	0.49 UL	0.5 UL	0.46 UL	0.47 UL
Arsenic	3.8	0.43	2.1 B	1.6 J	1.8 J	7.1	3.9	1.1 B	9.4	1.8 J	1.9 J	2.4	2.7
Barium	140,000	5,500	19.9 J	15.4 J	23.1 J	13.7 J	10.9 J	8 J	24.7 J	27.4 J	22.6 J	35 J	35.5 J
Beryllium	4,100	160	0.16 B	0.092 B	0.14 B	0.11 B	0.092 B	0.071 B	0.099 B	0.21 J	0.081 B	0.26 J	0.18 B
Calcium	--	--	209 J	56.4 J	96 J	2,070	1,050 J	462 J	115 J	180 J	120 J	304 J	317 J

Table 3-2
Constituents Detected in Surface Soils
St. Juliens Creek Annex Background Investigation

Station ID Sample ID Sample Date	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SS01 SJSBK-SS01-000 02/12/01	SJSBK-SS02 SJSBK-SS02-000 02/14/01	SJSBK-SS03 SJSBK-SS03-000 02/09/01	SJSBK-SS04 SJSBK-SS04-000 02/12/01	SJSBK-SS04 SJSBK-SS04-000P 02/12/01	SJSBK-SS05 SJSBK-SS05-000 02/12/01	SJSBK-SS06 SJSBK-SS06-000 02/13/01	SJSBK-SS07 SJSBK-SS07-000 02/13/01	SJSBK-SS08 SJSBK-SS08-000 02/13/01	SJSBK-SS09 SJSBK-SS09-000 02/13/01	SJSBK-SS10 SJSBK-SS10-000 02/12/01
Chemical Name													
Chromium	6,100	230	4.7	3	4.2	6.1	4.8	3.9 B	6.6	3.6	3.8	5.2	6.9
Cobalt	41,000	1,600	0.95 U	0.97 U	0.99 U	1.5 J	0.99 U	1 U	1.1 U	1.6 J	1 U	1.2 J	1.9 J
Copper	82,000	3,100	5.4 J	5.5 J	4 J	8.7	7.4	5 J	21.8	7.8	10.5	8.9	9.2
Iron	610,000	23,000	2,660	1,960	2,610	3,180	2,130	1,110	2,400	2,330	2,020	3,250	3,490
Lead	400	400	17	23.6	11.8	45.6	40.5	22.4	49.5	36.9	33	52.7	28.9
Magnesium	--	--	185 J	83.1 J	236 J	448 J	360 J	126 J	122 J	155 J	121 J	317 J	363 J
Manganese	41,000	1,600	7.3	4.7	11.2	25.6	22.8	8.8	8.5	35.3	7.9	10.7	11.6
Mercury	610	23	0.06 J	0.056 J	0.072 J	0.12	0.081 J	0.048 U	0.26	0.13 B	0.18 B	0.14 B	0.21 B
Nickel	41,000	1,600	2.3 U	2.3 U	2.6 J	2.4 U	3.4 J	2.4 U	3.8 B	5.6 B	4.7 B	5.8 B	5.1 B
Potassium	--	--	122 U	125 U	128 U	267 J	128 U	129 U	137 U	129 U	133 U	146 B	197 B
Selenium	10,000	390	0.62 UL	0.98 J	0.95 J	0.65 UI	0.65 UJ	0.66 UL	0.7 UL	0.66 UL	0.68 UL	0.61 UL	1.2 B
Silver	10,000	390	0.49 U	0.5 U	0.51 U	0.5 U	0.51 U	0.51 U	0.55 U	0.63 B	0.53 U	0.48 U	0.49 U
Sodium	--	--	26.6 B	23.2 B	32.7 B	290 J	269 J	30.1 B	42.7 J	39.9 J	41.1 J	67.3 J	49.8 J
Vanadium	14,000	550	11.6	15	13	12 J	9.1 J	9.3 J	18.5	20.1	17.2	22.4	19.5
Zinc	610,000	23,000	12.2	7	10.4	42.7	34.7	20.7	14.5	16.7	12	22.6	29.9
Wet Chemistry (MG/KG)													
% Solids	--	--	86.5	84.6	82.6	83.3	82.7	81.9	77.1	81.9	79.5	87.9	85.7
Total organic carbon (TOC)	--	--	12,800	19,900	15,200	8,760	4,850	10,100	32,800	17,000	13,300	23,500	27,000
pH	--	--	5	4.1	4.4	7.6	8	6	4	4.5	4.4	4.3	4.4

Table 3-2
Constituents Detected In Surface Soils
St. Juliens Creek Annex Background Investigation

Station ID	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SS11	SJSBK-SS12	SJSBK-SS13	SJSBK-SS14		SJSBK-SS15	SJSBK-SS16	SJSBK-SS17	SJSBK-SS18	SJSBK-SS19	SJSBK-SS20
Sample ID			SJSBK-SS11-000	SJSBK-SS12-000	SJSBK-SS13-000	SJSBK-SS14-000	SJSBK-SS14-000P	SJSBK-SS15-000	SJSBK-SS16-000	SJSBK-SS17-000	SJSBK-SS18-000	SJSBK-SS19-000	SJSBK-SS20-000
Sample Date			02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/12/01	02/12/01	02/12/01
Chemical Name													
Volatile Organic Compounds (UG/KG)													
Acetone	200,000,000	7,800,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semi-volatile Organic Compounds (UG/KG)													
Acenaphthene	120,000,000	4,700,000	77 U	76 U	84 U	91 U	90 U	86 U	99 U	86 U	82 U	79 U	85 U
Acenaphthylene	--	--	77 U	24 J	84 U	91 U	18 J	86 U	99 U	86 U	82 U	79 U	85 U
Anthracene	610,000,000	23,000,000	77 U	76 U	84 U	91 U	90 U	86 U	99 U	86 U	82 U	79 U	85 U
Benzo(a)anthracene	7,800	870	77 U	58 J	18	22 J	48 J	29 J	44 J	24 J	82 U	79 U	85 U
Benzo(a)pyrene	780	87	77 U	47 J	84 U	91 U	38 J	28 J	45 J	22 J	82 U	79 U	85 U
Benzo(b)fluoranthene	7,800	870	77 U	42 J	84 U	91 U	36 J	86 U	49 J	86 U	82 U	79 U	85 U
Benzo(g,h,i)perylene	61,000,000	2,300,000	77 U	39 J	84 U	91 U	32 J	33 J	57 J	28 J	82 U	79 U	85 U
Benzo(k)fluoranthene	78,000	8,700	77 U	39 J	84 U	91 U	30 J	23 J	40 J	20 J	82 U	79 U	85 U
Chrysene	780,000	87,000	77 U	76	20 J	30 J	58 J	41 J	59 J	31 J	82 U	79 U	85 U
Dibenz(a,h)anthracene	780	87	77 U	76 U	84 U	91 U	90 U	86 U	99 U	86 U	82 U	79 U	85 U
Fluoranthene	82,000,000	3,100,000	77 U	92	84 U	41 J	77 J	52 J	72 J	37 J	82 U	79 U	85 U
Fluorene	82,000,000	3,100,000	77 U	76 U	84 U	91 U	90 U	86 U	99 U	86 U	82 U	79 U	85 U
Indeno(1,2,3-cd)pyrene	7,800	870	77 U	31 J	84 U	91 U	26 J	26 J	45 J	22 J	82 U	79 U	85 U
Naphthalene	41,000,000	1,600,000	77 U	76 U	84 U	91 U	90 U	86 U	99 U	86 U	82 U	79 U	85 U
Phenanthrene	61,000,000	2,300,000	77 U	38 J	84 U	91 U	90 U	36 J	47 J	86 U	82 U	79 U	85 U
Pyrene	61,000,000	2,300,000	77 U	120	84 U	36 J	83 J	51 J	77 J	42 J	82 U	79 U	85 U
bis(2-Ethylhexyl)phthalate	410,000	46,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (UG/KG)													
4,4'-DDD	24,000	2,700	16 J	3.8 U	4.2 U	4.5 U	4.4 U	4.2 U	4.9 U	4.3 U	4.1 U	3.9 U	4.2 U
4,4'-DDE	17,000	1,900	1,900	9.4	4.2 U	11	11	16	250	49	2.6 J	3.9 U	5
4,4'-DDT	17,000	1,900	1,600	7.1	2.2 J	9.1	8.8	7.2	110	24	4.1 U	3.9 U	2.9 J
Aldrin	340	38	5.9 U	1.9 U	2.1 U	2.3 U	2.3 U	2.2 U	2.5 U	2.2 U	2.1 U	2 U	2.2 U
Aroclor-1254	2,900	320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	360	40	11 U	3.8 U	4.2 U	4.5 U	4.4 U	4.2 U	4.9 U	4.3 U	4.1 U	3.9 U	4.2 U
Endosulfan I	12,000,000	470,000	5.9 U	1.9 U	2.1 U	2.3 U	2.3 U	2.2 U	1.3 J	2.2 U	2.1 U	2 U	2.2 U
Endosulfan II	12,000,000	470,000	11 U	3.8 U	4.2 U	4.5 U	4.4 U	4.2 U	4.9 U	4.3 U	4.1 U	3.9 U	4.2 U
Endrin	610,000	23,000	11 U	3.8 U	4.2 U	4.5 U	4.4 U	4.2 U	4.9 U	4.3 U	4.1 U	3.9 U	4.2 U
Endrin aldehyde	610,000	23,000	11 U	3.8 U	4.2 U	4.5 U	2.5 J	4.2 U	7.7 J	4.3 U	4.1 U	3.9 U	4.2 U
alpha-Chlordane	16,000	1,800	5.9 U	1.9 U	2.1 U	2.3 U	2.3 U	2.2 U	1.4 J	2.2 U	2.1 U	2 U	2.2 U
delta-BHC	--	--	5.9 U	1.9 U	2.1 U	2.3 U	2.3 U	2.2 U	2.5 U	2.2 U	2.1 U	2 U	2.2 U
gamma-Chlordane	16,000	1,800	5.9 U	1.9 U	2.1 U	2.3 U	2.3 U	2.2 U	2.5 U	2.2 U	2.1 U	2 U	2.2 U
Total Metals (MG/KG)													
Aluminum	2,000,000	78,000	2,780	7,070	6,920	7,040	6,820	5,030	3,720	5,890	4,010	4,640	6,740
Antimony	820	31	0.46 UL	0.46 UL	0.5 UL	0.55 UL	0.54 UL	0.51 UL	0.63 J	0.52 UL	0.49 UL	0.69 B	0.7 B
Arsenic	3.8	0.43	1.6 B	2 J	2.4 J	3	3	4	3.9	2 J	1.6 B	1.7 B	2.8 L
Barium	140,000	5,500	12.6 J	28.1 J	25.2 J	25.5 J	26 J	30.2 J	34.4 J	27.5 J	23.2 J	27.3 J	47.3 J
Beryllium	4,100	160	0.044 B	0.11 B	0.15 B	0.1 B	0.11 B	0.16 B	0.22 B	0.18 B	0.11 B	0.2 B	0.33 B
Calcium	--	--	191 J	335 J	426 J	504 J	547 J	282 J	761 J	345 J	61.5 B	99.7 J	331 J

Table 3-2
Constituents Detected in Surface Soils
St. Juliens Creek Annex Background Investigation

Station ID Sample ID Sample Date	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SS11 SJSBK-SS11-000 02/13/01	SJSBK-SS12 SJSBK-SS12-000 02/13/01	SJSBK-SS13 SJSBK-SS13-000 02/13/01	SJSBK-SS14 SJSBK-SS14-000 02/13/01	SJSBK-SS14 SJSBK-SS14-000P 02/13/01	SJSBK-SS15 SJSBK-SS15-000 02/13/01	SJSBK-SS16 SJSBK-SS16-000 02/13/01	SJSBK-SS17 SJSBK-SS17-000 02/13/01	SJSBK-SS18 SJSBK-SS18-000 02/12/01	SJSBK-SS19 SJSBK-SS19-000 02/12/01	SJSBK-SS20 SJSBK-SS20-000 02/12/01
Chemical Name													
Chromium	6,100	230	3.7 B	7.9	6.9	9.7	9.3	7.7	6.8	7.5	4.9 K	4.9	6.9
Cobalt	41,000	1,600	0.95 U	2.3 J	1.7 J	2.5 J	2.2 J	1.6 J	1.5 B	2 B	1.1 J	1.3 J	1.7 J
Copper	82,000	3,100	2.6 J	5.4 J	7.9	12.4	12.2	11.2	15.5	9.9	5 J	4 J	7.2
Iron	610,000	23,000	1,200	4,390	4,040	5,010	5,140	3,270	3,230	3,880	2,170	2,480	3,990
Lead	400	400	13.2	13.2	22.9	35.7	35.1	54	49.3	26.5	34	17.6	26.6
Magnesium	--	--	137 J	414 J	455 J	519 J	513 J	260 J	149 J	250 J	155 J	200 J	321 J
Manganese	41,000	1,600	4.9	13.5	19.4	23.3	23.8	15.3	22.3	11.7	3.4 J	11.5	79.6
Mercury	610	23	0.084 J	0.088 B	0.13 B	0.26	0.2 B	0.24 B	0.24 B	0.2 B	0.079 J	0.12 J	0.14 B
Nickel	41,000	1,600	2.3 U	4.9 B	6.1 B	9.5 B	8 B	5.2 B	5.2 J	2.5 U	2.4 U	2.8 J	4.7 J
Potassium	--	--	122 U	204 B	270 B	308 B	281 B	135 U	156 U	156 J	168 J	178 J	134 U
Selenium	10,000	390	0.62 UL	0.61 UL	0.68 UL	0.74 UL	0.73 UL	0.82 B	1 J	0.7 UL	0.66 UL	0.64 UL	0.69 UL
Silver	10,000	390	0.49 U	0.48 U	0.53 U	0.58 U	0.57 U	0.54 U	0.62 UL	0.54 UL	0.52 U	0.5 U	0.53 U
Sodium	--	--	46.7 B	44.4 J	170 J	51.9 J	44.5 J	36.6 J	3.7 U	3.2 U	51.1 B	52 B	40.4 J
Vanadium	14,000	550	9.3 J	12.6	21.2	37.3	35.8	27.9	24.7	23.4	14.2	10.8 J	16.7
Zinc	610,000	23,000	7.8	15.1	17.7	25.6	26.5	16.9	24.9	32.3	7.3	9.7	23.9
Wet Chemistry (MG/KG)													
% Solids	--	--	86.7	87.9	79.3	73.1	74.3	78	67.5	77.2	81.5	84.7	78.8
Total organic carbon (TOC)	--	--	10,000	6,750	20,100	51,100	49,200	24,100	36,600	24,800	13,900	10,400	18,800
pH	--	--	4.5	5.4	5.1	4.2	4.2	4.2	4.4	4	4.1	4.2	4.8

Table 3-2
Constituents Detected in Surface Soils
St. Juliens Creek Annex Background Investigation

Station ID Sample ID Sample Date	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SS21 SJSBK-SS21-000 02/09/01	SJSBK-SS22 SJSBK-SS22-000 02/07/01	SJSBK-SS23 SJSBK-SS23-000 02/08/01	SJSBK-SS24 SJSBK-SS24-000 02/07/01	SJSBK-SS24-000P 02/07/01	SJSBK-SS25 SJSBK-SS25-000 02/08/01	SJSBK-SS26 SJSBK-SS26-000 02/08/01	SJSBK-SS27 SJSBK-SS27-000 02/08/01	SJSBK-SS28 SJSBK-SS28-000 02/09/01	SJSBK-SS29 SJSBK-SS29-000 02/09/01	SJSBK-SS30 SJSBK-SS30-000 02/08/01
Chemical Name													
Volatile Organic Compounds (UG/KG)													
Acetone	200,000,000	7,800,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semi-volatile Organic Compounds (UG/KG)													
Acenaphthene	120,000,000	4,700,000	49 J	130 U	97 U	130 U	110 U	93 U	100 U	120 U	240 U	290 U	320 U
Acenaphthylene	--	--	240	130 U	97 U	130 U	110 U	93 U	100 U	120 U	240 U	290 U	320 U
Anthracene	610,000,000	23,000,000	180 J	130 U	97 U	130 U	110 U	93 U	100 U	120 U	240 U	290 U	320 U
Benzo(a)anthracene	7,800	870	650	33 J	97 U	130 U	110 U	23 J	29 J	78 J	68 B	290 U	100 B
Benzo(a)pyrene	780	87	730	30 J	97 U	130 U	110 U	93 U	29 J	92 J	59 J	290 U	99 J
Benzo(b)fluoranthene	7,800	870	820	130 U	97 U	130 U	110 U	93 U	46 J	140	240 U	290 U	130 J
Benzo(g,h,i)perylene	61,000,000	2,300,000	750	130 U	97 U	130 U	110 U	93 U	36 J	120	240 U	290 U	100 J
Benzo(k)fluoranthene	78,000	8,700	600	130 U	97 U	130 U	110 U	93 U	30 J	66 J	54 J	290 U	89 J
Chrysene	780,000	87,000	930	43 J	23 J	130 U	110 U	29 J	48 J	110 J	83 J	87 J	140 J
Dibenz(a,h)anthracene	780	87	260	130 U	97 U	130 U	110 U	93 U	100 U	36 J	240 U	290 U	320 U
Fluoranthene	82,000,000	3,100,000	1,400	54 J	30 J	130 U	110 U	93 U	49 J	160	110 J	100 J	140 J
Fluorene	82,000,000	3,100,000	78 J	130 U	97 U	130 U	110 U	93 U	100 U	120 U	240 U	290 U	320 U
Indeno(1,2,3-cd)pyrene	7,800	870	600	130 U	97 U	130 U	110 U	93 U	29 J	90 J	240 U	290 U	88 J
Naphthalene	41,000,000	1,600,000	83 J	130 U	97 U	130 U	110 U	93 U	100 U	120 U	240 U	290 U	320 U
Phenanthrene	61,000,000	2,300,000	490	130 U	97 U	130 U	110 U	93 U	100 U	44 J	240 U	290 U	320 U
Pyrene	61,000,000	2,300,000	1,400	59 J	97 U	130 U	110 U	93 U	46 J	130	89 J	290 U	110 J
bis(2-Ethylhexyl)phthalate	410,000	46,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (UG/KG)													
4,4'-DDD	24,000	2,700	840	3.6 J	4.8 U	6.2 U	5.7 U	8.9	8.2	4.3 J	36	11 J	16 U
4,4'-DDE	17,000	1,900	430	27	7.7	11	9.8	20	28	5.7 J	28	17	16 U
4,4'-DDT	17,000	1,900	81	4.7 J	4.8 U	13 J	5.7 U	32	5.1 U	5.9 U	12 U	14 U	16 U
Aldrin	340	38	5.5 U	3.2 U	2.5 U	17 J	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
Aroclor-1254	2,900	320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	360	40	11 U	6.2 U	4.8 U	4.3 J	5.7 U	4.6 U	5.1 U	5.9 U	12 U	14 U	16 U
Endosulfan I	12,000,000	470,000	5.5 U	3.2 U	2.5 U	3.2 U	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
Endosulfan II	12,000,000	470,000	11 U	6.2 U	4.8 U	6.7 B	5.7 U	4.6 U	5.1 U	5.9 U	12 U	14 U	16 U
Endrin	610,000	23,000	11 U	6.2 U	4.8 U	9	5.7 U	4.6 U	5.1 U	5.9 U	12 U	14 U	16 U
Endrin aldehyde	610,000	23,000	15	6.2 U	4.8 U	9.1 J	5.7 U	4.6 U	5.1 U	5.9 U	12 U	14 U	16 U
alpha-Chlordane	16,000	1,800	25 J	3.2 U	2.5 U	3.1 J	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
delta-BHC	--	--	5.5 U	3.2 U	2.5 U	6 J	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
gamma-Chlordane	16,000	1,800	24	3.2 U	2.5 U	3.2 U	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
Total Metals (MG/KG)													
Aluminum	2,000,000	78,000	38,200	4,440	2,930	4,070	3,480	2,010	7,610	5,970	19,600	25,600	13,200
Antimony	820	31	2.3 B	0.76 UL	0.58 UL	0.98 B	0.69 UL	1.2 B	0.62 UL	0.92 B	1.7 B	1.8 UL	2 UL
Arsenic	3.8	0.43	32.5	2.2 J	2.7 J	2.6 J	2.1 J	3	1.7 J	5.7	11.8	18.2	7.1 J
Barium	140,000	5,500	71 J	18.7 J	5.5 J	8.1 J	6.7 J	5.6 J	22.6 J	32 J	43.9 J	67 J	30.7 J
Beryllium	4,100	160	3.4	0.3 B	0.09 B	0.24 B	0.24 B	0.21 B	0.27 B	0.54 B	1.2 B	1.5 B	0.66 B
Calcium	--	--	3,100 J	910 J	327 J	1,020 J	1,000 J	219 J	1,000 J	1,360 J	2,270 J	2,950 J	2,120 J

Table 3-2
Constituents Detected in Surface Soils
St. Juliens Creek Annex Background Investigation

Station ID Sample ID Sample Date	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SS21 SJSBK-SS21-000 02/09/01	SJSBK-SS22 SJSBK-SS22-000 02/07/01	SJSBK-SS23 SJSBK-SS23-000 02/08/01	SJSBK-SS24 SJSBK-SS24-000 02/07/01	SJSBK-SS24-000P 02/07/01	SJSBK-SS25 SJSBK-SS25-000 02/08/01	SJSBK-SS26 SJSBK-SS26-000 02/08/01	SJSBK-SS27 SJSBK-SS27-000 02/08/01	SJSBK-SS28 SJSBK-SS28-000 02/09/01	SJSBK-SS29 SJSBK-SS29-000 02/09/01	SJSBK-SS30 SJSBK-SS30-000 02/08/01
Chemical Name													
Chromium	6,100	230	49.9	6.8	4.9	10.4	6.9	5.5	8.2	14.8	38.7	56.6	30.4
Cobalt	41,000	1,600	20.7 J	1.6 U	1.3 B	1.5 U	1.4 U	3.4 B	1.3 U	7.3 J	11.8 J	14.3 J	7.2 J
Copper	82,000	3,100	78	10.8	7.2 J	13	11.9	12.2	12.3	74.3	43.9	53.3	29.1
Iron	610,000	23,000	43,300	1,960	3,450	3,590	2,880	6,780	2,750	15,000	26,500	42,800	12,700
Lead	400	400	228	40.4	13.1	28.2	24.8	22.1	29.4	161	86.3	89.4	57.2
Magnesium	--	--	7,220	829 J	505 J	1,480 J	1,300 J	366 J	1,230 J	2,640	6,780	10,100	5,650
Manganese	41,000	1,600	300	15.9	7.3	19.5	15	15.8	13.7	77.8	149	228	68.3
Mercury	610	23	0.89	0.12 J	0.058 UL	0.099 J	0.1 J	0.055 UL	0.061 UL	0.24	0.3 J	0.4 J	0.33 J
Nickel	41,000	1,600	32.8	3.7 U	4 J	4.5 J	5.9 J	7.7 J	4.3 J	18.6	25 J	26.7 J	16.1 J
Potassium	--	--	3,610	233 B	228 B	626 B	522 B	147 U	485 J	1,250 J	3,850	6,000	3,200 J
Selenium	10,000	390	2.4 J	1 U	0.83 J	1.2 J	1 J	0.76 U	0.95 J	0.96 U	2 UL	2.4 UL	2.6 UL
Silver	10,000	390	1.4 U	0.79 U	0.61 U	0.79 U	0.72 U	0.59 U	0.65 U	0.75 U	1.5 U	1.8 U	2.1 U
Sodium	--	--	8,270	1,160 J	1,320 J	4,770	4,210	612 J	2,770	4,710	16,800	20,700	22,600
Vanadium	14,000	550	72.5	15.1 J	8.4 J	13.1 J	10.2 J	7.5 J	16.4	20.8	60.6	68.3	58.3
Zinc	610,000	23,000	343	19.1	18.3	32.8	29.7	76.3	23.5	230	259	147	73
Wet Chemistry (MG/KG)													
% Solids	--	--	30.8	52.9	68.8	53.3	58.2	71.6	64.4	56.1	27.4	22.9	20.5
Total organic carbon (TOC)	--	--	81,300	25,300	16,700	35,000	31,300	8,240	32,700	29,700	92,500	126,000	138,000
pH	--	--	7.2	6.9	6.5	6.3	6.6	6.8	6.6	7	7.3	6.8	6.8

Table 3-2
Constituents Detected in Surface Soils
St. Juliens Creek Annex Background Investigation

Station ID Sample ID Sample Date	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SS31 SJSBK-SS31-000 02/12/01	SJSBK-SS32 SJSBK-SS32-000 02/12/01	SJSBK-SS33 SJSBK-SS33-000 02/12/01	SJSBK-SS34 SJSBK-SS34-000 02/12/01	SJSBK-SS34 SJSBK-SS34-000P 02/12/01	SJSBK-SS35 SJSBK-SS35-000 02/12/01	SJSBK-SS36 SJSBK-SS36-000 02/12/01	SJSBK-SS37 SJSBK-SS37-000 02/12/01	SJSBK-SS38 SJSBK-SS38-000 02/12/01	SJSBK-SS39 SJSBK-SS39-000 02/12/01	SJSBK-SS40 SJSBK-SS40-000 02/12/01
Chemical Name													
Volatile Organic Compounds (UG/KG)													
Acetone	200,000,000	7,800,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semi-volatile Organic Compounds (UG/KG)													
Acenaphthene	120,000,000	4,700,000	80 U	38 J	78 U	81 U	82 U	78 U	88 U	84 U	79 U	82 U	88 U
Acenaphthylene	--	--	80 U	42 J	32 J	36 J	24 J	78 U	88 U	84 U	21 J	82 U	88 U
Anthracene	610,000,000	23,000,000	80 U	70 J	39 J	67 J	37 J	78 U	88 U	84 U	16 J	82 U	88 U
Benzo(a)anthracene	7,800	870	53 J	300	180	260	150	78 U	44 J	42 J	76 J	70 J	88 U
Benzo(a)pyrene	780	87	57 J	300	170	250	140	78 U	43 J	38 J	82	69 J	88 U
Benzo(b)fluoranthene	7,800	870	59 J	310	200	420	230	78 U	39 J	31 J	120	110	88 U
Benzo(g,h,i)perylene	61,000,000	2,300,000	51 J	290 J	180	250 J	130 J	78 U	35 J	30 J	63 J	63 J	88 U
Benzo(k)fluoranthene	78,000	8,700	55 J	240	180	270	160	78 U	37 J	29 J	83	68 J	88 U
Chrysene	780,000	87,000	74 J	380	230	350	210	78 U	58 J	53 J	120	110	88 U
Dibenz(a,h)anthracene	780	87	80 U	97	42 J	110	57 J	78 U	88 U	84 U	22 J	82 U	88 U
Fluoranthene	82,000,000	3,100,000	82	500	310	430	230	78 U	76 J	63 J	120	97	88 U
Fluorene	82,000,000	3,100,000	80 U	30 J	78 U	81 U	82 U	78 U	88 U	84 U	79 U	82 U	88 U
Indeno(1,2,3-cd)pyrene	7,800	870	42 J	250	160	240	130	78 U	30 J	23 J	58 J	55 J	88 U
Naphthalene	41,000,000	1,600,000	80 U	14 J	19 J	30 J	78 J	78 U	88 U	84 U	79 U	82 U	88 U
Phenanthrene	61,000,000	2,300,000	40 J	310	140	140	61 J	78 U	49 J	67 J	30 J	39 J	88 U
Pyrene	61,000,000	2,300,000	99	520	340	430	240	78 U	83 J	96	130	100	88 U
bis(2-Ethylhexyl)phthalate	410,000	46,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (UG/KG)													
4,4'-DDD	24,000	2,700	32 J	21	3.9 U	4 U	4.1 U	3.9 U	2.4 J	2.6 J	2.9 J	2.3 J	4.3 U
4,4'-DDE	17,000	1,900	1,700	240	55	4 U	4.1 U	3.9 U	160	6.5	61	15	4.3 U
4,4'-DDT	17,000	1,900	920	36	27	2.9 J	4.1 U	3.9 U	34	12	13 J	15	4.3 U
Aldrin	340	38	8.1 U	2 U	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U
Aroclor-1254	2,900	320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	360	40	16 U	3.9 U	3.9 U	4 U	4.1 U	3.9 U	4.4 U	4.1 U	3.9 U	4 U	4.3 U
Endosulfan I	12,000,000	470,000	8.1 U	2 U	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U
Endosulfan II	12,000,000	470,000	16 U	3.9 U	3.9 U	4 U	4.1 U	3.9 U	4.4 U	4.1 U	3.9 U	4 U	4.3 U
Endrin	610,000	23,000	16 U	3.9 U	3.9 U	4 U	4.1 U	3.9 U	4.4 U	4.1 U	3.9 U	4 U	4.3 U
Endrin aldehyde	610,000	23,000	16 U	3.9 U	3.9 U	4 U	4.1 U	3.9 U	4.4 U	4.1 U	3.9 U	4 U	4.3 U
alpha-Chlordane	16,000	1,800	8.1 U	23 J	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U
delta-BHC	--	--	8.1 U	2 U	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U
gamma-Chlordane	16,000	1,800	8.1 U	5.3	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U
Total Metals (MG/KG)													
Aluminum	2,000,000	78,000	3,880	5,550	4,000	18,100	12,600	2,930	9,680	7,690	6,820	3,030	9,780
Antimony	820	31	0.48 UL	0.48 UL	1 B	0.9 B	0.49 UL	0.51 B	0.53 UL	0.86 B	0.47 UL	0.65 J	0.53 UL
Arsenic	3.8	0.43	4.9	5.1	1.8 J	4.1 L	4.2 L	1.3 J	4 L	3.9 L	3.1 L	3.3	3.3
Barium	140,000	5,500	27.5 J	32.2 J	30.9 J	71.8	60.2	18.3 J	50.5 J	40 J	33.8 J	14.4 J	39.2 J
Beryllium	4,100	160	0.14 B	0.22 B	0.14 B	0.6 B	0.34 B	0.13 B	0.27 B	0.3 B	0.21 B	0.3 B	0.33 B
Calcium	--	--	367 J	914 J	594 J	2,110	1,800	753 J	578 J	1,050 J	585 J	9,490	1,100 J

Table 3-2
Constituents Detected in Surface Soils
St. Juliens Creek Annex Background Investigation

Station ID Sample ID Sample Date	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SS31 SJSBK-SS31-000 02/12/01	SJSBK-SS32 SJSBK-SS32-000 02/12/01	SJSBK-SS33 SJSBK-SS33-000 02/12/01	SJSBK-SS34 SJSBK-SS34-000 02/12/01	SJSBK-SS34 SJSBK-SS34-000P 02/12/01	SJSBK-SS35 SJSBK-SS35-000 02/12/01	SJSBK-SS36 SJSBK-SS36-000 02/12/01	SJSBK-SS37 SJSBK-SS37-000 02/12/01	SJSBK-SS38 SJSBK-SS38-000 02/12/01	SJSBK-SS39 SJSBK-SS39-000 02/12/01	SJSBK-SS40 SJSBK-SS40-000 02/12/01
Chemical Name													
Chromium	6,100	230	6.6	10.5	5.5	31.8	22	6.4	13.2	13.3	9.5	7.1	16.6
Cobalt	41,000	1,600	0.98 U	2.5 J	1 J	8.5 J	5.1 J	1.2 J	2.1 J	5 J	1.9 J	3.9 B	2.6 B
Copper	82,000	3,100	10.8	12.8	8.9	47.1	39.1	6.2	8.4	9	7.5	6.3	27.1
Iron	610,000	23,000	3,020	9,990	4,300	21,500	13,300	3,610	5,800	12,100	5,090	7,170	10,600
Lead	400	400	58.1	68.6	111	31.6	34.1	32.1	52.9	22.6	23.5	18	39.4
Magnesium	--	--	216 J	918 J	274 J	2,490	1,610	322 J	563 J	558 J	468 J	718 J	1,320
Manganese	41,000	1,600	12.7	47.9	29.7	91.5	59.3	13.7	29.3	242	29.1	99.3	26.2
Mercury	610	23	0.15 B	0.14 B	0.25 B	0.42	0.7	0.081 B	0.13 B	0.13 B	0.13 B	0.12 B	0.18 B
Nickel	41,000	1,600	2.8 J	7.4 J	4.2 J	20.3	13 K	2.5 J	5.6 J	3.9 J	4.7 J	6.3 J	5.7 J
Potassium	--	--	126 U	556 B	123 U	1,430	1,020 J	158 B	215 B	436 B	218 B	476 J	774 J
Selenium	10,000	390	0.64 UL	0.79 B	0.63 UL	0.65 UL	0.66 UL	0.63 UL	0.72 UL	0.68 UL	0.79 B	0.66 UL	1.3 B
Silver	10,000	390	0.5 U	0.5 U	0.49 U	0.51 U	0.52 U	0.49 U	0.56 U	0.53 U	0.5 U	0.51 UL	0.55 UL
Sodium	--	--	39.2 B	45.8 J	44.4 J	67.5 J	62 J	32.4 B	47.1 J	31 B	33.2 J	27.8 J	538 J
Vanadium	14,000	550	16.2	24.5	15.4	44.5	31	18.5	28.8	24.6	13.1	17.2	28.8
Zinc	610,000	23,000	32	50.9	62.2	164	102	64	45.8	31.2	30.1	34.5	91.1
Wet Chemistry (MG/KG)													
% Solids	--	--	83.8	83.9	85.4	82.5	81.4	85.6	75.5	79.7	84.8	81.8	76.1
Total organic carbon (TOC)	--	--	12,800	17,700	10,900	12,200	22,900	10,100	19,200	20,900	17,900	20,300	6,880
pH	--	--	5.2	5.2	5.5	6.1	6.3	8.1	5.4	5.8	5.6	7.4	7.1

Table 3-2
Constituents Detected in Surface Soils
St. Juliens Creek Annex Background Investigation

Station ID	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SS41	SJSBK-SS42	SJSBK-SS43	SJSBK-SS44		SJSBK-SS45	SJSBK-SS46	SJSBK-SS47	SJSBK-SS48	SJSBK-SS49	SJSBK-SS50
Sample ID			SJSBK-SS41-000	SJSBK-SS42-000	SJSBK-SS43-000	SJSBK-SS44-000	SJSBK-SS44-000P	SJSBK-SS45-000	SJSBK-SS46-000	SJSBK-SS47-000	SJSBK-SS48-000	SJSBK-SS49-000	SJSBK-SS50-000
Sample Date			02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	04/19/99	04/19/99	04/19/99	04/19/99
Chemical Name													
Volatile Organic Compounds (UG/KG)													
Acetone	200,000,000	7,800,000	NA	NA	NA	NA	NA	NA	NA	74	37	17	61 J
Semi-volatile Organic Compounds (UG/KG)													
Acenaphthene	120,000,000	4,700,000	19 J	100 U	98 U	96 U	97 U	94 U	87 U	480 UJ	470 UJ	480 UJ	560 UJ
Acenaphthylene	--	--	200	64 J	240	210	180	80 J	31 J	63 J	250 J	88 J	240 J
Anthracene	610,000,000	23,000,000	130	35 J	130	120	96 J	47 J	20 J	69 J	360 J	91 J	340 J
Benzo(a)anthracene	7,800	870	600	150	610	510	400	190	110	210 J	1,400 J	360 J	1,200 J
Benzo(a)pyrene	780	87	580	180	650	520	420	250	110	150 J	1,200 J	260 J	790 J
Benzo(b)fluoranthene	7,800	870	1,500	400	1,500	1,600	1,100	640	180	790 J	3,300 J	1,200 J	3,200 J
Benzo(g,h,i)perylene	61,000,000	2,300,000	990	360	1,300	1,000	820	510	140	310 J	1,600 J	500 J	1,400 J
Benzo(k)fluoranthene	78,000	8,700	730	220	850	630	610	340	130	200 J	1,500 J	340 J	1,400 J
Chrysene	780,000	87,000	1,200	310	1,200	1,100	820	460	170	430 J	2,700 J	680	2,400 J
Dibenz(a,h)anthracene	780	87	480	150	630	490	380	210	57 J	480 UJ	470 UJ	480 UJ	560 UJ
Fluoranthene	82,000,000	3,100,000	730	180	670	710	570	210	140	230 J	1,100 J	350 J	880 J
Fluorene	82,000,000	3,100,000	94 U	100 U	98 U	96 U	97 U	94 U	87 U	480 UJ	470 UJ	480 UJ	560 UJ
Indeno(1,2,3-cd)pyrene	7,800	870	960	320	1,300	970	780	450	120	330 J	1,700 J	520 J	1,800 J
Naphthalene	41,000,000	1,600,000	45 J	19 J	56 J	62 J	52 J	24 J	87 U	480 UJ	470 UJ	480 UJ	62 J
Phenanthrene	61,000,000	2,300,000	120	35 J	84 J	97	75 J	53 J	48 J	57 J	260 J	68 J	190 J
Pyrene	61,000,000	2,300,000	640	160	570	570	470	190	120	210 J	1,100 J	310 J	890 J
bis(2-Ethylhexyl)phthalate	410,000	46,000	NA	NA	NA	NA	NA	NA	NA	53 J	57 J	54 J	57 J
Pesticide/Polychlorinated Biphenyls (UG/KG)													
4,4'-DDD	24,000	2,700	4.7 U	5 U	4.8 U	2.6 J	3.8 J	4.7 U	4.3 U	NA	NA	NA	NA
4,4'-DDE	17,000	1,900	9.4	6	4.8 U	8	7.7 J	4.6 J	4.3 U	2.1 J	4.7 UJ	2.9 J	5.5 UJ
4,4'-DDT	17,000	1,900	18	15	4.6 J	22	22	8.5	2.5 J	11 J	11 J	8.1 J	5.5 UJ
Aldrin	340	38	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U	2.4 U	2.2 U	NA	NA	NA	NA
Aroclor-1254	2,900	320	NA	NA	NA	NA	NA	NA	NA	9.6 J	13 J	16 J	14 J
Dieldrin	360	40	4.7 U	5 U	4.8 U	4.7 U	4.8 U	4.7 U	4.3 U	NA	NA	NA	NA
Endosulfan I	12,000,000	470,000	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U	2.4 U	2.2 U	NA	NA	NA	NA
Endosulfan II	12,000,000	470,000	4.7 U	5 U	4.8 U	4.7 U	4.8 U	4.7 U	4.3 U	NA	NA	NA	NA
Endrin	610,000	23,000	4.7 U	5 U	4.8 U	4.7 U	4.8 U	4.7 U	4.3 U	NA	NA	NA	NA
Endrin aldehyde	610,000	23,000	4.7 U	5 U	4.8 U	4.7 U	4.8 U	4.7 U	4.3 U	NA	NA	NA	NA
alpha-Chlordane	16,000	1,800	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U	2.4 U	2.2 U	NA	NA	NA	NA
delta-BHC	--	--	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U	2.4 U	2.2 U	NA	NA	NA	NA
gamma-Chlordane	16,000	1,800	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U	2.4 U	2.2 U	NA	NA	NA	NA
Total Metals (MG/KG)													
Aluminum	2,000,000	78,000	16,400	17,600	19,900	21,900	18,700	17,500	8,930	17,000	14,800	17,700	19,100
Antimony	820	31	1.2 J	2 J	1.4 J	0.9 J	0.92 J	1.1 J	0.75 J	0.74 U	0.63 U	0.67 U	0.74 U
Arsenic	3.8	0.43	12.1	23.6	16.5	15.3	14.2	13.8	8.7	18	20.1	17.2	22.4
Barium	140,000	5,500	62.2	79	78.1	75.7	71.4	108	67	75.6	66.3	83.5	71.6
Beryllium	4,100	160	0.63 B	1.3 B	0.61 B	0.68 B	0.59 B	0.57 B	0.53 B	0.51 J	0.46 J	0.71 J	0.63 J
Calcium	--	--	656 J	3,260	605 J	1,180 J	1,150 J	1,310 J	2,990	1,470	556 J	508 J	936 J

Table 3-2
Constituents Detected in Surface Soils
St. Juliens Creek Annex Background Investigation

Station ID	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SS41	SJSBK-SS42	SJSBK-SS43	SJSBK-SS44		SJSBK-SS45	SJSBK-SS46	SJSBK-SS47	SJSBK-SS48	SJSBK-SS49	SJSBK-SS50
Sample ID			SJSBK-SS41-000	SJSBK-SS42-000	SJSBK-SS43-000	SJSBK-SS44-000	SJSBK-SS44-000P	SJSBK-SS45-000	SJSBK-SS46-000	SJSBK-SS47-000	SJSBK-SS48-000	SJSBK-SS49-000	SJSBK-SS50-000
Sample Date			02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	04/19/99	04/19/99	04/19/99	04/19/99
Chemical Name													
Chromium	6,100	230	35.2	35.1	42.1	44.9	41.1	37.2	21.2 L	39.3	39.7	38.6	45
Cobalt	41,000	1,600	8.8 J	15.3	9.7 J	9.3 J	8.6 J	8.7 J	7.2 J	6.3 J	4.5 J	5.4 J	5.6 J
Copper	82,000	3,100	38	41.4	45	50.8	50.2	36.2	24.9	38.3	57.8	47.4	46.6
Iron	610,000	23,000	32,200	39,200	40,800	38,600	35,500	33,100	21,200	37,600	38,100	32,100	42,800
Lead	400	400	99.7	124	137	98.8	114	137	54.9 L	80.3	93.1	112	111
Magnesium	--	--	3,210	4,430	3,680	4,250	3,880	3,440	2,180	3,620	3,030	3,010	3,610
Manganese	41,000	1,600	126	224	125	136	132	124	166	157	115	115	137
Mercury	610	23	0.66	0.61	0.96	1.2	1.2	0.7	0.37	0.59	1.1	0.74	1.2
Nickel	41,000	1,600	12.6 K	23.9 K	11.7 J	14 K	10.8 J	12.8 K	9.4 J	12.8	11	12.7	13.2
Potassium	--	--	3,260	2,850	3,680	3,510	3,410	3,150	1,850	2,980	3,830	2,780	4,870
Selenium	10,000	390	1.1 J	0.82 UL	1.9 L	1.6 L	2.4 L	2.1 L	1.8 B	0.92 J	1.8	1.5	1.2 J
Silver	10,000	390	0.59 UL	0.64 UL	0.61 UL	0.6 UL	0.61 UL	0.59 UL	0.55 U	0.25 U	0.35 J	0.22 U	0.31 J
Sodium	--	--	276 J	133 J	197 J	219 J	169 J	176 J	151 J	168 J	806 J	134 J	392 J
Vanadium	14,000	550	53.4	50.7	64.4	54	48	56	33.5	57.5	53.2	65.6	63.7
Zinc	610,000	23,000	92.1	162	90	107	99.2	90.6	91.7	99	83.3	78.9	82.1
Wet Chemistry (MG/KG)													
% Solids	--	--	70.9	65.7	68.4	69.8	68.5	70.7	76.4	68.7	70.9	70.5	60
Total organic carbon (TOC)	--	--	27,300	34,300	22,200	28,400	35,500	33,900	30,700	NA	NA	NA	NA
pH	--	--	4.2	4.9	4	4.3	4.6	4.3	5.8	4.26	3.91	3.76	3.84

Tabe 3-3
Constituents Detected in Subsurface Soils
St. Juliens Creek Annex Background Investigation

Station ID	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SB01	SJSBK-SB02	SJSBK-SB03	SJSBK-SB04		SJSBK-SB05	SJSBK-SB06	SJSBK-SB07	SJSBK-SB08	SJSBK-SB09	SJSBK-SB10	SJSBK-SB11	SJSBK-SB12	SJSBK-SB13
Sample ID			SB01-001	SB02-001	SB03-001	SB04-001	SB04-001P	SB05-001	SB06-001	SB07-001	SB08-001	SB09-001	SB10-001	SB11-001	SB12-001	SB13-001
Sample Date			02/12/01	02/14/01	02/09/01	02/12/01	02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/12/01	02/13/01	02/13/01
Chemical Name																
Semi-volatile Organic Compounds (UG/KG)																
Acenaphthene	120,000,000	4,700,000	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Acenaphthylene	--	--	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Anthracene	610,000,000	23,000,000	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Benzo(a)anthracene	7,800	870	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Benzo(a)pyrene	780	87	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Benzo(b)fluoranthene	7,800	870	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Benzo(g,h,i)perylene	61,000,000	2,300,000	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Benzo(k)fluoranthene	78,000	8,700	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Chrysene	780,000	87,000	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Dibenz(a,h)anthracene	780	87	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Fluoranthene	82,000,000	3,100,000	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Fluorene	82,000,000	3,100,000	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Indeno(1,2,3-cd)pyrene	7,800	870	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Naphthalene	41,000,000	1,600,000	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Phenanthrene	61,000,000	2,300,000	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Pyrene	61,000,000	2,300,000	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U
Pest/PCBs (UG/KG)																
4,4'-DDD	24,000	2,700	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	3.9 U	3.9 U	3.9 U	3.8 U	3.8 U	3.7 U
4,4'-DDE	17,000	1,900	3.7 U	3.8 U	3.8 U	12	37	18	3.9 U	2.6 J	3.9 U	3.9 U	7.8 J	18	3.8 U	3.7 U
4,4'-DDT	17,000	1,900	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	3.9 U	3.9 U	7.2 J	19	3.8 U	3.7 U
Dieldrin	360	40	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	3.9 U	3.9 U	4 J	3.8 U	3.8 U	3.7 U
Endosulfan I	12,000,000	470,000	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	1.9 U
Endosulfan II	12,000,000	470,000	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	3.9 U	3.9 U	7.4 J	3.8 U	3.8 U	3.7 U
Endrin	610,000	23,000	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	2.2 J	3.9 U	8.9 J	3.8 U	3.8 U	3.7 U
Endrin aldehyde	610,000	23,000	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	3.9 U	3.9 U	4.2 J	3.8 U	3.8 U	3.7 U
alpha-Chlordane	16,000	1,800	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	8.4	2 U	2 U	1.9 U
beta-BHC	3,200	350	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	1.9 U
gamma-Chlordane	16,000	1,800	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	1.7 J	2 U	2 U	1.9 U
Total Metals (MG/KG)																
Aluminum	2,000,000	78,000	6,600	7,150	12,100	4,060	11,400	783	4,930	6,060	9,150	11,300	14,000	9,980	13,500	16,100
Antimony	820	31	0.45 UL	0.46 UL	0.53 B	0.6 UL	0.53 UL	0.46 UL	0.48 UL	0.46 UL	0.47 UL	0.47 UL	0.47 UL	0.47 UL	0.46 UL	0.45 UL
Arsenic	3.8	0.43	6.9	1.1 J	2.5	1.5 B	4.4	0.48 U	2.9	1.3 J	2.6	1.7 J	4.8	1.9 B	2 J	1.1 J
Barium	140,000	5,500	30.3 J	31 J	38.3 J	33.5 J	45.2 J	4.2 J	44.6 J	37.1 J	28.6 J	50.9	38.3 J	47	51.9	50.1
Beryllium	4,100	160	0.16 B	0.17 B	0.2 B	0.087 B	0.29 B	0.072 B	0.19 B	0.11 B	0.063 B	0.14 B	0.13 B	0.15 B	0.09 B	0.097 B
Calcium	--	--	129 J	102 J	76.2 J	1,180 J	2,030	9,060	99 J	293 J	146 J	263 J	167 J	236 J	196 J	223 J
Chromium	6,100	230	11.3	7.1	12.4	5.8 K	17.6	2.7 B	3.4	6.5	11.7	13.2	19.7	10.3	13.8	14.3
Cobalt	41,000	1,600	1.3 J	0.94 U	1.3 B	1.2 U	2.9 J	0.95 U	1.2 J	1.4 J	1.3 J	2 J	2.6 J	2.2 J	2.5 J	2.5 J
Copper	82,000	3,100	2.6 J	2 J	3.4 J	4.1 J	7.2	1.2 J	3.4 J	1.7 B	3.2 J	3.5 J	4.7 J	2.1 J	3.3 J	4 J
Iron	610,000	23,000	7,110	3,380	5,680	2,690	13,400	1,470	2,370	3,750	5,220	5,630	9,440	4,010	6,550	3,430
Lead	400	400	5.3	6	7.3	14	17.2	3.7	4.7	5.7	6.2	8	8.9	6.5	10.2	8.8

Tabe 3-3
Constituents Detected in Subsurface Soils
St. Juliens Creek Annex Background Investigation

Station ID	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SB01	SJSBK-SB02	SJSBK-SB03	SJSBK-SB04		SJSBK-SB05	SJSBK-SB06	SJSBK-SB07	SJSBK-SB08	SJSBK-SB09	SJSBK-SB10	SJSBK-SB11	SJSBK-SB12	SJSBK-SB13
Sample ID			SB01-001	SB02-001	SB03-001	SB04-001	SB04-001P	SB05-001	SB06-001	SB07-001	SB08-001	SB09-001	SB10-001	SB11-001	SB12-001	SB13-001
Sample Date			02/12/01	02/14/01	02/09/01	02/12/01	02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/12/01	02/13/01	02/13/01
Chemical Name																
Magnesium	--	--	268 J	336 J	448 J	294 J	1,360	155 J	209 J	211 J	421 J	441 J	631 J	430 J	444 J	553 J
Manganese	41,000	1,600	4.6	10	9.1	9.3	40	17.2	12.1	6.3	9.1	8.3	12.2	7.8	7.1	8.5
Mercury	610	23	0.046 J	0.045 UL	0.048 J	0.077 J	0.084 J	0.051 J	0.13 B	0.095 B	0.1 B	0.094 B	0.09 B	0.046 U	0.088 B	0.09 B
Nickel	41,000	1,600	2.2 J	3.2 J	4.6 J	2.9 U	7.2 J	2.3 U	5.5 B	3.4 B	5.7 B	5.4 B	6.9 B	3 J	5.4 B	7.5 B
Potassium	--	--	219 J	120 U	218 B	175 J	1,020 J	122 U	126 U	180 B	289 B	194 B	409 B	221 J	367 B	310 B
Selenium	10,000	390	0.6 UL	0.62 U	0.62 U	0.81 UL	0.71 UL	0.62 UL	0.65 UL	0.62 UL	0.63 UL	0.64 UL	0.63 UL	0.63 UL	0.62 UL	0.61 UL
Silver	10,000	390	0.47 U	0.48 U	0.48 U	0.63 U	0.55 U	0.48 U	0.5 U	0.48 U	0.49 U	0.5 U	0.49 U	0.49 U	0.48 U	0.48 U
Sodium	--	--	32.7 B	34.2 B	33.1 B	243 J	443 J	66.1 J	40.1 J	51 J	42.1 J	82.1 J	42.4 J	112 B	46.1 J	58.1 J
Vanadium	14,000	550	17.4	12.2	18.1	7.2 J	20.9	2.8 B	7.5 J	10.2 J	15	16.4	22.5	14.8	20.2	14.3
Zinc	610,000	23,000	3.4 J	8	8.6	29.8	35.7	7.7	11.7	3.8 J	5.9	6.2	9.5	7.1	7.2	8.3
Wet Chemistry (MG/KG)																
% Solids	--	--	89.4	87.6	87	67.1	76.2	86.7	83.7	87.8	85.7	84.6	85.3	85.9	86.8	88.4
Total organic carbon (TOC)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Tabe 3-3
Constituents Detected in Subsurface Soils
St. Juliens Creek Annex Background Investigation

Station ID	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SB14		SJSBK-SB15	SJSBK-SB16	SJSBK-SB17	SJSBK-SB18	SJSBK-SB19	SJSBK-SB20	SJSBK-SB21	SJSBK-SB22	SJSBK-SB23		SJSBK-SB24		SJSBK-SB25
Sample ID			SB14-001	SB14-001P	SB15-001	SB16-001	SB17-001	SB18-001	SB19-001	SB20-001	SB21-001	SB22-001	SB23-000	SB23-001	SB24-001	SB24-001P	SB25-001
Sample Date			02/13/01	02/13/01	02/13/2001	02/13/01	02/13/01	02/12/01	02/12/01	02/12/01	02/09/01	02/07/01	02/08/01	02/08/01	02/07/01	02/07/01	02/08/01
Chemical Name																	
Semi-volatile Organic Compounds (UG/KG)																	
Acenaphthene	120,000,000	4,700,000	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	46 J	110 U	97 U	95 U	110 U	110 U	110 U
Acenaphthylene	--	--	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	210	110 U	97 U	95 U	110 U	110 U	110 U
Anthracene	610,000,000	23,000,000	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	170 J	110 U	97 U	95 U	110 U	110 U	110 U
Benzo(a)anthracene	7,800	870	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	740	27 J	97 U	95 U	110 U	110 U	47 J
Benzo(a)pyrene	780	87	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	770	25 J	97 U	95 U	110 U	110 U	39 J
Benzo(b)fluoranthene	7,800	870	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	910	110 U	97 U	95 U	110 U	110 U	110 U
Benzo(g,h,i)perylene	61,000,000	2,300,000	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	620	110 U	97 U	95 U	110 U	110 U	35 J
Benzo(k)fluoranthene	78,000	8,700	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	700	110 U	97 U	95 U	110 U	110 U	30 J
Chrysene	780,000	87,000	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	980	35 J	23 J	95 U	110 U	110 U	53 J
Dibenz(a,h)anthracene	780	87	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	180 J	110 U	97 U	95 U	110 U	110 U	110 U
Fluoranthene	82,000,000	3,100,000	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	2,500	49 J	30 J	95 U	110 U	110 U	72 J
Fluorene	82,000,000	3,100,000	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	58 J	110 U	97 U	95 U	110 U	110 U	110 U
Indeno(1,2,3-cd)pyrene	7,800	870	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	560	110 U	97 U	95 U	110 U	110 U	26 J
Naphthalene	41,000,000	1,600,000	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	80 J	110 U	97 U	95 U	110 U	110 U	110 U
Phenanthrene	61,000,000	2,300,000	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	320	110 U	97 U	95 U	110 U	110 U	38 J
Pyrene	61,000,000	2,300,000	76 U	75 U	74 U	75 U	77 U	80 U	78 U	80 U	2,000	54 J	97 U	95 U	110 U	110 U	88 J
Pest/PCBs (UG/KG)																	
4,4'-DDD	24,000	2,700	3.7 U	3.7 U	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	280	6.1	4.8 U	4.7 U	5.3 U	5.4 U	5.4 U
4,4'-DDE	17,000	1,900	3.7 U	3.7 U	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	140	17	7.7	4.7 U	5 J	3.4 J	3.4 J
4,4'-DDT	17,000	1,900	3.7 U	3.7 U	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	26	4.9 J	4.8 U	4.7 U	5.3 U	5.4 U	5.4 U
Dieldrin	360	40	3.7 U	3.7 U	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	9.9 U	5.6 U	4.8 U	4.7 U	5.3 U	5.4 U	5.4 U
Endosulfan I	12,000,000	470,000	1.9 U	1.9 U	1.9 U	1.9 U	2 U	2 U	2 U	2 U	8.4 J	2.9 U	2.5 U	2.4 U	2.7 U	2.8 U	2.8 U
Endosulfan II	12,000,000	470,000	3.7 U	3.7 U	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	9.9 U	5.6 U	4.8 U	4.7 U	5.3 U	5.4 U	5.4 U
Endrin	610,000	23,000	3.7 U	3.7 U	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	9.9 U	5.6 U	4.8 U	4.7 U	5.3 U	5.4 U	5.4 U
Endrin aldehyde	610,000	23,000	3.7 U	3.7 U	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	9.9 U	5.6 U	4.8 U	4.7 U	5.3 U	5.4 U	5.4 U
alpha-Chlordane	16,000	1,800	1.9 U	1.9 U	1.9 U	1.9 U	2 U	2 U	2 U	2 U	5.1 U	2.9 U	2.5 U	2.4 U	2.7 U	2.8 U	2.8 U
beta-BHC	3,200	350	1.9 U	1.9 U	1.3 J	1.9 U	2 U	2 U	2 U	2 U	5.1 U	2.9 U	2.5 U	2.4 U	2.7 U	2.8 U	2.8 U
gamma-Chlordane	16,000	1,800	1.9 U	1.9 U	1.9 U	1.9 U	2 U	2 U	2 U	2 U	8.9	2.9 U	2.5 U	2.4 U	2.7 U	2.8 U	2.8 U
Total Metals (MG/KG)																	
Aluminum	2,000,000	78,000	12,800	8,190	9,530	6,660	12,100	10,500	8,510	11,400	26,700	4,230	2,930	5,600	2,930	2,980	9,080
Antimony	820	31	0.45 UL	0.45 UL	0.44 UL	0.45 UL	0.46 UL	0.48 UL	0.47 UL	1.2 B	1.2 UL	0.68 UL	0.58 UL	0.57 UL	0.64 UL	0.95 B	0.87 B
Arsenic	3.8	0.43	3	2.1 J	4.7	1.5 J	1.4 J	3.6	1.6 B	2.2 J	23.6	3.6	2.7 J	2.9	2.9 J	2.9 J	5.2
Barium	140,000	5,500	37.1 J	32.5 J	27.8 J	18.4 J	53.9	52.6	44.3 J	59.3	57.1 J	19.4 J	5.5 J	10.5 J	5.8 J	6.4 J	25.5 J
Beryllium	4,100	160	0.15 B	0.088 B	0.091 B	0.18 B	0.17 B	0.3 B	0.2 B	0.23 B	2.4 J	0.36 B	0.09 B	0.15 B	0.13 B	0.14 B	0.76 B
Calcium	--	--	172 J	143 J	119 J	71.9 B	173 J	78.5 J	122 J	273 J	2,530 J	1,120 J	327 J	529 J	698 J	726 J	767 J
Chromium	6,100	230	14.4	9.2	13.4	7.1	15.3	14.1	9.5	12.4	40	6.1	4.9	8.4	5.2	5.8	11.8
Cobalt	41,000	1,600	2.3 J	1.1 J	1.3 J	1.7 B	1.6 B	2.7 J	1.4 J	1.3 J	16.4 J	2.3 B	1.3 B	1.2 U	1.3 U	1.3 U	43.9
Copper	82,000	3,100	3.7 J	2.2 J	3.4 J	1.1 B	5.4 J	4.2 J	2.2 J	0.48 U	64	10.2	7.2 J	5.1 J	10	17.3	10.5
Iron	610,000	23,000	7,040	5,090	6,060	7,310	4,480	17,900	5,120	6,670	36,200	2,740	3,450	5,400	4,290	5,820	9,690
Lead	400	400	8	5.9	6.5	4.8	7.5	8.8	6.4	8.9	174	37.2	13.1	12.2	14.1	16.7	21.5

Tabo 3-3
Constituents Detected in Subsurface Soils
St. Juliens Creek Annex Background Investigation

Station ID	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SB14		SJSBK-SB15	SJSBK-SB16	SJSBK-SB17	SJSBK-SB18	SJSBK-SB19	SJSBK-SB20	SJSBK-SB21	SJSBK-SB22	SJSBK-SB23		SJSBK-SB24		SJSBK-SB25
Sample ID			SB14-001	SB14-001P	SB15-001	SB16-001	SB17-001	SB18-001	SB19-001	SB20-001	SB21-001	SB22-001	SB23-000	SB23-001	SB24-001	SB24-001P	SB25-001
Sample Date			02/13/01	02/13/01	02/13/2001	02/13/01	02/13/01	02/12/01	02/12/01	02/12/01	02/09/01	02/07/01	02/08/01	02/08/01	02/07/01	02/07/01	02/08/01
Chemical Name																	
Magnesium	--	--	590 J	349 J	440 J	217 J	348 J	391 J	325 J	295 J	5,950	988 J	505 J	988 J	1,100 J	1,120 J	1,220 J
Manganese	41,000	1,600	11.3	7.2	9.4	4.5	6.6	7	9.2	7.6	303	22.7	7.3	14.7	14.6	17.4	29.2
Mercury	610	23	0.087 B	0.085 B	0.072 B	0.085 B	0.083 B	0.049 J	0.059 J	0.095 B	0.53 J	0.083 J	0.058 UL	0.057 UL	0.064 J	0.065 UL	0.079 J
Nickel	41,000	1,600	5 B	3.9 B	4.8 B	2.2 U	3 J	2.4 U	3.1 J	5.1 J	31.3	6.1 J	4 J	4.1 J	3.2 U	4.1 J	48.7
Potassium	--	--	395 B	119 U	201 B	119 U	243 J	246 J	131 J	127 U	2,920 J	265 B	228 B	473 B	363 B	361 B	621 J
Selenium	10,000	390	0.61 UL	0.61 UL	0.6 UL	0.61 UL	0.62 UL	0.65 UL	0.63 UL	0.65 UL	3 J	1.1 J	0.83 J	0.77 U	0.87 U	0.99 J	0.88 U
Silver	10,000	390	0.48 U	0.47 U	0.47 U	0.47 UL	0.49 UL	0.5 U	0.49 U	0.51 U	1.5 J	0.71 U	0.61 U	0.6 U	0.68 U	0.69 U	0.68 J
Sodium	--	--	44.7 J	36.9 J	34.5 J	2.8 U	3.3 J	129 J	88.4 J	47.2 J	7,660	1,290 J	1,320 J	1,920	3,200	3,170	1,510 J
Vanadium	14,000	550	20.1	13.2	15.4	9.5 J	16	22.4	14.6	17.3	55.3	13.2 J	8.4 J	11.4 J	9.4 J	8.9 J	14.6 J
Zinc	610,000	23,000	9	5.8	6.1	3.5 J	9.7	8.2	8.1	5.3	294	40.4	18.3	13.9	14.1	20.4	119
Wet Chemistry (MG/KG)																	
% Solids	--	--	88.2	88.7	90.3	88.7	86.5	83.5	85.4	83.2	33.3	59.3	68.8	69.9	62.2	61.2	61.6
Total organic carbon (TOC)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	#####	NA	NA	NA	NA
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.5	NA	NA	NA	NA

Tabe 3-3
Constituents Detected in Subsurface Soils
St. Juliens Creek Annex Background Investigation

Station ID	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SB26	SJSBK-SB27	SJSBK-SB28	SJSBK-SB29	SJSBK-SB30	SJSBK-SB31	SJSBK-SB32	SJSBK-SB33	SJSBK-SB34		SJSBK-SB35	SJSBK-SB36	SJSBK-SB37	SJSBK-SB38
Sample ID			SB26-001	SB27-001	SB28-001	SB29-001	SB30-001	SB31-001	SB32-001	SB33-001	SB34-001	SB34-001P	SB35-001	SB36-001	SB37-001	SB38-001
Sample Date			02/08/01	02/08/01	02/09/01	02/09/01	02/08/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01
Chemical Name																
Semi-volatile Organic Compounds (UG/KG)																
Acenaphthene	120,000,000	4,700,000	110 U	130 U	120 U	150 U	110 U	79 U	21 J	79 U	79 U	76 U	78 U	78 U	79 U	81 U
Acenaphthylene	--	--	110 U	130 U	120 U	150 U	110 J	79 U	81 U	79 U	79 U	76 U	78 U	78 U	79 U	81 U
Anthracene	610,000,000	23,000,000	26 J	130 U	120 U	150 U	550	79 U	81 U	79 U	79 U	76 U	78 U	78 U	79 U	81 U
Benzo(a)anthracene	7,800	870	82 J	63 J	120 U	100 J	**910**	79 U	81 U	79 U	27 B	51 J	18 B	78 U	46 J	81 U
Benzo(a)pyrene	780	87	50 J	79 J	120 U	**110 J**	**550**	79 U	81 U	79 U	26 J	48 J	78 U	78 U	43 J	81 U
Benzo(b)fluoranthene	7,800	870	97 J	92 J	120 U	130 J	610	79 U	81 U	79 U	79 U	30 J	78 U	78 U	57 J	81 U
Benzo(g,h,i)perylene	61,000,000	2,300,000	55 J	160	120 U	94 J	370 J	79 U	81 U	79 U	23 J	36 J	23 J	78 U	33 J	81 U
Benzo(k)fluoranthene	78,000	8,700	58 J	69 J	120 U	100 J	430	79 U	81 U	79 U	17 J	32 J	78 U	78 U	36 J	81 U
Chrysene	780,000	87,000	110 J	87 J	120 U	150	1,100	79 U	81 U	79 U	36 J	65 J	18 J	78 U	64 J	81 U
Dibenz(a,h)anthracene	780	87	110 U	130 U	120 U	150 U	**140**	79 U	81 U	79 U	79 U	76 U	78 U	78 U	79 U	81 U
Fluoranthene	82,000,000	3,100,000	520	140	43 J	170	2,500	79 U	81 U	79 U	44 J	81	78 U	78 U	64 J	81 U
Fluorene	82,000,000	3,100,000	110 U	130 U	120 U	150 U	110 U	79 U	81 U	79 U	79 U	76 U	78 U	78 U	79 U	81 U
Indeno(1,2,3-cd)pyrene	7,800	870	43 J	75 J	120 U	82 J	350	79 U	81 U	79 U	79 U	29 J	78 U	78 U	31 J	81 U
Naphthalene	41,000,000	1,600,000	110 U	130 U	120 U	150 U	18 J	79 U	24 J	79 U	79 U	76 U	78 U	78 U	79 U	81 U
Phenanthrene	61,000,000	2,300,000	110 U	130 U	120 U	150 U	70 J	79 U	81 U	79 U	32 J	61 J	78 U	78 U	79 U	81 U
Pyrene	61,000,000	2,300,000	400	120 J	120 U	150	1,900	79 U	81 U	79 U	68 J	120	78 U	78 U	69 J	81 U
Pest/PCBs (UG/KG)																
4,4'-DDD	24,000	2,700	31	6.4 U	6.1 U	7.3 U	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	6	4 U
4,4'-DDE	17,000	1,900	58	6.4 U	6.1 U	7.3 U	5.5 U	3.9 U	4 U	3.9 U	3.9 U	5	3.8 U	3.8 U	70	4 U
4,4'-DDT	17,000	1,900	5.7	6.4 U	6.1 U	7.3 U	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	12	4 U
Dieldrin	360	40	5.5 U	6.4 U	6.1 U	7.3 U	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	3.9 U	4 U
Endosulfan I	12,000,000	470,000	2.8 U	3.3 U	3.1 U	3.8 U	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U
Endosulfan II	12,000,000	470,000	5.5 U	6.4 U	6.1 U	7.3 U	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	3.9 U	4 U
Endrin	610,000	23,000	5.5 U	6.4 U	6.1 U	7.3 U	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	3.9 U	4 U
Endrin aldehyde	610,000	23,000	5.5 U	6.4 U	6.1 U	7.3 U	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	3.9 U	4 U
alpha-Chlordane	16,000	1,800	2.8 U	3.3 U	3.1 U	3.8 U	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U
beta-BHC	3,200	350	2.8 U	3.3 U	3.1 U	3.8 U	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U
gamma-Chlordane	16,000	1,800	2.8 U	3.3 U	3.1 U	3.8 U	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U
Total Metals (MG/KG)																
Aluminum	2,000,000	78,000	6,060	8,990	12,700	13,300	5,170	7,400	2,900	11,600	13,800	12,000	2,910	13,300	13,400	20,700
Antimony	820	31	0.67 UJ	1.2 B	0.73 UL	1.1 B	0.67 UL	0.47 UL	0.49 UL	0.47 UL	0.73 B	0.46 UL	0.47 UL	0.66 B	0.57 B	0.49 UL
Arsenic	3.8	0.43	**2.3 J**	**7**	**7.5**	**9**	**3.4**	**1.4 J**	**0.56 J**	**2.1 J**	**2.1 J**	**2.6 L**	**1.6 J**	**6**	**3.5 L**	**3.8 L**
Barium	140,000	5,500	20.3 J	58.2 J	24.9 J	32.6 J	12.4 J	23.7 J	14.8 J	36.9 J	43.8 J	42.8 J	17.4 J	33.7 J	57.4	53.5
Beryllium	4,100	160	0.22 B	0.73 B	0.73 B	0.85 B	0.3 B	0.078 B	0.066 B	0.18 B	0.24 B	0.21 B	0.14 B	0.24 B	0.24 B	0.28 B
Calcium	--	--	1,500 J	1,410 J	1,270 J	1,510 J	551 J	391 J	241 J	399 J	1,100 J	1,090 J	728 J	210 J	826 J	696 J
Chromium	6,100	230	7.8	17.4	22.9	27.1	10.5	9.3	4.6	11.8	16.3	14.9	6.4	21.4	14.6	31
Cobalt	41,000	1,600	1.4 U	9.9 J	8 J	9.8 J	4.3 J	0.97 U	1.1 J	2.1 J	2 J	1.8 J	1.1 J	2.8 J	2.7 J	3.8 J
Copper	82,000	3,100	10.5	63.5	11.8	21.3	5.7 J	3.4 J	0.54 J	0.55 J	4.9 J	5.3 J	6.2	6.3	9.9	5.8 J
Iron	610,000	23,000	3,310	21,700	22,400	**23,100**	8,570	4,500	3,090	9,570	6,330	6,010	3,570	11,300	9,530	13,300
Lead	400	400	26.8	116	23	36.8	14.1	5.5	3	6.9	10	11.3	31.4	7.7	21	9.8

Tabe 3-3
Constituents Detected in Subsurface Soils
St. Juliens Creek Annex Background Investigation

Station ID	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SB26	SJSBK-SB27	SJSBK-SB28	SJSBK-SB29	SJSBK-SB30	SJSBK-SB31	SJSBK-SB32	SJSBK-SB33	SJSBK-SB34		SJSBK-SB35	SJSBK-SB36	SJSBK-SB37	SJSBK-SB38
Sample ID			SB26-001	SB27-001	SB28-001	SB29-001	SB30-001	SB31-001	SB32-001	SB33-001	SB34-001	SB34-001P	SB35-001	SB36-001	SB37-001	SB38-001
Sample Date			02/08/01	02/08/01	02/09/01	02/09/01	02/08/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01
Chemical Name																
Magnesium	--	--	1,190 J	3,310	4,010	5,050	1,830	409 J	370 J	615 J	854 J	584 J	321 J	814 J	579 J	1,180 J
Manganese	41,000	1,600	17.8	101	173	158	65.4	10.7	12.2	13	18.2	18.3	13.8	18.9	15.6	24.2
Mercury	610	23	0.13 J	0.22	0.13 J	0.25	0.24	0.075 B	0.097 B	0.097 B	0.11 B	0.11 B	0.087 B	0.072 B	0.12 B	0.086 B
Nickel	41,000	1,600	3.5 J	21	12 J	14 J	6.2 J	2.9 J	2.6 J	4 J	4.8 J	5.2 J	3.8 J	6.2 J	4.3 J	7.7 J
Potassium	--	--	421 J	1,720 J	2,270	2,760	1,070 J	125 U	192 B	162 B	412 B	389 B	222 B	541 B	283 B	531 B
Selenium	10,000	390	0.9 U	1.7 J	0.99 UL	1.2 UL	0.9 UL	0.64 UL	0.66 UL	0.64 UL	0.74 B	0.62 UL	0.63 UL	0.63 UL	0.64 UL	0.66 UL
Silver	10,000	390	0.7 U	0.82 U	0.77 U	1.3 J	0.7 U	0.5 U	0.51 U	0.5 U	0.5 U	0.48 U	0.49 U	0.49 U	0.5 U	0.51 U
Sodium	--	--	2,680	5,910	3,560 B	8,680	3,940	46.9 J	82.9 J	36.9 B	64.4 J	56.4 J	29 B	61.9 J	60.1 J	50.5 J
Vanadium	14,000	550	14.5 J	29.6	25.1	32.5	13 J	12.9	5.7 J	18.1	21.7	19.2	19	25.3	26.3	47.4
Zinc	610,000	23,000	19.6	185	73.7	82.2	27.9	9.6	7.4	9.4	12.1	11.3	59.2	11.4	21.3	15.9
Wet Chemistry (MG/KG)																
% Solids	--	--	60.1	51.5	54.5	45	60.1	84.6	82.2	84.7	84.9	87.5	85.8	86	84.3	82.1
Total organic carbon (TOC)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Tabe 3-3
Constituents Detected in Subsurface Soils
St. Juliens Creek Annex Background Investigation

Station ID	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SB39	SJSBK-SB40	SJSBK-SB41	SJSBK-SB42	SJSBK-SB43	SJSBK-SB44		SJSBK-SB45	SJSBK-SB46	SJSBK-SB47	SJSBK-SB48	SJSBK-SB49	SJSBK-SB50
Sample ID			SB39-001	SB40-001	SB41-001	SB42-001	SB43-001	SB44-001	SB44-001P	SB45-001	SB46-001	SB47-001	SB48-001	SB49-001	SB50-001
Sample Date			02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/14/01	02/14/01	02/14/01	02/14/01
Chemical Name															
Semi-volatile Organic Compounds (UG/KG)															
Acenaphthene	120,000,000	4,700,000	91 U	84 U	100 U	110 U	30 J	95 U	95 U	43 J	75 U	95 U	79 U	20 J	1,200
Acenaphthylene	--	--	91 U	84 U	53 J	65 J	160	78 J	53 J	29 J	75 U	45 J	25 J	83 J	73 J
Anthracene	610,000,000	23,000,000	91 U	84 U	72 J	78 J	150	69 J	81 J	98 J	75 U	44 J	79 U	68 J	2,400
Benzo(a)anthracene	7,800	870	28 B	84 U	260	300	730	340	250	440	34 J	100	74 J	280	**4,400**
Benzo(a)pyrene	780	87	91 U	84 U	**250**	**290**	**610**	**300**	**240**	**380**	36 J	**110**	66 J	**380**	**4,200**
Benzo(b)fluoranthene	7,800	870	91 U	84 U	340	420	**910**	390	360	360	41 J	260	88	390	**3,500**
Benzo(g,h,i)perylene	61,000,000	2,300,000	91 U	84 U	250	310	630	310	210	240	34 J	100	50 J	190	3,300
Benzo(k)fluoranthene	78,000	8,700	91 U	84 U	250	320	680	300	280	320	33 J	150	54 J	320	2,800
Chrysene	780,000	87,000	26 J	84 U	450	510	1,100	480	400	490	43 J	270	94	420	4,600
Dibenz(a,h)anthracene	780	87	91 U	84 U	**130**	**150**	**350**	**160**	**97**	67 J	75 U	63 J	20 J	**92 J**	**1,000**
Fluoranthene	82,000,000	3,100,000	31 J	84 U	300	290	1,100	380	280	650	39 J	140	100	600	11,000
Fluorene	82,000,000	3,100,000	91 U	84 U	100 U	110 U	24 J	95 U	95 U	39 J	75 U	95 U	79 U	19 J	1,400
Indeno(1,2,3-cd)pyrene	7,800	870	91 U	84 U	240	300	630	300	200	220	30 J	120	55 J	210	**2,700**
Naphthalene	41,000,000	1,600,000	91 U	84 U	17 J	29 J	45 J	26 J	24 J	67 J	14 J	95 U	79 U	32 J	570
Phenanthrene	61,000,000	2,300,000	91 U	84 U	84 J	99 J	140	150	120	450	26 J	35 J	79 U	83 J	9,700
Pyrene	61,000,000	2,300,000	30 J	84 U	240	250	800	330	230	860	38 J	90 J	74 J	730	9,200
Pest/PCBs (UG/KG)															
4,4'-DDD	24,000	2,700	4.5 U	4.1 U	5 U	5.3 U	5.2 U	4.7 U	4.7 U	5 U	3.7 U	4.7 U	3.9 U	4.7 U	4.5 U
4,4'-DDE	17,000	1,900	4.5 U	4.1 U	5 U	5.3 U	11	4.7 U	4.7 U	5 U	3.7 U	4.7 U	3.9 U	4.7 U	4.5 U
4,4'-DDT	17,000	1,900	4.5 U	4.1 U	5 U	5.3 U	12	4.7 U	4.7 U	5 U	3.7 U	4.7 U	3.9 U	4.7 U	4.5 U
Dieldrin	360	40	4.5 U	4.1 U	5 U	5.3 U	5.2 U	4.7 U	4.7 U	5 U	3.2 J	4.7 U	3.9 U	4.7 U	3.5 J
Endosulfan I	12,000,000	470,000	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U	2.4 U	2.6 U	1.9 U	2.4 U	2 U	2.4 U	2.3 U
Endosulfan II	12,000,000	470,000	4.5 U	4.1 U	5 U	5.3 U	5.2 U	4.7 U	4.7 U	5 U	3.7 U	4.7 U	3.9 U	4.7 U	4.5 U
Endrin	610,000	23,000	4.5 U	4.1 U	5 U	5.3 U	5.2 U	4.7 U	4.7 U	5 U	3.7 U	4.7 U	3.9 U	4.7 U	4.5 U
Endrin aldehyde	610,000	23,000	4.5 U	4.1 U	5 U	5.3 U	5.2 U	4.7 U	4.7 U	5 U	3.7 U	4.7 U	3.9 U	4.7 U	4.5 U
alpha-Chlordane	16,000	1,800	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U	2.4 U	2.6 U	1.9 U	2.4 U	2 U	2.4 U	2.3 U
beta-BHC	3,200	350	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U	2.4 U	2.6 U	1.9 U	2.4 U	2 U	2.4 U	2.3 U
gamma-Chlordane	16,000	1,800	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U	2.4 U	2.6 U	1.9 U	2.4 U	2 U	2.4 U	2.3 U
Total Metals (MG/KG)															
Aluminum	2,000,000	78,000	1,780	6,290	14,500	17,400	13,100	15,400	14,500	2,430	1,820	10,900	7,680	2,330	5,940
Antimony	820	31	0.55 UL	0.5 UL	1.2 J	0.83 J	0.63 UL	0.78 J	0.75 J	0.7 J	0.45 UL	0.57 UL	0.89 J	0.57 UL	0.54 UL
Arsenic	3.8	0.43	**0.85 J**	**3.5**	**11.9**	**10.4**	**11.6**	**9.7**	**9.8**	**5.1**	**2.8**	**11.8**	**6.6**	**3.3**	**4.8**
Barium	140,000	5,500	4.7 J	14.2 J	47.9 J	44.7 J	36.4 J	36.1 J	37.7 J	18.4 J	10.2 J	28 J	20.9 J	9.5 J	16.4 J
Beryllium	4,100	160	0.18 B	0.69 B	0.43 B	0.58 B	0.4 B	0.92 B	1.1 B	0.23 B	0.28 B	0.36 B	0.25 B	0.13 B	0.63 B
Calcium	--	--	54,900	105,000	328 J	648 J	537 J	3,970	5,040	453 J	2,250	439 J	352 J	1,680	773 J
Chromium	6,100	230	3.7 B	11.2	30.1	34	27.6	30.3	28.6	6.8	5.1 L	27 L	19.3 L	5.3 L	12 L
Cobalt	41,000	1,600	2.6 B	5.7 B	6.4 B	7.8 J	6.3 B	12.1 J	13.1 J	2.7 B	2.2 J	6.1 J	4.4 J	1.4 J	10.6 J
Copper	82,000	3,100	1.6 B	3.7 B	29	29.5	21.6	17.2	19.9	44.6	26.7	15.9	15.1	7.4	12.9
Iron	610,000	23,000	4,230	12,000	**32,300**	**27,100**	**24,600**	**31,000**	**29,400**	7,170	5,760	**27,200**	17,100	6,550	9,510
Lead	400	400	3.1	6.1	88.7	81.3	65	34.3	40.4	48.8	35.5 L	34.9 L	24.4 L	26.2 L	19.9 L

Tabe 3-3
Constituents Detected in Subsurface Soils
St. Juliens Creek Annex Background Investigation

Station ID	RBC-Soil Industrial	RBC-Soil Residential	SJSBK-SB39	SJSBK-SB40	SJSBK-SB41	SJSBK-SB42	SJSBK-SB43	SJSBK-SB44		SJSBK-SB45	SJSBK-SB46	SJSBK-SB47	SJSBK-SB48	SJSBK-SB49	SJSBK-SB50
Sample ID			SB39-001	SB40-001	SB41-001	SB42-001	SB43-001	SB44-001	SB44-001P	SB45-001	SB46-001	SB47-001	SB48-001	SB49-001	SB50-001
Sample Date			02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/14/01	02/14/01	02/14/01	02/14/01
Chemical Name															
Magnesium	--	--	644 J	2,170	2,660	3,100	2,210	3,790	3,380	512 J	440 J	2,680	1,800	567 J	1,470
Manganese	41,000	1,600	47.3	164	93.7	102	70.8	181	215	29.7	46.3	97	61.1	33	72.9
Mercury	610	23	0.11 B	0.11 B	0.34	0.39	0.49	0.4	0.3 B	0.69	0.33	0.4	0.13	0.25	0.29
Nickel	41,000	1,600	2.7 U	6.8 J	9.5 J	11.8 J	10.2 J	12.8 K	15.7 K	3 U	2.4 J	10.4 J	4.7 J	3.3 J	14 K
Potassium	--	--	365 J	1,060 J	3,710	2,280	2,050	2,180	2,040	579 J	277 J	2,380	1,720	273 J	814 J
Selenium	10,000	390	0.74 UL	0.68 UL	1.4 J	0.86 UL	0.86 UL	1 J	0.97 J	0.83 UL	0.61 UL	0.99 J	1.4 L	1.3 J	0.73 UL
Silver	10,000	390	0.57 UL	0.53 UL	0.63 UL	0.67 UL	0.67 UL	0.6 UL	0.6 UL	0.64 UL	0.47 U	0.6 U	0.5 U	0.6 U	0.57 U
Sodium	--	--	308 J	1,260	258 J	86.5 J	72.2 J	105 J	102 J	3.8 U	42.1 J	101 J	79.7 J	45.2 J	118 J
Vanadium	14,000	550	4.6 J	15	34.6	33.4	32.3	36.4	31.4	9.9 J	5.8 J	28.9	16.5	6.7 J	14.4
Zinc	610,000	23,000	9.6 B	30.9	61	58.9	41.2	82.6	86.5	20.6	22.2	48.3	34.1	16.8	84.6
Wet Chemistry (MG/KG)															
% Solids	--	--	73.2	79.8	66.3	62.7	63.1	70.4	70.6	65.4	89.1	70.2	84.2	69.9	73.6
Total organic carbon (TOC)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-1
Columbia Aquifer Background Groundwater Quality Summary
St. Juliens Creek Annex Background Investigation

Chemical Name	Number of Detects	Total Number of Samples	Frequency of Detection	Reporting Limit Minimum	Reporting Limit Maximum	Minimum Detected Conc.	Maximum Detected Conc.	Average Conc.	Median Conc.	Standard Deviation	Coefficient of Variation	Upper Confidence Limit
Dissolved Metals (ug/L)												
Barium	4	4	1.00			24	63.2	50.5	57.5	18.2	0.4	72.0
Calcium	4	4	1.00			21400	141000	56800.0	32400.0	56406.4	1.0	123186.0
Iron	4	4	1.00			65	21100	7513.8	4445.0	9941.3	1.3	19213.9
Magnesium	4	4	1.00			4890	22400	11692.5	9740.0	8163.2	0.7	21299.9
Manganese	4	4	1.00			120	1040	442.8	305.5	411.8	0.9	927.4
Nickel	4	4	1.00			2.2	14.3	7.7	7.1	5.0	0.7	13.5
Potassium	4	4	1.00			1600	5620	3185.0	2760.0	1953.4	0.6	5484.0
Sodium	4	4	1.00			18400	57700	39675.0	41300.0	17363.6	0.4	60110.7
Cobalt	3	4	0.75	0.5	0.5	4.6	14.4	6.8	6.3	6.0	0.9	13.8
Aluminum	2	4	0.50	38.2	38.2	69.9	399	126.8	54.1	183.1	1.4	342.2
Arsenic	2	4	0.50	2	2	2.1	2.2	1.6	2.1	0.7	0.4	2.4
Lead	2	4	0.50	1	1	1.1	2.1	1.1	1.1	0.8	0.7	1.9
Beryllium	1	4	0.25	0.1	0.1	0.31	0.31	0.1	0.1	0.1	1.1	0.3
Antimony		4	0.00	2.7	2.7			1.4	2.7			1.4
Cadmium		4	0.00	0.3	0.3			0.2	0.3			0.2
Chromium		4	0.00	1.1	1.1			0.6	1.1			0.6
Copper		4	0.00	2.2	3.3			1.5	3.1	0.2	0.2	1.8
Mercury		4	0.00	0.1	0.1			0.1	0.1			0.1
Selenium		4	0.00	2.6	2.6			1.3	2.6			1.3
Silver		4	0.00	0.9	0.9			0.5	0.9			0.5
Thallium		4	0.00	3.2	3.2			1.6	3.2			1.6
Vanadium		4	0.00	0.6	0.6			0.3	0.6			0.3
Zinc	4	4	1.00			9.1	109	47.3	35.6	43.7	0.9	98.8
Total Metals (ug/L)												
Aluminum	4	4	1.00			181	357	232.3	195.5	84.0	0.4	331.1
Barium	4	4	1.00			26.1	63.5	52.8	60.9	18.0	0.3	74.0
Calcium	4	4	1.00			21300	142000	56075.0	30500.0	57486.5	1.0	123732.2
Cobalt	4	4	1.00			0.84	13.9	7.1	6.8	5.5	0.8	13.6
Iron	4	4	1.00			374	18000	6927.3	4667.5	8306.8	1.2	16703.7
Magnesium	4	4	1.00			4860	19600	11337.5	10445.0	7106.7	0.6	19701.5
Manganese	4	4	1.00			121	912	415.8	315.0	347.8	0.8	825.1
Nickel	4	4	1.00			2.7	15.1	8.3	7.8	5.1	0.6	14.3
Potassium	4	4	1.00			1620	5010	3027.5	2740.0	1678.6	0.6	5003.1
Sodium	4	4	1.00			18600	53900	39850.0	43450.0	16793.0	0.4	59614.0
Vanadium	4	4	1.00			0.79	1	0.9	0.9	0.1	0.1	1.0
Zinc	4	4	1.00			9.5	89.7	46.9	44.2	32.9	0.7	85.6
Lead	2	4	0.50	1	1	1.1	1.9	1.0	1.1	0.7	0.7	1.8
Arsenic	1	4	0.25	2	2	2	2	1.3	2.0	0.5	0.4	1.8
Beryllium	1	4	0.25	0.1	0.1	0.27	0.27	0.1	0.1	0.1	1.0	0.2
Antimony		4	0.00	2.7	2.7			1.4	2.7			1.4
Cadmium		4	0.00	0.3	0.3			0.2	0.3			0.2
Chromium		4	0.00	1.1	1.1			0.6	1.1			0.6
Copper		4	0.00	2.7	4.2			1.7	3.5	0.3	0.2	2.1
Cyanide		4	0.00	5	5			2.5	5.0			2.5
Mercury		4	0.00	0.1	0.1			0.1	0.1			0.1
Selenium		4	0.00	2.6	2.6			1.3	2.6			1.3

Table 4-1
Columbia Aquifer Background Groundwater Quality Summary
St. Juliens Creek Annex Background Investigation

Chemical Name	Number of Detects	Total Number of Samples	Frequency of Detection	Reporting Limit Minimum	Reporting Limit Maximum	Minimum Detected Conc.	Maximum Detected Conc.	Average Conc.	Median Conc.	Standard Deviation	Coefficient of Variation	Upper Confidence Limit
Silver		4	0.00	0.9	0.9			0.5	0.9			0.5
Thallium		4	0.00	3.2	3.2			1.6	3.2			1.6
Semivolatile Organic (ug/L)												
2,2'-oxybis(1-Chloropropane)		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
2,4,5-Trichlorophenol		4	0.00	26	29			13.5	26.5	0.7	0.1	14.3
2,4,6-Trichlorophenol		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
2,4-Dichlorophenol		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
2,4-Dimethylphenol		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
2,4-Dinitrophenol		4	0.00	26	29			13.5	26.5	0.7	0.1	14.3
2,4-Dinitrotoluene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
2,6-Dinitrotoluene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
2-Chloronaphthalene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
2-Chlorophenol		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
2-Methylnaphthalene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
2-Methylphenol		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
2-Nitroaniline		4	0.00	26	29			13.5	26.5	0.7	0.1	14.3
2-Nitrophenol		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
3,3'-Dichlorobenzidine		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
3-Nitroaniline		4	0.00	26	29			13.5	26.5	0.7	0.1	14.3
4,6-Dinitro-2-methylphenol		4	0.00	26	29			13.5	26.5	0.7	0.1	14.3
4-Bromophenyl-phenylether		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
4-Chloro-3-methylphenol		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
4-Chloroaniline		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
4-Chlorophenyl-phenylether		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
4-Methylphenol		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
4-Nitroaniline		4	0.00	26	29			13.5	26.5	0.7	0.1	14.3
4-Nitrophenol		4	0.00	26	29			13.5	26.5	0.7	0.1	14.3
Acenaphthene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Acenaphthylene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Anthracene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Benzo(a)anthracene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Benzo(a)pyrene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Benzo(b)fluoranthene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Benzo(g,h,i)perylene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Benzo(k)fluoranthene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
bis(2-Chloroethoxy)methane		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
bis(2-Chloroethyl)ether		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
bis(2-Ethylhexyl)phthalate		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Butylbenzylphthalate		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Carbazole		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Chrysene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Di-n-butylphthalate		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Di-n-octylphthalate		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Dibenz(a,h)anthracene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Dibenzofuran		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Diethylphthalate		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Dimethylphthalate		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9

Table 4-1
Columbia Aquifer Background Groundwater Quality Summary
St. Juliens Creek Annex Background Investigation

Chemical Name	Number of Detects	Total Number of Samples	Frequency of Detection	Reporting Limit Minimum	Reporting Limit Maximum	Minimum Detected Conc.	Maximum Detected Conc.	Average Conc.	Median Conc.	Standard Deviation	Coefficient of Variation	Upper Confidence Limit
Fluoranthene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Fluorene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Hexachlorobenzene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Hexachlorobutadiene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Hexachlorocyclopentadiene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Hexachloroethane		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Indeno(1,2,3-cd)pyrene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Isophorone		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
n-Nitroso-di-n-propylamine		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
n-Nitrosodiphenylamine		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Naphthalene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Nitrobenzene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Pentachlorophenol		4	0.00	26	29			13.5	26.5	0.7	0.1	14.3
Phenanthrene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Phenol		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Pyrene		4	0.00	11	12			5.6	11.0	0.3	0.0	5.9
Volatile Organic (ug/L)												
Acetone	1	4	0.25	5	5	30.5	30.5	9.5	5.0	14.0	1.5	26.0
cis-1,2-Dichloroethene	1	4	0.25	1	1	0.2	0.2	0.4	1.0	0.2	0.4	0.6
Trichloroethene	1	4	0.25	1	1	0.8	0.8	0.6	1.0	0.2	0.3	0.8
1,1,1-Trichloroethane		4	0.00	1	1			0.5	1.0			0.5
1,1,2,2-Tetrachloroethane		4	0.00	1	1			0.5	1.0			0.5
1,1,2-Trichloroethane		4	0.00	1	1			0.5	1.0			0.5
1,1-Dichloroethane		4	0.00	1	1			0.5	1.0			0.5
1,1-Dichloroethene		4	0.00	1	1			0.5	1.0			0.5
1,2,4-Trichlorobenzene		8	0.00	1	12			3.1	6.0	2.7	0.9	4.9
1,2-Dibromo-3-chloropropane		4	0.00	1	1			0.5	1.0			0.5
1,2-Dibromoethane		4	0.00	1	1			0.5	1.0			0.5
1,2-Dichlorobenzene		8	0.00	1	12			3.1	6.0	2.7	0.9	4.9
1,2-Dichloroethane		4	0.00	1	1			0.5	1.0			0.5
1,2-Dichloropropane		4	0.00	1	1			0.5	1.0			0.5
1,3-Dichlorobenzene		8	0.00	1	12			3.1	6.0	2.7	0.9	4.9
1,4-Dichlorobenzene		8	0.00	1	12			3.1	6.0	2.7	0.9	4.9
2-Butanone		4	0.00	5	5			2.5	5.0			2.5
2-Hexanone		4	0.00	5	5			2.5	5.0			2.5
4-Methyl-2-pentanone		4	0.00	5	5			2.5	5.0			2.5
Benzene		4	0.00	1	1			0.5	1.0			0.5
Bromochloromethane		4	0.00	1	1			0.5	1.0			0.5
Bromodichloromethane		4	0.00	1	1			0.5	1.0			0.5
Bromoform		4	0.00	1	1			0.5	1.0			0.5
Bromomethane		4	0.00	1	1			0.5	1.0			0.5
Carbon disulfide		4	0.00	1	2.1			0.8	1.5	0.2	0.3	1.0
Carbon tetrachloride		4	0.00	1	1			0.5	1.0			0.5
Chlorobenzene		4	0.00	1	1			0.5	1.0			0.5
Chloroethane		4	0.00	1	1			0.5	1.0			0.5
Chloroform		4	0.00	0.2	1			0.3	0.5	0.2	0.8	0.5
Chloromethane		4	0.00	1	1			0.5	1.0			0.5

Table 4-1
Columbia Aquifer Background Groundwater Quality Summary
St. Juliens Creek Annex Background Investigation

Chemical Name	Number of Detects	Total Number of Samples	Frequency of Detection	Reporting Limit Minimum	Reporting Limit Maximum	Minimum Detected Conc.	Maximum Detected Conc.	Average Conc.	Median Conc.	Standard Deviation	Coefficient of Variation	Upper Confidence Limit
cis-1,3-Dichloropropene		4	0.00	1	1			0.5	1.0			0.5
Dibromochloromethane		4	0.00	1	1			0.5	1.0			0.5
Ethylbenzene		4	0.00	1	1			0.5	1.0			0.5
Methylene chloride		4	0.00	1	1.2			0.6	1.1	0.0	0.1	0.6
Styrene		4	0.00	1	1			0.5	1.0			0.5
Tetrachloroethene		4	0.00	1	1			0.5	1.0			0.5
Toluene		4	0.00	1	1			0.5	1.0			0.5
Xylene, total		4	0.00	1	1			0.5	1.0			0.5
trans-1,2-Dichloroethene		4	0.00	1	1			0.5	1.0			0.5
trans-1,3-Dichloropropene		4	0.00	1	1			0.5	1.0			0.5
Vinyl chloride		4	0.00	1	1			0.5	1.0			0.5
Water Chemistry												
Total Phosphorous (as P) (mg/L		4	0.00	0.02	0.02			0.0	0.0			0.0

Table 4-2
Yorktown Aquifer Background Groundwater Quality Summary
St. Juliens Creek Annex Background Investigation

Chemical Name	Number of Detects	Total Number of Samples	Frequency of Detection	Reporting Limit Minimum	Reporting Limit Maximum	Minimum Detected Conc.	Maximum Detected Conc.	Average Conc.	Median Conc.	Standard Deviation	Coefficient of Variation	Upper Confidence Limit
Dissolved Metals (ug/L)												
Barium	3	3	1.00			10.1	31.2	23.0	27.8	11.3	0.5	42.1
Calcium	3	3	1.00			34600	77700	57666.7	60700.0	21709.5	0.4	94265.5
Iron	3	3	1.00			390	1360	788.7	616.0	507.5	0.6	1644.3
Magnesium	3	3	1.00			2000	10000	5966.7	5900.0	4000.4	0.7	12710.7
Manganese	3	3	1.00			122	188	161.3	174.0	34.8	0.2	220.0
Potassium	3	3	1.00			1480	7200	4406.7	4540.0	2862.3	0.6	9232.1
Sodium	3	3	1.00			13600	37900	28400.0	33700.0	12988.1	0.5	50295.8
Zinc	3	3	1.00			3.4	10.5	6.1	4.3	3.9	0.6	12.6
Nickel	2	3	0.67	0.9	0.9	1.1	2.3	1.3	1.1	0.9	0.7	2.9
Aluminum	1	3	0.33	38.2	38.2	63.1	63.1	33.8	38.2	25.4	0.8	76.6
Chromium	1	3	0.33	1.1	1.1	2.1	2.1	1.1	1.1	0.9	0.8	2.6
Antimony		3	0.00	2.7	2.7			1.4	2.7			
Arsenic		3	0.00	2	2			1.0	2.0			1.0
Beryllium		3	0.00	0.1	0.1			0.1	0.1			0.1
Cadmium		3	0.00	0.3	0.3			0.2	0.3	0.0	0.0	0.2
Cobalt		3	0.00	0.5	0.5			0.3	0.5			0.3
Copper		3	0.00	3	3.7			1.7	3.6	0.2	0.1	2.0
Lead		3	0.00	1	1			0.5	1.0			0.5
Mercury		3	0.00	0.1	0.1			0.1	0.1			0.1
Selenium		3	0.00	2.6	2.6			1.3	2.6			
Silver		3	0.00	0.9	0.9			0.5	0.9			0.5
Thallium		3	0.00	3.2	3.2			1.6	3.2			1.6
Vanadium		3	0.00	0.6	0.6			0.3	0.6	0.0	0.0	0.3
Total Metals (ug/L)												
Barium	3	3	1.00			11.8	32.7	24.7	29.6	11.3	0.5	43.7
Calcium	3	3	1.00			38600	75200	61933.3	72000.0	20270.5	0.3	96106.2
Iron	3	3	1.00			419	1670	907.7	634.0	668.9	0.7	2035.3
Magnesium	3	3	1.00			2240	12000	6630.0	5650.0	4953.3	0.7	14980.4
Manganese	3	3	1.00			117	226	177.7	190.0	55.5	0.3	271.3
Potassium	3	3	1.00			1620	8490	4816.7	4340.0	3459.7	0.7	10649.2
Sodium	3	3	1.00			14900	39900	30233.3	35900.0	13428.8	0.4	52872.2
Zinc	3	3	1.00			2.2	4.8	3.5	3.5	1.3	0.4	5.7
Aluminum	2	3	0.67	38.2	38.2	51.7	133	67.9	51.7	58.7	0.9	166.8
Nickel	1	3	0.33	0.9	0.9	1.1	1.1	0.7	0.9	0.4	0.6	1.3
Vanadium	1	3	0.33	0.6	0.6	0.68	0.68	0.4	0.6	0.2	0.5	0.8
Antimony		3	0.00	2.7	2.7			1.4	2.7			
Arsenic		3	0.00	2	2			1.0	2.0			1.0
Beryllium		3	0.00	0.1	0.1			0.1	0.1			0.1
Cadmium		3	0.00	0.3	0.3			0.2	0.3	0.0	0.0	0.2
Chromium		3	0.00	1.1	1.1			0.6	1.1			0.6
Cobalt		3	0.00	0.5	0.5			0.3	0.5			0.3
Copper		3	0.00	2.7	3.3			1.5	2.8	0.2	0.1	1.7
Cyanide		3	0.00	5	5			2.5	5.0			2.5
Lead		3	0.00	1	1			0.5	1.0			0.5
Mercury		3	0.00	0.1	0.1			0.1	0.1			0.1
Selenium		3	0.00	2.6	2.6			1.3	2.6			

Table 4-2
Yorktown Aquifer Background Groundwater Quality Summary
St. Juliens Creek Annex Background Investigation

Chemical Name	Number of Detects	Total Number of Samples	Frequency of Detection	Reporting Limit Minimum	Reporting Limit Maximum	Minimum Detected Conc.	Maximum Detected Conc.	Average Conc.	Median Conc.	Standard Deviation	Coefficient of Variation	Upper Confidence Limit
Silver		3	0.00	0.9	0.9			0.5	0.9			0.5
Thallium		3	0.00	3.2	3.2			1.6	3.2			1.6
Semivolatile Organic (ug/L)												
bis(2-Ethylhexyl)phthalate	1	3	0.33	11	11	1	1	4.0	11.0	2.6	0.6	8.4
2,2'-oxybis(1-Chloropropane)		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
2,4,5-Trichlorophenol		3	0.00	26	28			13.5	27.0	0.5	0.0	14.3
2,4,6-Trichlorophenol		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
2,4-Dichlorophenol		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
2,4-Dimethylphenol		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
2,4-Dinitrophenol		3	0.00	26	28			13.5	27.0	0.5	0.0	14.3
2,4-Dinitrotoluene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
2,6-Dinitrotoluene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
2-Chloronaphthalene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
2-Chlorophenol		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
2-Methylnaphthalene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
2-Methylphenol		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
2-Nitroaniline		3	0.00	26	28			13.5	27.0	0.5	0.0	14.3
2-Nitrophenol		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
3,3'-Dichlorobenzidine		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
3-Nitroaniline		3	0.00	26	28			13.5	27.0	0.5	0.0	14.3
4,6-Dinitro-2-methylphenol		3	0.00	26	28			13.5	27.0	0.5	0.0	14.3
4-Bromophenyl-phenylether		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
4-Chloro-3-methylphenol		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
4-Chloroaniline		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
4-Chlorophenyl-phenylether		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
4-Methylphenol		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
4-Nitroaniline		3	0.00	26	28			13.5	27.0	0.5	0.0	14.3
4-Nitrophenol		3	0.00	26	28			13.5	27.0	0.5	0.0	14.3
Acenaphthene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Acenaphthylene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Anthracene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Benzo(a)anthracene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Benzo(a)pyrene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Benzo(b)fluoranthene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Benzo(g,h,i)perylene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Benzo(k)fluoranthene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
bis(2-Chloroethoxy)methane		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
bis(2-Chloroethyl)ether		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Butylbenzylphthalate		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Carbazole		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Chrysene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Dibenz(a,h)anthracene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Dibenzofuran		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Diethylphthalate		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Dimethylphthalate		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Di-n-butylphthalate		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Di-n-octylphthalate		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8

Table 4-2
Yorktown Aquifer Background Groundwater Quality Summary
St. Juliens Creek Annex Background Investigation

Chemical Name	Number of Detects	Total Number of Samples	Frequency of Detection	Reporting Limit Minimum	Reporting Limit Maximum	Minimum Detected Conc.	Maximum Detected Conc.	Average Conc.	Median Conc.	Standard Deviation	Coefficient of Variation	Upper Confidence Limit
Fluoranthene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Fluorene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Hexachlorobenzene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Hexachlorobutadiene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Hexachlorocyclopentadiene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Hexachloroethane		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Indeno(1,2,3-cd)pyrene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Isophorone		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Naphthalene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Nitrobenzene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
n-Nitroso-di-n-propylamine		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
n-Nitrosodiphenylamine		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Pentachlorophenol		3	0.00	26	28			13.5	27.0	0.5	0.0	14.3
Phenanthrene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Phenol		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Pyrene		3	0.00	10	11			5.3	11.0	0.3	0.1	5.8
Volatile Organic (ug/L)												
1,1,1-Trichloroethane		3	0.00	1	1			0.5	1.0			0.5
1,1,2,2-Tetrachloroethane		3	0.00	1	1			0.5	1.0			0.5
1,1,2-Trichloroethane		3	0.00	1	1			0.5	1.0			0.5
1,1-Dichloroethane		3	0.00	1	1			0.5	1.0			0.5
1,1-Dichloroethene		3	0.00	1	1			0.5	1.0			0.5
1,2,4-Trichlorobenzene		6	0.00	1	11			2.9	5.5	2.7	0.9	5.1
1,2-Dibromo-3-chloropropane		3	0.00	1	1			0.5	1.0			0.5
1,2-Dibromoethane		3	0.00	1	1			0.5	1.0			0.5
1,2-Dichlorobenzene		6	0.00	1	11			2.9	5.5	2.7	0.9	5.1
1,2-Dichloroethane		3	0.00	1	1			0.5	1.0			0.5
1,2-Dichloropropane		3	0.00	1	1			0.5	1.0			0.5
1,3-Dichlorobenzene		6	0.00	1	11			2.9	5.5	2.7	0.9	5.1
1,4-Dichlorobenzene		6	0.00	1	11			2.9	5.5	2.7	0.9	5.1
2-Butanone		3	0.00	5	5			2.5	5.0			2.5
2-Hexanone		3	0.00	5	5			2.5	5.0			2.5
4-Methyl-2-pentanone		3	0.00	5	5			2.5	5.0			2.5
Acetone		3	0.00	5	5			2.5	5.0			2.5
Benzene		3	0.00	1	1			0.5	1.0			0.5
Bromochloromethane		3	0.00	1	1			0.5	1.0			0.5
Bromodichloromethane		3	0.00	1	1			0.5	1.0			0.5
Bromoform		3	0.00	1	1			0.5	1.0			0.5
Bromomethane		3	0.00	1	1			0.5	1.0			0.5
Carbon disulfide		3	0.00	0.4	1.8			0.6	1.1	0.4	0.6	1.1
Carbon tetrachloride		3	0.00	1	1			0.5	1.0			0.5
Chlorobenzene		3	0.00	1	1			0.5	1.0			0.5
Chloroethane		3	0.00	1	1			0.5	1.0			0.5
Chloroform		3	0.00	0.3	1.6			0.4	0.6	0.3	0.8	1.0
Chloromethane		3	0.00	1	1			0.5	1.0			0.5
cis-1,2-Dichloroethene		3	0.00	1	1			0.5	1.0			0.5
cis-1,3-Dichloropropene		3	0.00	1	1			0.5	1.0			0.5

Table 4-2
Yorktown Aquifer Background Groundwater Quality Summary
St. Juliens Creek Annex Background Investigation

Chemical Name	Number of Detects	Total Number of Samples	Frequency of Detection	Reporting Limit Minimum	Reporting Limit Maximum	Minimum Detected Conc.	Maximum Detected Conc.	Average Conc.	Median Conc.	Standard Deviation	Coefficient of Variation	Upper Confidence Limit
Dibromochloromethane		3	0.00	1	1			0.5	1.0			0.5
Ethylbenzene		3	0.00	1	1			0.5	1.0			0.5
Methylene chloride		3	0.00	1	1.3			0.6	1.3	0.1	0.1	0.7
Styrene		3	0.00	1	1			0.5	1.0			0.5
Tetrachloroethene		3	0.00	1	1			0.5	1.0			0.5
Toluene		3	0.00	1	1			0.5	1.0			0.5
Xylene, total		3	0.00	1	1			0.5	1.0			0.5
trans-1,2-Dichloroethene		3	0.00	1	1			0.5	1.0			0.5
trans-1,3-Dichloropropene		3	0.00	1	1			0.5	1.0			0.5
Trichloroethene		3	0.00	1	1			0.5	1.0			0.5
Vinyl chloride		3	0.00	1	1			0.5	1.0			0.5
Water Chemistry												
Total Phosphorous (as P) (mg/L)	2	3	0.67	0.02	0.02	0.051	0.095	0.1	0.1	0.0	0.8	0.1

Table 4-3
Columbia Aquifer Background Groundwater Quality Parameters Exceeding Criteria
St Juliens Creek Annex

Columbia Aquifer Parameters	EPA Region III Tap Water RBC (ug/L)	Number of Detects Exceeding Tap Water RBC	Number of Non Detects Exceeding Tap Water RBC	Federal MCL (ug/L)	Number of Detects Exceeding MCL	Number of Non-Detects Exceeding MCL
Dissolved Metals						
Arsenic	0.045	2	2	10		
Iron	11000	1				
Manganese	730	1				
Thallium	2.6		4	2		4
Total Metals						
Arsenic	0.045	1	3	10		
Iron	11000	1				
Manganese	730	1				
Thallium	2.6		4	2		4
Volatile Organic						
1,1,2,2-Tetrachloroethane	0.053		4			
1,1,2-Trichloroethane	0.19		4	5		
1,1-Dichloroethene	0.044		4	7		
1,2-Dibromo-3-chloropropane	0.047		4	0		4
1,2-Dibromoethane	0.00075		4	0		4
1,2-Dichloroethane	0.12		4	5		
1,2-Dichloropropane	0.16		4	5		
1,3-Dichlorobenzene	5.5		4			
1,4-Dichlorobenzene	0.47		8	75		
Benzene	0.32		4	5		
Bromodichloromethane	0.17		4	80		
Carbon tetrachloride	0.16		4	5		
Chloroform	0.15		4	80		
cis-1,3-Dichloropropene	0.44		4			
Dibromochloromethane	0.13		4	80		
trans-1,3-Dichloropropene	0.44		4			
Vinyl chloride	0.04		4	2		
Semivolatile Organic						
2,2'-oxybis(1-Chloropropane)	0.26		4			
2,4,6-Trichlorophenol	6.1		4			
2,4-Dichlorophenol	6.1		4			
3,3'-Dichlorobenzidine	0.15		4			
4,6-Dinitro-2-methylphenol	3.7		4			
Benzo(a)anthracene	0.092		4			
Benzo(a)pyrene	0.0092		4			
Benzo(b)fluoranthene	0.092		4			
Benzo(k)fluoranthene	0.92		4			
bis(2-Chloroethyl)ether	0.0096		4			
bis(2-Ethylhexyl)phthalate	4.8		4	6		4
Carbazole	3.3		4			
Chrysene	9.2		4			
Dibenz(a,h)anthracene	0.0092		4			
Hexachlorobenzene	0.042		4	1		4
Hexachlorobutadiene	0.86		4			
Hexachloroethane	4.8		4			
Indeno(1,2,3-cd)pyrene	0.092		4			
Naphthalene	6.5		4			
Nitrobenzene	3.5		4			
n-Nitroso-di-n-propylamine	0.0096		4			
Pentachloropheno	0.56		4	1		4

Table 4-4
Statistical Summary of Background Soils
St. Juliens Creek Annex Background Investigation

Chemical Name	Number of Detects	Total Number of Samples	Frequency of Detection	Reporting Limit Minimum	Reporting Limit Maximum	Minimum Detected Conc.	Maximum Detected Conc.	Average Conc.	Median Conc.	Standard Deviation	Coefficient of Variation	Upper 95% Confidence - t	Industrial RBC	Detects > Industrial RBC	Detection Limits > Industrial RBC	Residential RBC	Detects > Residential RBC	Detection Limits > Residential RBC
Metal (mg/Kg)																		
Aluminum	100	100	1.00			783	38200	9256.65	7110	6,514.55	0.70	10,338.54	2000000			78000		
Barium	100	100	1.00			4.2	108	35.518	31.5	20.81	0.59	38.97	140000			5500		
Iron	100	100	1.00			1110	43300	11748	5930	12,106.37	1.03	13,758.54	610000			23000	19	
Lead	100	100	1.00			3	228	40.605	26.35	42.65	1.05	47.69	400			400		
Magnesium	100	100	1.00			83.1	10100	1443.911	560.5	1,821.65	1.26	1,746.44						
Manganese	100	100	1.00			3.4	303	54.802	19.15	68.04	1.24	66.10	41000			1600		
Vanadium	99	100	0.99	2.8	2.8	4.6	72.5	24.073	17.75	16.74	0.70	26.85	14000			550		
Zinc	99	100	0.99	9.6	9.6	3.4	343	48.636	23.7	62.17	1.28	58.96	610000			23000		
Calcium	98	100	0.98	61.5	71.9	56.4	105000	2544.725	544	11,758.26	4.62	4,497.45						
Chromium	96	100	0.96	2.7	3.9	3	56.6	15.363	10.5	12.79	0.83	17.49	6100			230		
Copper	95	100	0.95	0.48	3.7	0.54	78	16.0328	8.9	17.98	1.12	19.02	82000			3100		
Arsenic	91	100	0.91	0.48	2.1	0.56	32.5	5.597	3.2	6.09	1.09	6.61	4	37		0	91	9
Sodium	79	100	0.79	2.8	3560	3.3	22600	1308.006	66.7	3,748.44	2.87	1,930.52						
Cobalt	67	100	0.67	0.94	6.4	1	43.9	3.94	2.15	5.70	1.45	4.89	120000			4700		
Nickel	67	100	0.67	2.2	9.5	2.2	48.7	7.1545	5.1	7.93	1.11	8.47	41000			1600		
Mercury	52	100	0.52	0.045	0.25	0.046	1.2	0.20532	0.13	0.27	1.30	0.25	610			23		
Potassium	48	100	0.48	119	626	131	6000	915.025	286	1,326.83	1.45	1,135.37						
Selenium	23	100	0.23	0.6	2.6	0.83	3	0.6307	0.735	0.52	0.83	0.72	10000			390		
Antimony	13	100	0.13	0.44	2.3	0.63	2	0.42085	0.57	0.31	0.73	0.47	820			31		
Beryllium	8	100	0.08	0.044	1.5	0.21	3.4	0.227105	0.22	0.42	1.86	0.30	4100			160		
Silver	5	100	0.05	0.22	2.1	0.31	1.5	0.3243	0.515	0.20	0.63	0.36	10000			390		
Cadmium		100	0.00	0.2	2.5			0.3945	0.65	0.19	0.47	0.43	1000			39		
Cyanide		96	0.00	0.55	2.4			0.3641146	0.62	0.15	0.42	0.39	41000			1600		
Thallium		100	0.00	0.75	5.8			0.851	1.4	0.37	0.44	0.91	140			6		
Pesticide/PCB (ug/Kg)																		
Aroclor-1254	4	4	1.00			9.6	16	13.15	13.5	2.68	0.20	16.30	2900			320		
4,4'-DDE	49	98	0.50	3.7	16	2.1	1900	64.170918	5	263.42	4.11	108.37	17000			1900		
4,4'-DDT	44	98	0.45	3.7	16	2.2	1600	33.980612	5	184.92	5.44	65.01	17000			1900		
4,4'-DDD	22	98	0.22	3.7	16	2.3	840	15.405102	4.2	88.85	5.77	30.31	24000			2700		
alpha-Chlordane	7	98	0.07	1.9	8.3	1.1	45	2.2831633	2.2	5.50	2.41	3.21	16000			1800		
Dieldrin	5	98	0.05	3.7	16	3.2	16	2.7112245	4.2	1.82	0.67	3.02	360			40		
Endrin	5	98	0.05	3.7	16	2.2	35	2.9841837	4.2	3.59	1.20	3.59	610000			23000		
Endrin aldehyde	5	98	0.05	3.7	16	2.2	17	2.8433673	4.2	2.33	0.82	3.24	610000			23000		
gamma-Chlordane	5	98	0.05	1.9	8.3	1.7	24	1.694898	2.2	2.59	1.53	2.13	16000			1800		
Endosulfan II	2	98	0.02	3.7	16	7.4	36	2.9137755	4.2	3.61	1.24	3.52	12000000			470000		
Aldrin	1	98	0.01	1.9	8.3	17	17	1.4464286	2.1	1.70	1.18	1.73	340			38		
beta-BHC	1	98	0.01	1.9	8.3	1.3	1.3	1.2928571	2.1	0.62	0.48	1.40	3200			350		
delta-BHC	1	98	0.01	1.9	8.3	6	6	1.3341837	2.1	0.78	0.58	1.46						
Endosulfan I	1	98	0.01	1.9	8.3	8.4	8.4	1.3489796	2.1	0.94	0.70	1.51	12000000			470000		
alpha-BHC		98	0.00	1.9	8.3			1.2892857	2.1	0.62	0.48	1.39	910			100		
Aroclor-1016		4	0.00	47	55			24.75	48	1.89	0.08	26.98	82000			5500		
Aroclor-1221		4	0.00	93	110			49.25	95.5	3.93	0.08	53.87	2900			320		

Table 4-4
Statistical Summary of Background Soils
St. Juliens Creek Annex Background Investigation

Chemical Name	Number of Detects	Total Number of Samples	Frequency of Detection	Reporting Limit Minimum	Reporting Limit Maximum	Minimum Detected Conc.	Maximum Detected Conc.	Average Conc.	Median Conc.	Standard Deviation	Coefficient of Variation	Upper 95% Confidence - t	Industrial RBC	Detects > Industrial RBC	Detection Limits > Industrial RBC	Residential RBC	Detects > Residential RBC	Detection Limits > Residential RBC
Aroclor-1232		4	0.00	47	55			24.75	48	1.89	0.08	26.98	2900			320		
Aroclor-1242		4	0.00	47	55			24.75	48	1.89	0.08	26.98	2900			320		
Aroclor-1248		4	0.00	47	55			24.75	48	1.89	0.08	26.98	2900			320		
Aroclor-1260		4	0.00	47	55			24.75	48	1.89	0.08	26.98	2900			320		
Endosulfan sulfate		98	0.00	3.7	16			2.5076531	4.2	1.19	0.47	2.71	12000000			470000		
Endrin ketone		98	0.00	3.7	16			2.5076531	4.2	1.19	0.47	2.71	610000			23000		
gamma-BHC (Lindane)		98	0.00	1.9	8.3			1.2892857	2.1	0.62	0.48	1.39	4400			490		
Heptachlor		98	0.00	1.9	8.3			1.2892857	2.1	0.62	0.48	1.39	1300			140		
Heptachlor epoxide		98	0.00	1.9	8.3			1.2892857	2.1	0.62	0.48	1.39	630			70		
Methoxychlor		98	0.00	19	83			12.892857	21	6.16	0.48	13.93	10000000			390000		
Toxaphene		98	0.00	190	830			128.92857	210	61.63	0.48	139.27	5200			580		5
Semi-volatile Organic (ug/Kg)																		
bis(2-Ethylhexyl)phthalate	4	4	1.00			53	57	55.25	55.5	2.06	0.04	57.68	410000			46000		
Chrysene	61	100	0.61	74	130	18	4600	270.93	80	619.64	2.29	373.83	780000			87000		
Fluoranthene	59	100	0.59	74	130	26	11000	323.565	81.5	1,155.93	3.57	515.53	82000000			3100000		
Pyrene	56	100	0.56	74	290	27	9200	290.54	84	966.36	3.33	451.03	61000000			2300000		
Benzo(a)anthracene	53	100	0.53	18	290	18	4400	187.62	79	490.02	2.61	269.00	7800			870	4	
Benzo(a)pyrene	53	100	0.53	74	290	17	4200	176.28	80	455.69	2.59	251.96	780	3		87	28	11
Benzo(g,h,i)perylene	50	100	0.50	74	290	23	3300	196.885	81	428.96	2.18	268.12	61000000			2300000		
Benzo(k)fluoranthene	50	100	0.50	74	290	17	2800	174.485	80	367.00	2.10	235.43	78000			8700		
Indeno(1,2,3-cd)pyrene	48	100	0.48	74	290	22	2700	188.73	80.5	401.85	2.13	255.47	7800			870	6	
Benzo(b)fluoranthene	45	100	0.45	74	290	31	3500	282.75	86	629.27	2.23	387.25	7800			870	9	
Phenanthrene	39	100	0.39	74	320	26	9700	168.615	80	965.88	5.73	329.02	61000000			2300000		
Acenaphthylene	29	100	0.29	74	320	21	250	63.205	80	51.72	0.82	71.80						
Anthracene	27	100	0.27	74	320	16	2400	89.425	80	244.12	2.73	129.97	610000000			23000000		
Dibenz(a,h)anthracene	25	100	0.25	74	560	20	1000	93.81	83	136.77	1.46	116.52	780	1		87	16	26
Naphthalene	21	100	0.21	74	480	14	570	56.695	79.5	64.99	1.15	67.49	41000000			1600000		
Acenaphthene	9	100	0.09	74	560	19	1200	65.98	81	122.82	1.86	86.38	120000000			4700000		
Fluorene	7	100	0.07	74	560	19	1400	68.675	81	141.56	2.06	92.18	82000000			3100000		
2,2'-Oxybis(1-chloropropane)		4	0.00	470	560			248.75	480	20.97	0.08	273.43	82000			9100		
2,4,5-Trichlorophenol		4	0.00	1200	1400			625	1200	50.00	0.08	683.85	200000000			7800000		
2,4,6-Trichlorophenol		4	0.00	470	560			248.75	480	20.97	0.08	273.43	520000			58000		
2,4-Dichlorophenol		4	0.00	470	560			248.75	480	20.97	0.08	273.43	6100000			230000		
2,4-Dimethylphenol		4	0.00	470	560			248.75	480	20.97	0.08	273.43	41000000			1600000		
2,4-Dinitrophenol		4	0.00	1200	1400			625	1200	50.00	0.08	683.85	4100000			160000		
2,4-Dinitrotoluene		4	0.00	470	560			248.75	480	20.97	0.08	273.43	4100000			160000		
2,6-Dinitrotoluene		4	0.00	470	560			248.75	480	20.97	0.08	273.43	2000000			78000		
2-Chloronaphthalene		4	0.00	470	560			248.75	480	20.97	0.08	273.43	160000000			6300000		
2-Chlorophenol		4	0.00	470	560			248.75	480	20.97	0.08	273.43	10000000			390000		
2-Methylnaphthalene		4	0.00	470	560			248.75	480	20.97	0.08	273.43	41000000			1600000		
2-Methylphenol		4	0.00	470	560			248.75	480	20.97	0.08	273.43	100000000			3900000		
2-Nitroaniline		4	0.00	1200	1400			625	1200	50.00	0.08	683.85						
2-Nitrophenol		4	0.00	470	560			248.75	480	20.97	0.08	273.43						

Table 4-4
Statistical Summary of Background Soils
St. Juliens Creek Annex Background Investigation

Chemical Name	Number of Detects	Total Number of Samples	Frequency of Detection	Reporting Limit Minimum	Reporting Limit Maximum	Minimum Detected Conc.	Maximum Detected Conc.	Average Conc.	Median Conc.	Standard Deviation	Coefficient of Variation	Upper 95% Confidence - t	Industrial RBC	Detects > Industrial RBC	Detection Limits > Industrial RBC	Residential RBC	Detects > Residential RBC	Detection Limits > Residential RBC
3,3'-Dichlorobenzidine		4	0.00	470	560			248.75	480	20.97	0.08	273.43	13000			1400		
3-Nitroaniline		4	0.00	1200	1400			625	1200	50.00	0.08	683.85						
4,6-Dinitro-2-methylphenol		4	0.00	1200	1400			625	1200	50.00	0.08	683.85	200000			7800		
4-Bromophenyl-phenylether		4	0.00	470	560			248.75	480	20.97	0.08	273.43						
4-Chloro-3-methylphenol		4	0.00	470	560			248.75	480	20.97	0.08	273.43						
4-Chloroaniline		4	0.00	470	560			248.75	480	20.97	0.08	273.43	8200000			310000		
4-Chlorophenyl-phenylether		4	0.00	470	560			248.75	480	20.97	0.08	273.43						
4-Methylphenol		4	0.00	470	560			248.75	480	20.97	0.08	273.43	10000000			390000		
4-Nitroaniline		4	0.00	1200	1400			625	1200	50.00	0.08	683.85						
4-Nitrophenol		4	0.00	1200	1400			625	1200	50.00	0.08	683.85	16000000			630000		
bis(2-Chloroethoxy)methane		4	0.00	470	560			248.75	480	20.97	0.08	273.43						
bis(2-Chloroethyl)ether		4	0.00	470	560			248.75	480	20.97	0.08	273.43	5200			580		
Butylbenzylphthalate		4	0.00	470	560			248.75	480	20.97	0.08	273.43	410000000			16000000		
Carbazole		7	0.00	77	560			160.92857	470	110.58	0.69	242.14	290000			32000		
Di-n-butylphthalate		4	0.00	470	560			248.75	480	20.97	0.08	273.43	200000000			7800000		
Di-n-octyl phthalate		4	0.00	470	560			248.75	480	20.97	0.08	273.43	41000000			1600000		
Dibenzofuran		4	0.00	470	560			248.75	480	20.97	0.08	273.43	8200000			310000		
Diethylphthalate		4	0.00	470	560			248.75	480	20.97	0.08	273.43				780000000		
Dimethyl phthalate		4	0.00	470	560			248.75	480	20.97	0.08	273.43				780000000		
Hexachlorobenzene		4	0.00	470	560			248.75	480	20.97	0.08	273.43	3600			400		4
Hexachlorobutadiene		4	0.00	470	560			248.75	480	20.97	0.08	273.43	73000			8200		
Hexachlorocyclopentadiene		4	0.00	470	560			248.75	480	20.97	0.08	273.43	14000000			550000		
Hexachloroethane		4	0.00	470	560			248.75	480	20.97	0.08	273.43	410000			46000		
Isophorone		4	0.00	470	560			248.75	480	20.97	0.08	273.43	6000000			670000		
n-Nitroso-di-n-propylamine		4	0.00	470	560			248.75	480	20.97	0.08	273.43	820			91		4
n-Nitrosodiphenylamine		4	0.00	470	560			248.75	480	20.97	0.08	273.43	1200000			130000		
Nitrobenzene		4	0.00	470	560			248.75	480	20.97	0.08	273.43	1000000			39000		
Pentachlorophenol		4	0.00	1200	1400			625	1200	50.00	0.08	683.85	48000			5300		
Phenol		4	0.00	470	560			248.75	480	20.97	0.08	273.43	1.2E+09			47000000		
Volatile Organic (ug/Kg)																		
Acetone	4	4	1.00			17	74	47.25	49	25.33	0.54	77.06	200000000			7800000		
1,1,1-Trichloroethane		4	0.00	14	17			7.375	14	0.75	0.10	8.26	570000000			22000000		
1,1,2,2-Tetrachloroethane		4	0.00	14	17			7.375	14	0.75	0.10	8.26	29000			3200		
1,1,2-Trichloroethane		4	0.00	14	17			7.375	14	0.75	0.10	8.26	100000			11000		
1,1-Dichloroethane		4	0.00	14	17			7.375	14	0.75	0.10	8.26	200000000			7800000		
1,1-Dichloroethene		4	0.00	14	17			7.375	14	0.75	0.10	8.26	9500			1100		
1,2,4-Trichlorobenzene		4	0.00	470	560			248.75	480	20.97	0.08	273.43	20000000			780000		
1,2-Dichlorobenzene		4	0.00	470	560			248.75	480	20.97	0.08	273.43	180000000			7000000		
1,2-Dichloroethane		4	0.00	14	17			7.375	14	0.75	0.10	8.26	63000			7000		
1,2-Dichloroethane (Total)		4	0.00	14	17			7.375	14	0.75	0.10	8.26	9500			1100		
1,2-Dichloropropane		4	0.00	14	17			7.375	14	0.75	0.10	8.26	84000			9400		
1,3-Dichlorobenzene		4	0.00	470	560			248.75	480	20.97	0.08	273.43	1800000			70000		
1,4-Dichlorobenzene		4	0.00	470	560			248.75	480	20.97	0.08	273.43	240000			27000		

Table 4-4
Statistical Summary of Background Soils
St. Juliens Creek Annex Background Investigation

Chemical Name	Number of Detects	Total Number of Samples	Frequency of Detection	Reporting Limit Minimum	Reporting Limit Maximum	Minimum Detected Conc.	Maximum Detected Conc.	Average Conc.	Median Conc.	Standard Deviation	Coefficient of Variation	Upper 95% Confidence - t	Industrial RBC	Detects > Industrial RBC	Detection Limits > Industrial RBC	Residential RBC	Detects > Residential RBC	Detection Limits > Residential RBC
2-Butanone		4	0.00	14	17			7.375	14	0.75	0.10	8.26	1.2E+09			47000000		
2-Hexanone		4	0.00	14	17			7.375	14	0.75	0.10	8.26	82000000			3100000		
4-Methyl-2-pentanone		4	0.00	14	17			7.375	14	0.75	0.10	8.26	160000000			6300000		
Benzene		4	0.00	14	17			7.375	14	0.75	0.10	8.26	100000			12000		
Bromodichloromethane		4	0.00	14	17			7.375	14	0.75	0.10	8.26	92000			10000		
Bromoform		4	0.00	14	17			7.375	14	0.75	0.10	8.26	720000			81000		
Bromomethane		4	0.00	14	17			7.375	14	0.75	0.10	8.26	2900000			110000		
Carbon disulfide		4	0.00	14	17			7.375	14	0.75	0.10	8.26	200000000			7800000		
Carbon tetrachloride		4	0.00	14	17			7.375	14	0.75	0.10	8.26	44000			4900		
Chlorobenzene		4	0.00	14	17			7.375	14	0.75	0.10	8.26	41000000			1600000		
Chloroethane		4	0.00	14	17			7.375	14	0.75	0.10	8.26	2000000			220000		
Chloroform		4	0.00	14	17			7.375	14	0.75	0.10	8.26	940000			100000		
Chloromethane		4	0.00	14	17			7.375	14	0.75	0.10	8.26	440000			49000		
cis-1,3-Dichloropropene		4	0.00	14	17			7.375	14	0.75	0.10	8.26	57000			6400		
Dibromochloromethane		4	0.00	14	17			7.375	14	0.75	0.10	8.26	68000			7600		
Ethylbenzene		4	0.00	14	17			7.375	14	0.75	0.10	8.26	200000000			7800000		
Methylene chloride		4	0.00	10	25			8.625	17	3.07	0.36	12.23	760000			85000		
Styrene		4	0.00	14	17			7.375	14	0.75	0.10	8.26	410000000			16000000		
Tetrachloroethene		4	0.00	14	17			7.375	14	0.75	0.10	8.26	110000			12000		
Toluene		4	0.00	14	17			7.375	14	0.75	0.10	8.26	410000000			16000000		
trans-1,3-Dichloropropene		4	0.00	14	17			7.375	14	0.75	0.10	8.26	57000			6400		
Trichloroethene		4	0.00	14	17			7.375	14	0.75	0.10	8.26	520000			58000		
Vinyl chloride		4	0.00	14	17			7.375	14	0.75	0.10	8.26	3800			430		
Xylenes, total		4	0.00	14	17			7.375	14	0.75	0.10	8.26				160000000		

Table 4-5
Mann Whitney Analysis of Soil Type and Soil Depth
St Juliens Creek Annex Background Investigation

Chemical Name	Munden-Tetotum/ Dragston-Augusta					Munden-Tetotum				Dragston-Augusta				Bohicket				Urban-Udorthen				Dredge & Fill			
	Mann Whitney Soil Type	Mann Whitney Soil Depth	S/S	SRF	SUB	Mann Whitney Soil Depth	S/S	SRF	SUB	Mann Whitney Soil Depth	S/S	SRF	SUB	Mann Whitney Soil Depth	S/S	SRF	SUB	Mann Whitney Soil Depth	S/S	SRF	SUB	Mann Whitney Soil Depth	S/S	SRF	SUB
Metal																									
Aluminum	0.06	0.001		X	X									0.62	X			0.59	X			0.002		X	X
Antimony	0.98	0.003		X	X									0.03		X	X	0.31	X			0.06	X		
Arsenic	0.79	0.36	X											0.91	X			0.15	X			0.001		X	X
Barium	0.22	0.001		X	X									0.43	X			0.49	X			0.001		X	X
Beryllium	0.21	0.96	X											0.49	X			0.41	X			0.02		X	X
Calcium	0.84	0.15	X											0.27	X			0.57	X			0.23	X		
Chromium	0.016					0.03		X	X	0.001		X	X	0.31	X			0.91	X			0.001		X	X
Cobalt	0.006					0.24	X			0.37	X			0.68	X			0.94	X			0.21	X		
Copper	0.78	0.001		X	X									0.02		X	X	0.001		X	X	0.001		X	X
Iron	0.04					0.01		X	X	0.001		X	X	0.68	X			0.94	X			0.001		X	X
Lead	0.55	0.001		X	X									0.04		X	X	0.001		X	X	0.001		X	X
Magnesium	0.21	0.007		X	X									0.31	X			0.59	X			0.007		X	X
Manganese	0.87	0.034		X	X									0.79	X			0.07	X			0.002		X	X
Mercury	0.26	0.002		X	X									0.36	X			0.002		X	X	0.001		X	X
Nickel	0.56	0.76	X											0.43	X			0.55	X			0.03		X	X
Potassium	0.24	0.12	X											0.31	X			0.99	X			0.004		X	X
Selenium	0.59	0.001		X	X									0.17	X			0.36	X			0.02		X	X
Silver	0.81	0.001		X	X									0.17	X			0.73	X			0.07	X		
Sodium	0.91	0.44	X											0.27	X			0.09	X			0.001		X	X
Vanadium	0.11	0.29	X											0.14	X			0.41	X			0.001		X	X
Zinc	0.99	0.001		X	X									0.24	X			0.001		X	X	0.001		X	X
Pesticide/PCB																									
Aldrin	0.73	0.001		X	X									0.08	X			0.45	X			0.88	X		
Aroclor-1254	NA	NA												NA				NA				NA			
beta-BHC	0.78	0.001		X	X									0.13	X			0.45	X			0.88	X		
delta-BHC	0.73	0.001		X	X									0.08	X			0.45	X			0.88	X		
alpha-Chlordane	0.81	0.016		X	X									0.14	X			0.17	X			0.88	X		
gamma-Chlordane	0.91	0.001		X	X									0.19	X			0.17	X			0.88	X		
4,4'-DDD	0.59	0.007		X	X									0.27	X			0.74	X			0.94	X		
4,4'-DDE	0.17	0.001		X	X									0.05		X	X	0.02		X	X	0.91	X		
4,4'-DDT	0.26	0.012		X	X									0.08	X			0.03		X	X	0.03		X	X
Dieldrin	0.94	0.001		X	X									0.38	X			0.29	X			0.73	X		
Endrin	0.71	0.003		X	X									0.11	X			0.29	X			0.78	X		
Endrin aldehyde	0.68	0.004		X	X									0.11	X			0.29	X			0.78	X		
Endosulfan I	0.73	0.001		X	X									0.22	X			0.45	X			0.88	X		
Endosulfan II	0.89	0.001		X	X									0.12	X			0.29	X			0.78	X		
Semi-volatile Organic																									

Table 4-5
Mann Whitney Analysis of Soil Type and Soil Depth
St Juliens Creek Annex Background Investigation

Chemical Name	Munden-Tetotum/ Dragston-Augusta					Munden-Tetotum				Dragston-Augusta				Bohicket				Urban-Udorthen				Dredge & Fill			
	Mann Whitney Soil Type	Mann Whitney Soil Depth	S/S	SRF	SUB	Mann Whitney Soil Depth	S/S	SRF	SUB	Mann Whitney Soil Depth	S/S	SRF	SUB	Mann Whitney Soil Depth	S/S	SRF	SUB	Mann Whitney Soil Depth	S/S	SRF	SUB	Mann Whitney Soil Depth	S/S	SRF	SUB
Acenaphthene	0.87	0.001		X	X									0.22	X			0.49	X			0.19	X		
Acenaphthylene	0.92	0.005		X	X									0.11	X			0.52	X			0.04		X	X
Anthracene	0.73	0.003		X	X									0.22	X			0.52	X			0.85	X		
bis(2-Ethylhexyl)phthalate	NA	NA												NA				NA				NA			
Benzo(a)anthracene	0.17	0.27	X											0.54	X			0.34	X			0.41	X		
Benzo(a)pyrene	0.72	0.91	X											0.85	X			0.62	X			0.49	X		
Benzo(b)fluoranthene	0.82	0.18	X											0.29	X			0.36	X			0.03		X	X
Benzo(g,h,i)perylene	0.72	0.84	X											0.41	X			0.62	X			0.03		X	X
Benzo(k)fluoranthene	0.73	0.84	X											0.82	X			0.59	X			0.17	X		
Chrysene	0.34	0.19	X											0.59	X			0.06	X			0.21	X		
Dibenz(a,h)anthracene	0.52	0.012		X	X									0.38	X			0.38	X			0.03		X	X
Fluoranthene	0.62	0.94	X											0.94	X			0.03		X	X	0.59	X		
Fluorene	0.87	0.001		X	X									0.22	X			0.79	X			0.09	X		
Indeno(1,2,3-cd)pyrene	0.71	0.82	X											0.43	X			0.65	X			0.03		X	X
Naphthalene	0.87	0.001		X	X									0.15	X			0.97	X			0.34	X		
Phenanthrene	0.58	0.19	X											0.22	X			0.71	X			0.49	X		
Pyrene	0.67	0.67	X											0.49	X			0.001		X	X	0.82	X		

S/S = Surface/Subsurface
SRF = Surface
SUB = Subsurface

Table 4-6
Theoretical Distribution by Soil Type
St Juliens Creek Annex Background Investigation

Soil Type	Munden-Tetotum/ Dragston Augusta			Munden-Tetotum			Dragston-Augusta			Bohicket			Urban-Udorthent			Dredge & Fill		
Soil Depth	S/S	SRF	SUB	S/S	SRF	SUB	S/S	SRF	SUB	S/S	SRF	SUB	S/S	SRF	SUB	S/S	SRF	SUB
Chemical Name																		
Metals																		
Silver		NP	NP							NP			NP			NP		
Aluminum		N	N							L			L				N	N
Arsenic	L									L			N				N	N
Barium		N	N							L			N				N	N
Beryllium	L									L			NP				NP	N
Calcium	NP									L			NP			L		
Cobalt				NP			N			L			L			N		
Chromium					N	N		N	NP	L			L				NP	N
Copper		L	N								N	NP		NP	N		N	N
Iron					N	N		N	NP	L			L				N	N
Mercury		L	NP							L				NP	N		N	N
Potassium	NP									L			L				N	N
Magnesium		L	N							L			L				N	N
Mangane		L	L							L			L				NP	N
Sodium	NP									L			NP				NP	N
Nickel	NP									L			L				NP	N
Lead		L	L								N	NP		N	NP		N	N
Antimony		NP	NP								N	NP	NP			L		
Selenium		NP	NP							NP			NP				N	N
Vanadium	N									L			N				N	N
Zinc		L	NP							L				NP	NP		NP	N
Pesticides																		
Aldrin		NP	NP							NP			NP			N		
beta-BHC		NP	NP							NP			NP			N		
delta-BHC		NP	NP							NP			NP			N		
alpha-Chlordane		NP	NP							NP			NP			N		
gamma-Chlordane		NP	NP							NP			NP			N		
4,4'-DDD		NP	NP							NP			NP			NP		
4,4'-DDE		NP	NP								NP	NP		NP	NP	L		
4,4'-DDT		NP	NP							NP				NP	NP		N	NP
Dieldrin		NP	NP							NP			NP			NP		
Endrin		NP	NP							NP			NP			N		
Endrin aldehyde		NP	NP							NP			NP			N		
Endosulfan I		NP	NP							NP			NP			N		
Endosulfan II		NP	NP							NP			NP			N		
Semi-volatiles																		
Acenaphthene		L	NP							NP			NP			NP		
Acenaphthylene		NP	NP							NP			NP				NP	N
Anthracene		NP	NP							NP			NP			NP		
Benzo(a)anthracene	NP									NP			L			L		
Benzo(a)pyrene	NP									NP			NP			L		
Benzo(b)fluoranthene	NP									NP			NP				N	NP
Benzo(g,h,I)perylene	NP									L			L				N	NP
Benzo(k)fluoranthene	NP									L			NP			L		
Chrysene	NP									NP			L			L		
Dibenz(a,h)anthracene		NP	NP							NP			NP				N	NP
Fluoranthene	NP									NP				NP	NP	L		
Fluorene		L	NP							NP			NP			NP		
Indeno(1,2,3-cd)pyrene	NP									L			L				N	NP
Naphthalene		L	NP							NP			NP			NP		
Phenanthrene	NP									L			NP			NP		
Pyrene	NP									NP				NP	NP	L		

SOIL DEPTH
S/S=Surface/Subsurface
SRF=Surface
SUB=Subsurface

DISTRIBUTION
N=Normal
NP=Non Parametric
L= Log Normal

Table 4-7
Central Tendency (Mean) by Soil Type
St Juliens Creek Annex Background Investigation

Soil Type	Munden-Tetotum/ Dragston Augusta			Munden-Tetotum			Dragston-Augusta			Bohicket			Urban-Udorthent			Dredge & Fill		
Soil Depth	S/S	SRF	SUB	S/S	SRF	SUB	S/S	SRF	SUB	S/S	SRF	SUB	S/S	SRF	SUB	S/S	SRF	SUB
Chemical Name																		
Metals																		
Silver (mg/Kg)		**0.52**	**0.49**							0.76			**0.5**			0.6		
Aluminum (mg/Kg)		**4610**	**9361**							10777			**8389**				17083	9150
Arsenic (mg/Kg)	**2.6**									7.4			3				17	7.8
Barium (mg/Kg)		**25**	**39**							30			33				77	27
Beryllium (mg/Kg)	**0.15**									0.74			**0.2**				0.62	0.42
Calcium (mg/Kg)	**194**									1395			**741**			1217		
Cobalt (mg/Kg)				1.2			**1.8**			8.5			**2.7**			7		
Chromium (mg/Kg)					4.8	9.5		**6.7**	**14**	19			**12.5**				39	20
Copper (mg/Kg)		**8.4**	3								36	11		**9**	**4.3**		43	22
Iron (mg/Kg)					2501	4614		**3366**	**6550**	15220			**8023**				35570	18829
Mercury (mg/Kg)		**0.14**	**0.08**							0.21				**0.14**	**0.1**		0.8	0.37
Potassium (mg/Kg)	**172**									1702			**415**				3276	1626
Magnesium (mg/Kg)		**251**	**372**							3191			**777**				3446	1923
Manganese (mg/Kg)		**16**	**8.9**							93			**44**				131	79
Sodium (mg/Kg)	**44**									6199			**47**				187	92
Nickel (mg/Kg)	**4.2**									15			**5.3**				13	8.2
Lead (mg/Kg)		**31**	**7.3**								82	23		**46**	**7.3**		105	46
Antimony (mg/Kg)		**0.5**	**0.5**								1.4	0.7	**0.52**			0.86		
Selenium (mg/Kg)		**0.7**	**0.6**							1			**0.66**				1.5	1
Vanadium (mg/Kg)	**16.3**									28			**21**				55	22
Zinc (mg/Kg)		**19**	**7.9**							108				**48**	**12**		91	47
Pesticides																		
Aldrin (ug/Kg)		**2.1**	**2**							3.1			**2**			2.4		
beta-BHC (ug/Kg)		**2.1**	**2**							3.1			**78**			2.4		
delta-BHC (ug/Kg)		**2.1**	**2**							3.1			**2**			2.4		
alpha-Chlordane (ug/Kg)		**2.1**	**2**							3.1			**2.1**			2.4		
gamma-Chlordane (ug/Kg)		**2.1**	**2**							3.1			**2.1**			2.4		
4,4'-DDD (ug/Kg)		**4.2**	**3.8**							6.3			**3.9**			4.7		
4,4'-DDE (ug/Kg)		**11**	**3.9**								20	6.4		**15**	**4**	5.2		
4,4'-DDT (ug/Kg)		**7.2**	**3.8**							6				**13**	**4**		11	4.7
Dieldrin (ug/Kg)		**4.1**	**3.8**							5.8			**3.9**			4.7		
Endrin (ug/Kg)		**4.1**	**3.8**							6			**3.9**			4.7		
Endrin aldehyde (ug/Kg)		**4**	**3.8**							6			**3.9**			4.7		
Endosulfan I (ug/Kg)		**2.1**	**2**							3.1			**2**			2.4		
Endosulfan II (ug/Kg)		**4.1**	**3.8**							6			**3.9**			4.7		
Semi-volatiles																		
Acenaphthene (ug/Kg)		**82**	**77**							110			**79**			96		
Acenaphthylene (ug/Kg)		**82**	**77**							120			**79**				144	69
Anthracene (ug/Kg)		**81**	**77**							125			**79**			78		
Benzo(a)anthracene (ug/Kg)	**2**									96			**88**			578		
Benzo(a)pyrene (ug/Kg)	**77**									96			**79**			525		
Benzo(b)fluoranthene (ug/Kg)	**78**									125			**80**				1431	375
Benzo(g,h,I)perylene (ug/Kg)	**77**									181			**88**				811	245
Benzo(k)fluoranthene (ug/Kg)	**77**									160			**79**			594		
Chrysene (ug/Kg)	**77**									103			**106**			992		
Dibenz(a,h)anthracene (ug/Kg)		**81**	**77**							125			**81**				401	111
Fluoranthene (ug/Kg)	**77**									110				**93**	**79**	758		
Fluorene (ug/Kg)		**82**	**77**							110			**80**			96		
Indeno(1,2,3-cd)pyrene (ug/Kg)	**77**									164			**89**				847	230
Naphthalene (ug/Kg)		**82**	**77**							110			**79**			59		
Phenanthrene (ug/Kg)	**78**									158			**79**			84		
Pyrene (ug/Kg)	**77**									115				**100**	**79**	696		

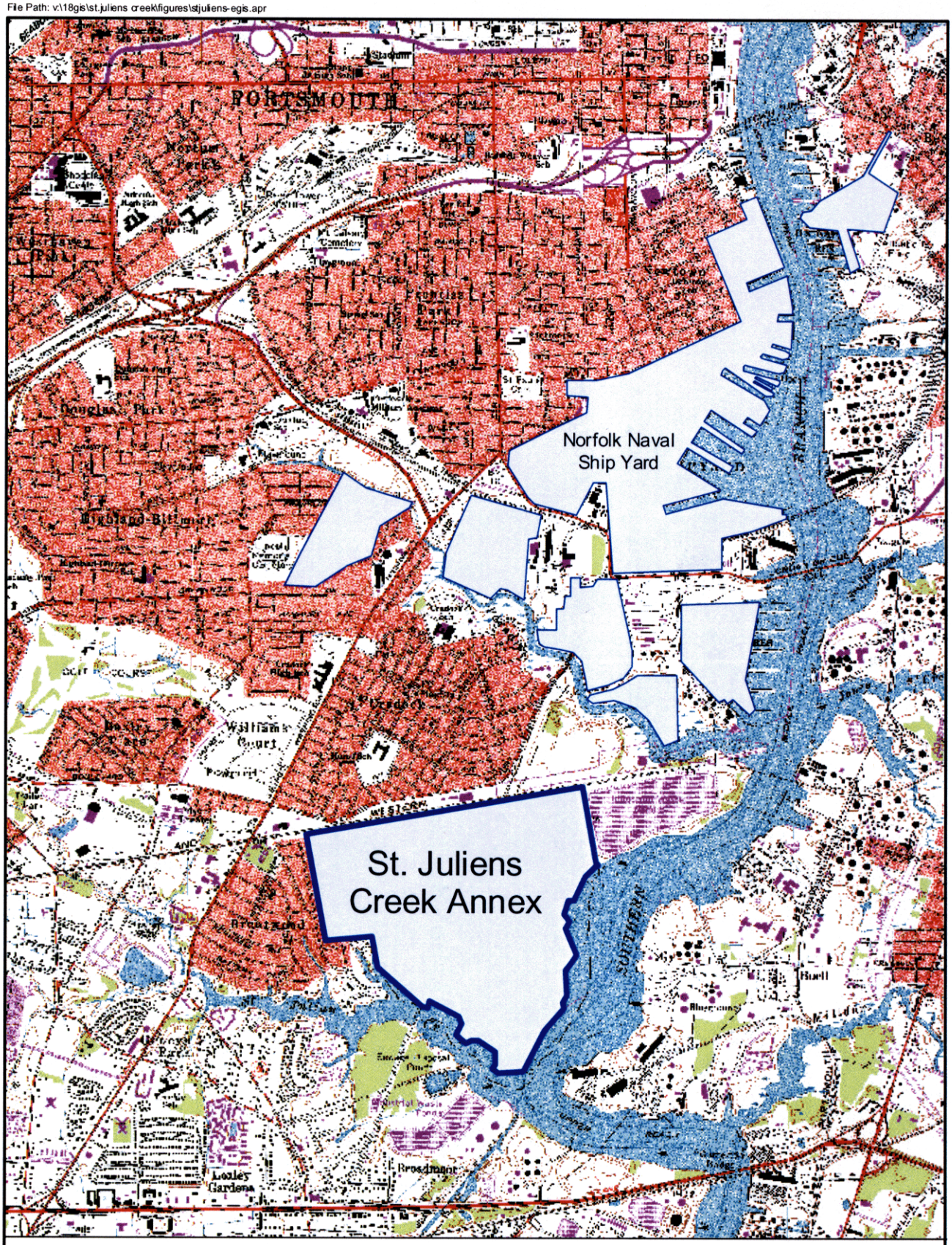
SOIL DEPTH
S/S=Surface/Subsurface
SRF=Surface
SUB=Subsurface

Table 4-8
Upper Tolerance Limit (95%) by Soil Type
St. Juliens Creek Annex Background Investigation

Soil Type	Munden-Tetotum/ Dragston-Augusta			Munden-Tetotum			Dragston-Augusta			Bohicket			Urban-Udorthent			Dredge & Fill		
Soil Depth	S/S	SRF	SUB	S/S	SRF	SUB	S/S	SRF	SUB	S/S	SRF	SUB	S/S	SRF	SUB	S/S	SRF	SUB
Chemical Name																		
Metals																		
Silver (mg/Kg)		0.62	0.52							1.8			0.56			0.67		
Aluminum (mg/Kg)		7669	15599							30002			21155				22786	18839
Arsenic (mg/Kg)	5.7									21			5.5				24	14
Barium (mg/Kg)		40	61							83			61				98	50
Beryllium (mg/Kg)	0.28									2.3			0.6				1	0.81
Calcium (mg/Kg)	1225									3530			57405			3251		
Cobalt (mg/Kg)				2.2			2.7			30			6.3			13		
Chromium (mg/Kg)					7	18		9.6	15	53			28				45	39
Copper (mg/Kg)		17.1	5.1								81	64		38	9.1		58	40
Iron (mg/Kg)					3669	8412		5249	13664	50142			17494				45805	36585
Mercury ((mg/Kg))		0.3	0.1							0.6				0.34	0.12		1.3	0.62
Potassium ((mg/Kg))	368									6046			1067				4577	3465
Magnesium (mg/Kg)		527	587							10058			1853				4507	3847
Mangane (mg/Kg)		42	14							345			133				198	151
Sodium (mg/Kg)	174									20145			574				620	203
Nickel (mg/Kg)	6.9									44			11				19	15
Lead (mg/Kg)		61	12								198	145		92	27		147	86
Antimony (mg/Kg)		0.7	0.6								2.4	1.2	0.91			1.47		
Selenium (mg/Kg)		1	0.7							2.6			0.82				2.2	1.5
Vanadium (mg/Kg)	26.6									72			39				70	42
Zinc (mg/Kg)		38	13							372				131	46		137	87
Pesticides																		
Aldrin (ug/Kg)		2.7	2							8.7			2.9			2.8		
beta-BHC ((ug/Kg))		2.7	2							7.5			252			2.8		
delta-BHC ((ug/Kg))		2.7	2							7.5			2.9			2.8		
alpha-Chlordane (ug/Kg)		9.8	2.8							9.1			9.6			2.8		
gamma-Chlordane (ug/Kg)		6.1	2							9.7			5.6			2.8		
4,4'-DDD (ug/Kg)		10.6	4							308			22.1			5.3		
4,4'-DDE (ug/Kg)		532	18								269	99		1116	41	9		
4,4'-DDT (ug/Kg)		237	7.8							34				566	9		21	9
Dieldrin (ug/Kg)		11.5	4							14			5.7			5.3		
Endrin (ug/Kg)		13.4	5.1							14			5.7			5.4		
Endrin aldehyde (ug/Kg)		11.6	4.2							15			5.7			5.4		
Endosulfan I (ug/Kg)		2.7	2							8.3			2.9			2.8		
Endosulfan II (ug/Kg)		13.5	5							14			5.7			5.4		
Semi-volatiles																		
Acenaphthene (ug/Kg)		92	81							292			88			592		
Acenaphthylene (ug/Kg)		95	81							292			88				246	131
Anthracene (ug/Kg)		91	81							332			88			462		
Benzo(a)anthracene (ug/Kg)	6.9									749			221			2027		
Benzo(a)pyrene (ug/Kg)	91									732			253			1785		
Benzo(b)fluoranthene (ug/Kg)	91									825			316				3197	2335
Benzo(g,h,I)perylene (ug/Kg)	91									501			219				1655	2099
Benzo(k)fluoranthene (ug/Kg)	91									467			241			2038		
Chrysene (ug/Kg)	102									986			277			3487		
Dibenz(a,h)anthracene (ug/Kg)		91	81							292			98				714	708
Fluoranthene (ug/Kg)	103									2500				469	83	2766		
Fluorene (ug/Kg)		92	81							292			88			602		
Indeno(1,2,3-cd)pyrene (ug/Kg)	91									472			202				1829	1769
Naphthalene (ug/Kg)		92	81							292			88			485		
Phenanthrene (ug/Kg)	91									376			149			913		
Pyrene (ug/Kg)	125									1905				480	83	2590		

SOIL DEPTH
S/S=Surface/Subsurface
SRF=Surface
SUB=Subsurface

File Path: v:\18gis\st.juliens creek\figures\stjuliens-egis.apr



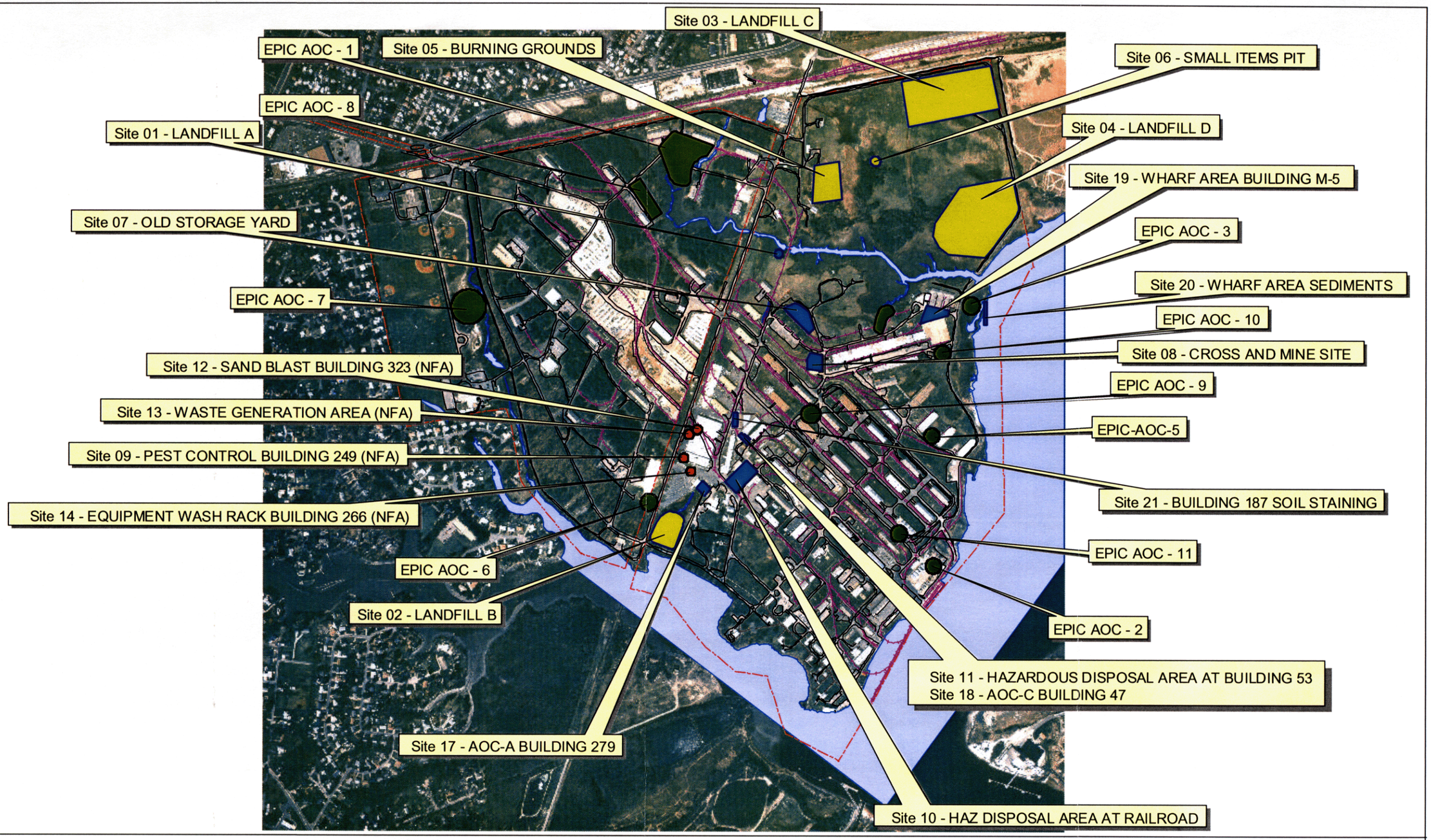
N

0 500 1000 Feet

Figure 1-1
Regional Site Map
St. Juliens Creek Annex
Chesapeake, Virginia

CH2MHILL

File Path: v:\18gis\st.juliens creek\figures\stjuliens-egis.apr



LEGEND

- EPIC AOCs
- SWMUs
- SWMUs For No Further Action
- IR Sites

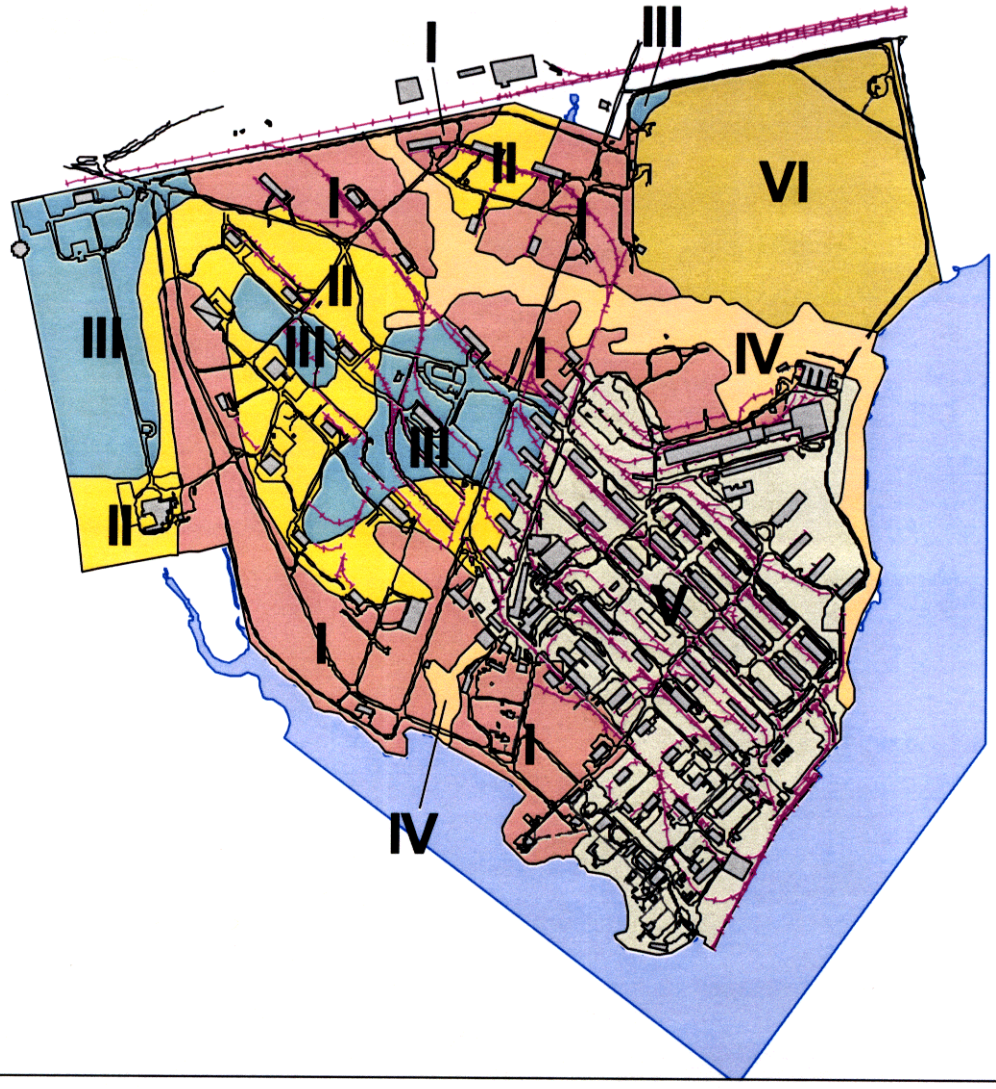
N

0 500 1000 Feet

Figure 1-2
Site Location Map
St. Juliens Creek Annex
Chesapeake, Virginia

CH2MHILL

File Path: v:\18gis\st.juliens creek\figures\stjuliens-egis.apr



LEGEND

- I - Munden-Tetotum
- II - Dragston-Augusta Association
- III - Nimmo
- IV - Bohicket
- V - Urban-Udorthents
- VI - Dredge Fill

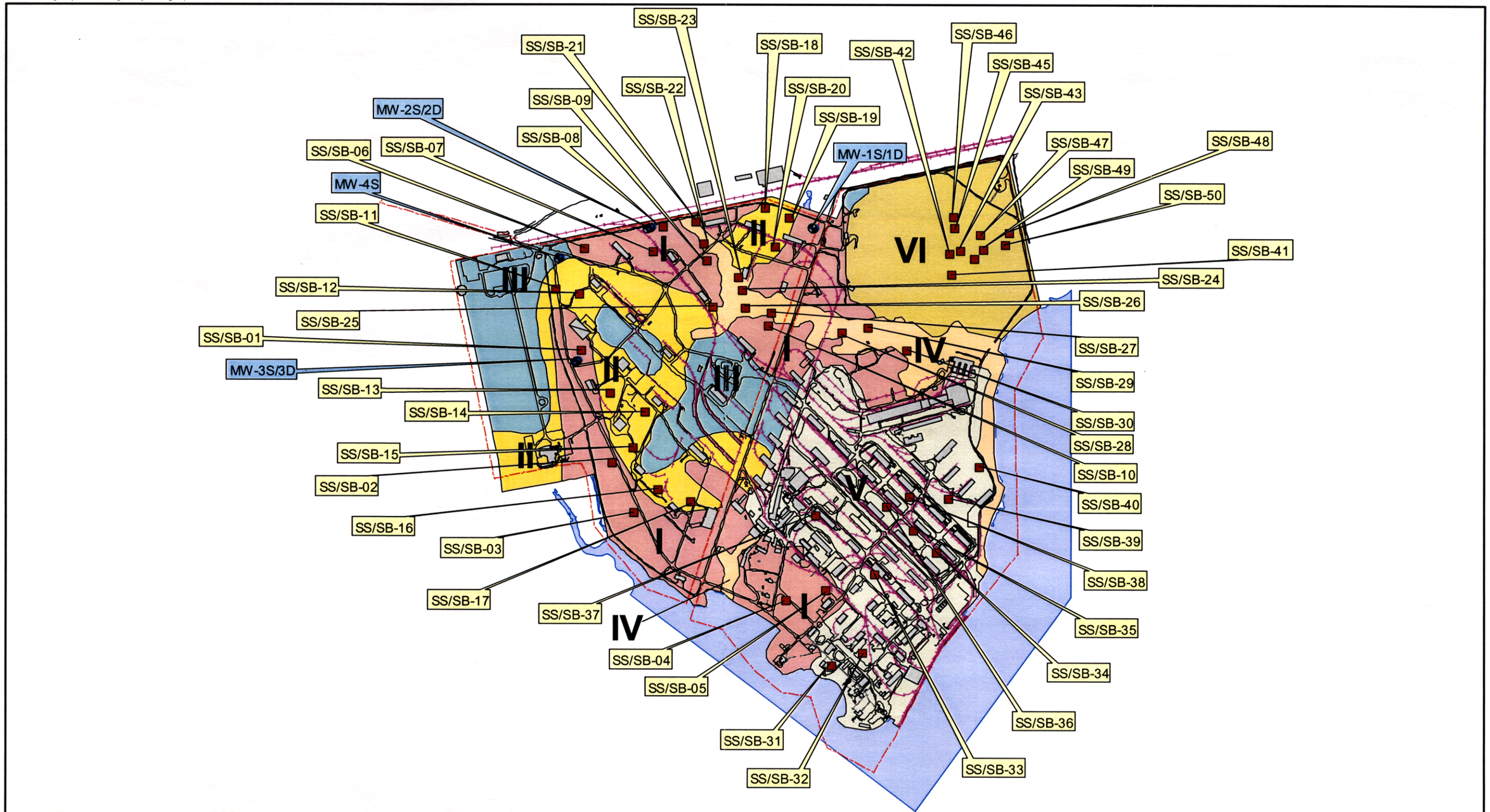
N

0 800 1600 Feet

Figure 1-3
Soil Types
St. Juliens Creek Annex
Chesapeake, Virginia

CH2MHILL

File Path: v:\18gis\st.juliens creek\figures\stjuliens-egis.apr



LEGEND

- Soil Sample Locations
- Monitoring Well Locations
- I - Munden-Tetotum
- II - Dragston-Augusta Association
- III - Nimmo
- IV - Bohicket
- V - Urban-Udorthents
- VI - Dredge Fill

N

0 500 1000 Feet

Figure 2-1
Background Sampling Locations
St. Juliens Creek Annex
Chesapeake, Virginia

CH2MHILL

Table/Appendix Legend

The following are the data qualifier explanations for detects/exceedances in the tables and appendices for the St. Juliens Creek Annex Background Report.

NA – Not Analyzed

B – Analyte not detected above associated blank

J – Reported value is estimated

K – Reported limit may be biased high

L – Reported value may be biased low

U- Analyte not detected

Shaded cells within the tables indicate the analyte exceeded one or more criteria

The sample type explanations are as follows:

S/S – Surface Soil Sample

SUR – Surface Soil Sample

SUB – Subsurface Soil Sample

Appendix A

Lithologic Descriptions of Background Soil Samples

CDM Federal Programs Corporation

Boring Number: BK01

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC O

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6''	0-6''	SS01		Black (2.5y 2.5/1) Silty SAND, with organics, loose, moist. Silty SAND (SM)	
3'	1-3'	SB01		Dark Grayish Brown (2.5y 4/2) Clayey SAND, trace organics, stiff, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK02

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 02

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample Interval	Sample Type and Number	Sample Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS02		Black (2.5Y 2.5/1) Sandy SILT, with organics, very loose, moist. (TOPSOIL)	
3'	1-3'	SB02		Grayish Brown (2.5Y 5/2) Sandy SILT, loose, dry. SILT (ML)	

CDM Federal Programs Corporation	Boring Number: BK03 Sheet: 1 of 1
St. Juliens Creek Annex, Portsmouth, VA	Soil Boring Log

Project: Site Screening Assessments — Location: AOC 03

Start / Finish: — Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push — Logger: Bob Hunt

Depth Below Surface (FT)	Sample: Interval	Sample: Type and Number	Sample: Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS03		Black (2.5Y 2.5/1) silty SAND, with organics, loose, moist. Silty SAND (SM)	
3'	1-3'	SB03		Dark Gray (2.5Y 4/1) Silty SAND, trace clay, stiff, moist. Silty SAND (SM)	

CDM Federal Programs Corporation

Boring Number: BK04

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 01

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS04		Black (2.5y 2.5/1) Silty SAND, trace organics, loose, moist. Silty SAND (SM)	
3'	1-3'	SB04		Very Dark Gray (2.5y 3/1) Sandy CLAY, trace organics, stiff, moist. Lean CLAY (CL)	

CDM Federal Programs Corporation

Boring Number: BK05

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 05

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample: Interval	Sample: Type and Number	Sample: Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS05		Black (2.5Y 2.5/1) Silty SAND, with organics, loose, moist. Silty SAND (SM)	
3'	1-3'	SB05		Olive Brown (2.5Y 4/3) Poorly Graded SAND, with silt, trace shell fragments, loose, moist. Poorly Graded SAND (SP)	

CDM Federal Programs Corporation

Boring Number: BK 06

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log 06

Project: Site Screening Assessments

Location: AOC 06

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample: Interval	Sample: Type and Number	Sample: Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS06		Black (2.5Y 2.5/1) SANDY SILT, organics, very loose, moist. (TOPSOIL)	
3'	1-3'	SB06		Dark Grayish Brown (2.5Y 4/2) Silty SAND, with clay, stiff, moist. Silty SAND (SM)	

CDM Federal Programs Corporation

Boring Number: 3K07

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 07

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample Interval	Sample Type and Number	Sample Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS07		Black (2.5Y 2.5/1) silty SAND, trace organics, loose, moist. Silty SAND (SM)	
3'	1-3'	SB07		Olive Brown (2.5Y 4/3) Clayey SAND, stiff, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK08

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 08

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample: Interval	Sample: Type and Number	Sample: Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
0''	0-6''	SS08		Black (2.5Y 2.5/1) Silty SAND, trace organics, loose, moist. Silty SAND (SM)	
3'	1-3'	SB08		Olive Brown (2.5Y 4/3) Silty SAND, with clay, stiff, moist. Silty SAND (SM)	

CDM Federal Programs Corporation

Boring Number: BK09

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 09

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6''	0-6'	SS09		Black (2.5Y 2.5/1) Sandy SILT, organics, very loose, moist. (TOPSOIL)	
3'	1-3'	SB09		Dark Grayish Brown (2.5Y 4/2) Clayey SAND, stiff, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK 10

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 10

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS10		Black (2.5Y 2.5/1) Silty SAND, with organics, very loose, moist. Silty SAND (SM)	
3'	1-3'	SB10		Olive Brown (2.5Y 4/3) Clayey SAND, with silt, stiff, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK11

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 11

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS11		Black (2.5y 2.5/1) silty SAND, with organics, loose, moist. silty SAND (SM)	
3'	1-3'	SB11		Dark Grayish Brown (2.5y 4/2) Clayey SAND, with silt, stiff moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK 12

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 12

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SB12		Very Dark Gray (2.5y 3/1) Silty SAND, with organics, loose, moist. Silty SAND (SM)	
3'	1-3'	SB12		Very Dark Gray (2.5y 3/1) Silty SAND, trace organics, loose, moist. Silty SAND (SM)	

CDM Federal Programs Corporation

Boring Number: BK 13

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 13

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS13		Black (2.5Y 2.5/1) Sandy SILT, with organics, very loose, moist. (TOPSOIL)	
3'	1-3'	SB13		Dark Grayish Brown (2.5Y 4/2) clayey SAND, silt, moist. Clayey SAND	

CDM Federal Programs Corporation

Boring Number: 14

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 14

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS14		Black (2.5Y 2.5/1) Sandy SILT, with organics, very loose, moist. (TOPSOIL)	
3'	1-3'	SB14		Dark Grayish Brown (2.5Y 4/2) Clayey SAND, stiff, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation	Boring Number: BK 15 Sheet: 1 of 1
St. Juliens Creek Annex, Portsmouth, VA	Soil Boring Log

Project: Site Screening Assessments — Location: AOC 15

Start / Finish: — Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push — Logger: Bob Hunt

Depth Below Surface (FT)	Sample: Interval	Sample: Type and Number	Sample: Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS15		Black (2.5Y 2.5/1) Sandy SILT, organics, very loose, moist. (TOPSOIL)	
3'	1-3'	SB15		Dark Grayish Brown (2.5Y 4/2) clayey SAND, with silt, stiff, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK 16

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 16

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample: Interval	Sample: Type and Number	Sample: Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS16		Black (2.5y 2.5/1) Sandy SILT; organics, very loose, moist. (TOPSOIL)	
3'	1-3'	SB16		Light Olive Brown (2.5y 5/3) Silty SAND, stiff, moist. Silty SAND (SM)	

CDM Federal Programs Corporation

Boring Number: BK17

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 17

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6'	SS17		Black (2.5Y 2.5/1) Sandy SICT, with organics, very loose, moist. (Topsoil)	
3'	1-3'	SB17		Dark Grayish Brown (2.5Y 4/2) Clayey SAND, stiff, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK18

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 18

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS18		Black (2.5Y 2.5/1) Silty SAND, with clay, trace organics. Silty SAND (SM)	
3'	1-3'	SB18		Dark Grayish Brown (2.5Y 4/2) Sandy CLAY, stiff, moist. Lean CLAY (CL)	

CDM Federal Programs Corporation

Boring Number: BK 19

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 19

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS 19		Very Dark Gray (2.5y 3/1) Silty SAND, trace organics, trace clay. Silty SAND (SM)	
3'	1-3'	SB19		Olive Brown (2.5y 4/3) Clayey SAND, stiff, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK20

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 31

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS20		Black (2.5Y 2.5/1) Sandy SILT, with organics, very loose, moist. (TOPSOIL)	
3'	1-3'	SB20		Dark Grayish Brown (2.5Y 4/2) Clayey SAND, with silt, stiff, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK21

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 21

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6''	0-6''	SS21		Black (2.5Y 2.5/1) Organic SILT, very loose, moist. Organic SILT (OH)	
3'	1-3'	SB21		Very Dark Gray (2.5Y 3/1) Organic SILT, very loose, wet. Organic SILT (OH)	

CDM Federal Programs Corporation

Boring Number: BK22

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 22

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS22		Black (2.5y 2.5/1) Silty fine SAND, with organics, loose, wet Silty SAND (SM)	
3'	1-3'	SB22		Black (2.5y 2.5/1) Silty fine SAND with organics, trace shell fragments, loose wet. Silty SAND (SM)	

CDM Federal Programs Corporation	**Boring Number:** BK 23 Sheet: 1 of 1
St. Juliens Creek Annex, Portsmouth, VA	Soil Boring Log

Project: Site Screening Assessments — Location: AOC 23

Start / Finish: — Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push — Logger: Bob Hunt

Depth Below Surface (FT)	Sample: Interval	Sample: Type and Number	Sample: Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS23		Black (2.5Y 2.5/1) Poorly Graded SAND, with silt, with organics, loose, wet. Poorly Graded SAND (SP)	
3'	1-3'	SB23		Black (2.5Y 2.5/1) Poorly Graded SAND, with silt, trace organics, loose, wet. Poorly Graded SAND (SP)	

CDM Federal Programs Corporation	Boring Number: BK 24 Sheet: 1 of 1
St. Juliens Creek Annex, Portsmouth, VA	Soil Boring Log

Project: Site Screening Assessments — Location: AOC 24

Start / Finish: — Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push — Logger: Bob Hunt

Depth Below Surface (FT)	Sample: Interval	Sample: Type and Number	Sample: Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS24		Very Dark Gray (2.5y 3/1) silty SAND, ORGANICS, loose, moist	
3'	1-3'	SB24		Very Dark Gray (2.5y 3/1) silty fine SAND, trace organics, loose, wet. Silty SAND (SM)	

CDM Federal Programs Corporation

Boring Number: BK 25

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 25

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS25		Dark Olive Brown (2.5y 3/3) Poorly Graded SAND, with organics, loose, moist. Poorly Graded SAND (SP)	
3'	1-3'	SB25		Very Dark Grayish Brown (2.5y 3/2) Silty SAND, with organics, loose, wet. Silty SAND (SM)	

CDM Federal Programs Corporation

Boring Number: BK 26

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS26		Very Dark Gray (2.5Y 3/1) Silty SAND, with organics, loose, moist. Silty SAND (SM)	
3'	1-3	SB26		Very Dark Gray (2.5Y 3/1) Silty fine SAND, with organics, loose, wet. Silty SAND	

CDM Federal Programs Corporation	Boring Number: BK 27 Sheet: 1 of 1
St. Juliens Creek Annex, Portsmouth, VA	Soil Boring Log

Project:	Site Screening Assessments	Location:	AOC
Start / Finish:		Drilling Contractor:	Columbia Technologies
Drilling Method and Equipment:	Geoprobe Direct Push	Logger:	Bob Hunt

Depth Below Surface (FT)	Sample: Interval	Sample: Type and Number	Sample: Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS27		Very Dark Grayish Brown (2.5Y 3/2) Silty SAND, with organics, loose, wet. Silty SAND (SM)	
3'	1-3'	SB27		Very Dark Grayish Brown (2.5Y 3/2) sandy SILT, trace organics, loose, wet. SILT (ML)	

CDM Federal Programs Corporation

Boring Number: BKZ8

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 28

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS28		Very Dark Gray (2.5Y 3/1) Sandy SILT, organics, loose, moist. SILT (ML)	
3'	1-3'	SB28		Very Dark Gray (2.5Y 3/1) SILT, with fine sand, trace organics, loose, wet. SILT (ML)	

CDM Federal Programs Corporation

Boring Number: BKZ9

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6 H	0-6"	SS29		Very Dark Grayish Brown (2.5y 3/2) Organic SILT, with fine sand, loose, moist. Organic SILT (OH)	
3'	1-3	SB29		Very Dark Gray (2.5y 3/1) SILT, with fine sand, loose, wet. SILT (ML)	

CDM Federal Programs Corporation	Boring Number: BK 30 Sheet: 1 of 1
St. Juliens Creek Annex, Portsmouth, VA	Soil Boring Log

Project: Site Screening Assessments **Location:** AOC

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS30		Very Dark Grayish Brown (2.5Y 3/2) Organic SILT, with fine sand, loose, moist. Organic SILT (OH)	
3'	1-3'	SB30		Very Dark Grayish Brown (2.5Y 3/2) Silty SAND, with organics, loose, wet. Silty SAND (SM)	

CDM Federal Programs Corporation

Boring Number: BK31

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 31

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6''	0-6''	SS31		Black (2.5Y 2.5/1) Sandy SILT, with organics, loose, moist. (TOPSOIL)	
3'	1-3'	SB31		Light Olive Brown (2.5Y 5/3) Clayey SAND, firm, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK32

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 32

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample Interval	Sample Type and Number	Sample Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	06"	SS32		Black (2.5Y 2.5/1) Silty SAND, organics, loose, moist. (TOPSOIL)	
3'	1-3'	SB32		Dark Grayish Brown (2.5Y 4/2) Silty SAND, loose, moist Silty SAND (SM)	

CDM Federal Programs Corporation

Boring Number: 33

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 33

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS 33		Black (2.5y 2.5/1) silty SAND, organics, very loose, moist. (TOPSOIL)	
3'	1-3'	SB33		Light yellowish brown (2.5y 6/4) clayey SAND, stiff, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK34

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 34

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample: Interval	Sample: Type and Number	Sample: Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS34		Black (2.5y 2.5/1) SILT, with fine sand, with organics, very loose, moist. (TOPSOIL)	
3'	1-3	SB34		Dark Grayish Brown (2.5y 4/2) Sandy CLAY, trace shell fragments, stiff, moist. Lean CLAY (CL)	

CDM Federal Programs Corporation

Boring Number: BK35

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 35

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample Interval	Sample Type and Number	Sample Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS35		Black (2.5Y 2.5/1) Poorly Graded SAND, trace shell fragments, loose, moist. Poorly Graded SAND (SP)	
3'	1-3'	SB35		Olive Brown (2.5Y 4/3) Poorly Graded SAND, trace shell fragments, loose, moist. Poorly Graded SAND (SP)	

CDM Federal Programs Corporation

Boring Number: 3K36

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS36		Black (2.5Y 2.5/1) SILT, with fine sand, with organics, very loose, moist. (TOPSOIL)	
3'	1-3'	SB36		Light Olive Brown (2.5Y 5/3) Clayey f-m SAND, stiff, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK37

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample: Interval	Sample: Type and Number	Sample: Recovery (FT)	Soil Description: Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Comments: Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS37		Very Dark Grayish Brown (2.5y 3/2) SILT, with fine sand, with organics, very loose, moist. (TOPSOIL)	
2'	1-2'	SB37		Very Dark Grayish Brown (2.5y 3/2) Silty fine SAND, trace organics, loose, moist. Silty SAND (SM)	
3'	2-3'	SB37		Grayish Brown (2.5y 5/2) Clayey fine SAND, stiff, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK38

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS38		Black (2.5Y 2.5/1) SILT, with fine sand, with organics, very loose, moist. (TOPSOIL)	
3'	1-3'	SB38		Olive Brown (2.5Y 4/3) Clayey fine SAND, loose, moist. Clayey SAND (SC)	

CDM Federal Programs Corporation

Boring Number: BK 39

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments

Location: AOC 39

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS39		Black (2.5y 2.5/1) SILT, organics, with fine sand, trace shell fragments, very loose, moist. (TOPSOIL)	
3'	1-3'	SB39		Very Dark Grayish Brown (2.5y 3/2) silty SAND, with shell fragments, loose, moist. Silty SAND (SM)	

CDM Federal Programs Corporation

Boring Number: BK 40
Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 40

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS40		Black (2.5y 2.5/1) CLAY, with silt, with organics, trace fine sand, loose, moist. (TOPSOIL)	
3'	1-3'	SB40		Very Dark Gray (2.5y 3/1) CLAY, with fine sand, with shell fragments, stiff, moist. Lean CLAY (CL)	

CDM Federal Programs Corporation

Boring Number: BK41

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 41

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS41		Black (2.5y 2.5/1) SILT, organics, with fine sand, loose, moist. (TOPSOIL)	
1-3'	1-3'	SB41		Dark Grayish Brown (2.5y 4/2) CLAY, with silt, trace fine sand, stiff, moist. Lean CLAY (CL)	

CDM Federal Programs Corporation	Boring Number: BK42 Sheet: 1 of 1
St. Juliens Creek Annex, Portsmouth, VA	Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 42

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS42		Black (2.5y 2.5/1) SILT, organics, trace fine sand, very loose, moist. (TOPSOIL)	
1-3'	1-3'	SB42		Very Dark Gray (2.5y 3/1) CLAY, with silt, trace fine sand. Lean CLAY (CL)	

CDM Federal Programs Corporation

Boring Number: BK 43

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 43

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS43		Black (2.5y 2.5/1) SILT, organics with fine sand, very loose, moist (TOPSOIL)	
1-3'	1-3'	SB43		Very Dark Gray (2.5y 3/1) CLAY, with silt, trace fine sand, stiff, moist. (Lean CLAY (CL))	

CDM Federal Programs Corporation	Boring Number: BK 44 Sheet: 1 of 1
St. Juliens Creek Annex, Portsmouth, VA	Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 44

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6'	SS44		Black (2.5Y 2.5/1) SILT, organics, with fine sand, very loose, moist (TOPSOIL)	
1-3'	1-3'	SB44		Dark Grayish Brown (2.5Y 4/2) Sandy CLAY, trace shell fragments, stiff, moist. Lean CLAY (CL)	

CDM Federal Programs Corporation

Boring Number: BK 45

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 45

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS45		Black (2.5y 2.5/1) Silt, organics with fine sand, very loose, moist. (TOPSOIL)	
3'	1-3'	SB45		Olive Brown (2.5y 4/3) Poorly Graded SAND, trace silt, loose, moist. Poorly Graded SAND (SP)	

CDM Federal Programs Corporation

Boring Number: BK 46

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 46

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS46		Black (2.5Y 2.5/1) SILT, with fine Sand, with organics, loose, moist (TOPSOIL)	
3'	1-3'	SB46		Olive Brown (2.5Y 4/4) Poorly Graded SAND, loose, moist. Poorly Graded SAND (SP)	

CDM Federal Programs Corporation

Boring Number: BK 47

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log

Project: Site Screening Assessments **Location:** AOC 47

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
6"	0-6"	SS 47			
1-3'	1-3'	SB47		Dark Grayish Brown (2.5Y 4/2) Lean CLAY with silt, loose, moist. Lean CLAY (CL)	

CDM Federal Programs Corporation	**Boring Number:** BK 48 **Sheet:** 1 of 1
St. Juliens Creek Annex, Portsmouth, VA	**Soil Boring Log**

Project: Site Screening Assessments **Location:** AOC 48

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
3'	1-3'	SB48		Olive Brown (2.5y 4/3) Poorly Graded SAND, trace silt, loose, moist. Poorly Graded SAND (SP)	

CDM Federal Programs Corporation

Boring Number: BK 49

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log 49

Project: Site Screening Assessments **Location:** AOC

Start / Finish: **Drilling Contractor:** Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push **Logger:** Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
3'	1-3'	SB49		Very Dark Grayish Brown (2.5y 3/2) Silty SAND, trace clay, loose, moist Silty SAND (SM)	

CDM Federal Programs Corporation

Boring Number: BK 50

Sheet: 1 of 1

St. Juliens Creek Annex, Portsmouth, VA

Soil Boring Log 50

Project: Site Screening Assessments

Location: AOC 50

Start / Finish:

Drilling Contractor: Columbia Technologies

Drilling Method and Equipment: Geoprobe Direct Push

Logger: Bob Hunt

Depth Below Surface (FT)	Sample			Soil Description	Comments
	Interval	Type and Number	Recovery (FT)	Soil Name, USCS Group Symbol, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy	Health and Safety Comments, and Instrument (OVM) Readings
3'	1-3'	SB50		Very Dark Grayish Brown (2.5Y 3/2) Silty SAND, with clay, loose, moist Silty SAND (SM)	

Appendix B

Soil Borings and Monitoring Well Completion Logs

PROJECT NUMBER	BORING NUMBER	SHEET
6207-015	SJS BKMW15	1 OF 1

SOIL BORING LOG

PROJECT ST Juliens Creek Annex LOCATION Background - N end of Craddrock

ELEVATION _____ DRILLING CONTRACTOR _____

DRILLING METHOD AND EQUIPMENT Acker AD2 rig 6 1/4" HSA.

WATER LEVELS _____ START 1152 4/26/99 FINISH 1330 4/26/99 LOGGER L. Campbell

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		1	18"	2-6-7-9	SILT(ML) DK brown, Grass/roots	Start sampling 1152 4/26/99
					SILT(ML) clayey, Light yellowish brown, Dry.	
		2	18"	10-10-7-6	CLAY (LL) Light yellowish brown	
					SAND (SC) clayey, well rounded, LE. Yellowish brown	
5		3	18"		SAND (SP) f-m, trace clay, well rounded, Wet	Wet @ 5'
10					See Log for BKMW1D for addition information	
15					Boring Terminated at 14' bgs	Finished Constructing Monitor Well BKMW15 1330 4/26/99.
20						

Figure 1
SOIL BORING LOG, FORM D1586

PROJECT NUMBER	BORING NUMBER	
6207-015	BKMW1D	SHEET 1 OF 2

SOIL BORING LOG

PROJECT CTO15 ST. JULIENS CREEK ANNEX LOCATION BKMW1D (North End of Craddock St)

ELEVATION . DRILLING CONTRACTOR GROUNDWATER SYSTEMS

DRILLING METHOD AND EQUIPMENT Acker AD-2 Rig, 8 1/4" HSA, 6" spade bit, 2' split spoon, Water Rotary

WATER LEVELS START 0740 4/22/99 FINISH 1045 4/24/99 LOGGER L. FRANCE

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		1	19"	4-8-19-14	SILT (SM), Light yellowish brown (2.5Y 6/4), Organics and silty fine sand at 8"	Start drilling 0740 with 8 1/4" HSA.
		2	15"	8-12-12-11	SAND some clay (SC), Some orange mottling. Wet.	Water table ~3 ft bgs
5		3	15"	6-5-8-8	SAND and CLAY (SC). Orange and gray mottled. med-fine grained. @ 6': (SP) fine sand.	
		4	12"	5-7-4-4	SAND (SP) fine, yellowish brown (10YR 6/8). Little clay in 1-2" layers Grey (2.5Y 7/1)	
10		5	20"	4-5-7-7	SAND (SP) vi fine - fine. Olive yellow (2.5Y 6/6) one 2" layer of clayey sand. Dk. greenish grey (GLEY 4/1)	
		6	20"	4-6-8-10	SAND (SP) fine, little med. grained Greenish grey (GLEY 5/1)	Charging augers with water to prevent running sands
15		7	22"	1-2-1-2	CLAY (CL) greenish grey (GLEY 5/1) Some layers of few shell fragments imbedded in clay. With sand to 15'.	plastic clay at 15'
		8	24"	WOH	CLAY (CL). as above to 17'. 17-18' clay with little fine sand. V. soft.	Set 6" Sch. 40 PVC isolation casing at 16.5'. Pushed to 17' Stop drilling with 8 1/4" HSA 0900 4/22/99.
						Start sampling 0755 4/24/99.
20		9	24"	3-3-2-4	SILT (SM) and clay (CL). Dk. greenish grey (GLEY 3/1). Little organic matter	
		10	24"	3-3-4-6	CLAY (CL). Dk greenish grey. stiff little silt and v. fine sand	
25		11	24"	1-1-1-1	CLAY (CL) Dk. greenish grey. Soft.	
		12	24"	WOH-2-2-1	CLAY, as above, V. soft	
30		13				

Figure 1
SOIL BORING LOG, FORM D1586

PROJECT NUMBER	BORING NUMBER	SHEET
6207-015	BKMW1D	2 OF 2

SOIL BORING LOG

PROJECT CT015 ST. JULIENS CREEK ANNEX LOCATION BKMW1D (NE END OF CRADDOCK ST)

ELEVATION . DRILLING CONTRACTOR

DRILLING METHOD AND EQUIPMENT See p. 1

WATER LEVELS START FINISH LOGGER L. France

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		13	24"	1-1-1-3	CLAY (CL), as above, trace mica	Sample 13 is 29.5 – 31.5' bgs
		14	24"	WOH-1-1-1	CLAY (CL), as above.	
35		15	24"	1-1-1-2	CLAY (CL), as above, occ. silt parting.	
		16	24"	1-1-1-2	CLAY, as above, trace shells embedded in clay.	
40		17	24"	2-4-5-6	CLAY (CL) as above, little shells, to 41.25, then sandy clay (SC) m-c qtz sand.	top of sand at 42.5 ft bgs
		18	12"	2-16-40-36	SANDY CLAY (SC) SAND (SP) coarsening downward. to med sand. greenish grey (10GY 5/1).	
45		19	14"	11-14-14-26	SAND (SW) fine to med. Greenish grey (GLEY 5/1). trace shells. Trace organic matter	
		20	12"	11-13-15-19	SAND (SP) fine, trace clay and silt, trace shells, trace organic matter	
50		21	20"	2-4-12-19	SAND (SP) fine, some v. fine little clay and silt. Dk. greenish grey.	
		22		4-6-20-26	SAND (SW) coarse, Shell fragments 12" clay layer at 53.25 - 53.5' fine sand to 54'.	Collected last sample 10:45 Stopped sampling, Drill to 54' bgs
55					Boring Terminated at 54 ft bgs.	

Figure 1
SOIL BORING LOG,
FORM D1586

PROJECT NUMBER	BORING NUMBER	SHEET	OF
6207-015	STSBK MW25	1	1

SOIL BORING LOG

PROJECT ST Juliens Creek Annex LOCATION Background Well #2 by RR Tracks + Patrol Rd.

ELEVATION . DRILLING CONTRACTOR Groundwater Systems

DRILLING METHOD AND EQUIPMENT Acker AD 2, 6¼" ID HSA

WATER LEVELS START 1405 4/26/99 FINISH 1500 4/26/99 LOGGER L. Campbell

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		1	18"	6-4-3-5	SILT (ML) Dk. Brown Dry. Grass/roots CLAY (SC) Sandy, med. soft, moist, light yellowish brown.	
		2	12"	8-13-9-6	SAND (SP) f-m trace clay. Very moist. Light yellowish brown.	Water at ~3' bgs.
5						
					For more lithologic information see log for BKMW2D	
10						charged augers with water during well construction due to running sands.
						Finish setting well at 1500 4/26/99
15					Boring Terminated at 14' bgs	

Figure 1
SOIL BORING LOG, FORM D1586

PROJECT NUMBER	BORING NUMBER	SHEET	OF
6207-015	BKMW2D	1	2

SOIL BORING LOG

PROJECT St. Juliens Creek Annex LOCATION BKMW2D - Patrol Rd near RR track

ELEVATION . DRILLING CONTRACTOR Groundwater Systems

DRILLING METHOD AND EQUIPMENT Acker AD2, 8 1/4" HSA / 6" Spade bit with Water Rotary

WATER LEVELS START 14:42 4/22/99 FINISH LOGGER L. French

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		1	16"	4-5-4-5	0-2" SILT (ML) brown topsoil. CLAY (SC) sandy, clayey sand light yellowish brown (2.5Y 6/3) moist	Start sampling w/ 2' split spoon @ 1440.
		2	14"	4-7-8-7	SAND (SP) pale yellow (2.5Y 7/4) fine some med. qtz.	Water @ 3-4 ft bgs
5		3	24"	3-2-3-5	Same as above to 5'. CLAY (SC) Some sand, Mottled 2.5Y 6/6 and light grey.	
		4	20"	3-3-3-2	SAND (SP). Olive yellow, qtz (2.5Y 6/6). little clay and silt, fine grained some med.	
10		5	24"	3-4-6-8	SAND (SP), v. fine qtz. little shell fragments throughout. Dk greenish grey (GLEY 4/1)	
		6	5"	3-4-1-1	Same as above.	
15		7	24"		CLAY (CL), Tr. shell fragments, little fine sand, Dk greenish grey (GLEY 4/1)	CLAY @ 14'
		8	24"	WOH	CLAY (CL) as above. No sand) Soft, plastic	Stop augering at 1600 4/22/99 will set PVC (6" sch-40) casing at 17.5'. Push casing to 18ft. Start drilling 1520 4/24/99 Sampling 19-21 ft bgs.
20		9	24"	1-1-1-1	CLAY (CL) as above. Dk. greenish grey (1GLEY 4/1)	
		10	24"	WOH-1-1	CLAY (CL), as above	
25		11	24"	WOH-1-1	CLAY (CL), as above	
30		12	17"	WOH-1	CLAY (CL), as above.	

Figure 1
SOIL BORING LOG, FORM D1586

PROJECT NUMBER	BORING NUMBER	SHEET
6207-015	BKMW21D	2 OF 2

SOIL BORING LOG

PROJECT: ST. JULIENS CREEK ANNEX LOCATION:
ELEVATION: DRILLING CONTRACTOR:
DRILLING METHOD AND EQUIPMENT: See p. 1
WATER LEVELS: START: FINISH: LOGGER: L. France

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: NUMBER AND TYPE	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		13	24"	WOH-1-2	CLAY, as above, one shell frag.	Sample 13 from 29.5-31.5 ft
		14	24"	1-1-1-1	CLAY, as above	
35		15	24"	1-1-1-2	Same as above to 36 ft. Some silt to 36.5 ft. trace shells, organic matter	
		16	14"	2-2-3-2	CLAY (CL), trace silt, organic material throughout sample. Brown	
40		17	24"	3-4-5-7	CLAY (CL), Greenish grey (GLEY 6/1) trace m-c sand to 40.5'	
		18	24"	4-7-3-3	CLAY to 42.25' CLAYEY SAND / SANDY CLAY (SC) sand is f-v. coarse Trace c. gravel (qtz) trace sandstone Gravel is subrounded	
45		19	24"	2-13-34-30	SAND + SHELLS (f-c) Little clay 44.75 coquina (GLEY 7/1) Light greenish grey	YORKTOWN Fm @ 44.75 ft.
		20	19"	26-29-23-24	SAND + SHELLS as above but m-f grained. Trace coarse shell fragments	
50		21	19"	23-31-30-33	Same as above, Pale yellow (5Y 8/2) above 50.5'	
		22	19"	9-10-13-15	Same as above. 4" layer of coarser grained material at 52.5'	
55		23		27-39-44 50/5"	Same as above: V. coarse from 54.5' to 55.5 ft. then m-f grained	End sampling at 56.5'
60					Boring Terminated at 56.5'	

Figure 1
SOIL BORING LOG, FORM D1586

PROJECT NUMBER	BORING NUMBER	SHEET
6207-015	SJSBKMW35	1 OF 1

SOIL BORING LOG

PROJECT ST. JULIENS CREEK LOCATION Background #3 St. Juliens Cr.

ELEVATION . DRILLING CONTRACTOR GROUNDWATER SYSTEMS

DRILLING METHOD AND EQUIPMENT 6 1/4" ID HSA, ACKER AD2 RIG.

WATER LEVELS START 1100 4/27/99 FINISH 1200 4/27/99 LOGGER L. Campbell

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		1	18"	5-6-3-4	SILT (ML) V. DK Gray (10YR 3/1), tr. clay 0-8'	
		2	14"	3-4-7-9	SAND (SP) fine, Light yellowish brown (10YR 6/4) well rounded, Slightly moist. 4" of sandy clay at 2-2.25'.	
5					For more lithologic data see log for BKMW3D.	
10						Finish installing BKMW35 @ 1200 4/27/99
15					BORING TERMINATED AT 14' bgs	

Figure
SO'

PROJECT NUMBER	BORING NUMBER	SHEET	OF
6207-015	BKMW3D	1	2

SOIL BORING LOG

PROJECT ST. JULIENS CREEK ANNEX LOCATION BKMW3D (Along St. Juliens Drive)

ELEVATION . DRILLING CONTRACTOR GROUNDWATER SYSTEMS

DRILLING METHOD AND EQUIPMENT ACKER AD2, 8 1/4" ID HSA, 6" spade bit with tooter rotary

WATER LEVELS START 0755 4/23/99 FINISH LOGGER L. France

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		1	3"	5-10-9-8	SILT (topsoil) little fine sand, roots, black (7.5YR 2.5/1).	0755 Start drilling and sampling with split spoon
		2	NR		End of spoon is wet	Water @ 3 to 4 ft.
5		3	18"	2-3-5-7	SAND (SP) fine, pale yellow (2.5Y 7/3) wet, organic material @ 5 ft.	
		4	NR	7-8-4-3	SAND, as above, in nose of spoon	Charging augers with water at 7 ft. Running sands.
10		5	20"	2-2-2-2.	SAND (SP) Bluish grey (2.5GY 6/1)	
		6	24	7-10-13-17	SAND (SP) DK. bluish grey	
15		7	24"	WOH	CLAY (CL), little sand, shells dk. bluish grey.	Stopped Sampling 900 4/23/99
		8	24"	WOH	CLAY (CL) DK. ~~brown~~ blue-grey	Start Sampling 1010 4/23/99 @ 18.5 ft. Set 6" PVC sch. 40 isolation casing at 18.5'.
20		9	24"	1-2-1-4	CLAY (CL) as above to 20'. F-m sand to 20.25. Then clay (CL) dk. greenish grey.	
		10	11"	4-10-16-18	SAND (SP) fine. DK. greenish grey	
25		11	24"	1-2-6-4	sand as above to 24.25 CLAY (CL) soft. SAND and sandy clay (SC)	
		12	24"	1-1-1-3	CLAY (CL). Plastic, a few sand stringers	Sample 13 is from 29 to 31 ft.
30		13	19"	2-3-2-3	CLAY (CL) little sand in 1-2" layers.	

Figure 1
SOIL BORING LOG, FORM D1586

PROJECT NUMBER	BORING NUMBER	
6207-015	BKMW3D	SHEET 2 OF 2

SOIL BORING LOG

PROJECT St. Juliens Creek Annex LOCATION BKMW3D (SE. Julian Drive)

ELEVATION . DRILLING CONTRACTOR

DRILLING METHOD AND EQUIPMENT See p. 1

WATER LEVELS START FINISH LOGGER

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					and along partings. DK. greenish grey	
		14	24"	WOH-1-2	CLAY (CL) Soft, plastic, DK greenish grey (GLEY 3/1)	
35		15	31"	1-14-22-34	CLAY with gravel (CL) and some f-m sand to 35'	
					SAND (SP) fine. light greenish grey GLEY 7/1.	
		16	16"	1-5-6-6	SAND (SP) fine. greenish grey (GLEY 6/1).	
40		17	24"	3-4-4-5	SILT (SM) and fine sand 38.75 greenish grey	
		18	20"	1-2-1-1	SILT (SM) little m-f sand little clay on end of spoon	
45		19	19"	8-12-14-16	SILT (SM) as above to 45.25' then shell fragments - f-m. little silt	
		20		9-10-13-20	Same as above little clay	
50						

Fm. taking water at 46'. Sampled to 48'. Reamed 6" boring to 46'.

Figure 1
SOIL BORING LOG, FORM D1586

PROJECT NUMBER	BORING NUMBER	
6207-015	SJSBKMW43	SHEET 1 OF 1

SOIL BORING LOG

PROJECT St. Juliens Creek LOCATION Background well MW-43 Near Front gate

ELEVATION . DRILLING CONTRACTOR Groundwater Systems

DRILLING METHOD AND EQUIPMENT Acker AD2. HSA (6 1/4" ID)

WATER LEVELS START 1550 4/26/99 FINISH LOGGER L. Campbell

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		1	14"	2-4-7-7	SILT(ML), trace clay. V. Dk grayish brown (10YR 3/1), Dry	
					CLAY(CL) Some sand, Stiff. dry DK grayish brown (10YR 3/2)	
		2	24"	6-7-7-8	SAND(SM) fine clayey slightly moist	
5		3	18"	1-2-3-4	CLAY(CL). Stiff v. moist. gray (10YR 5/1).	
					SAND(SP) fine, some clay. well rounded. wet	OVM = 0 ppm
		4	18"	4-2-1-3	Same as above. More clay.	
		5	8"	1-2-1	Same as above. Shell fragments	
10		6	16"	10-WOH	Same as above. Very Soft	
		7	12"	1-6-6-11	Same as above. Slighty less clay.	
15					Boring Terminated @ 15' bgs	Finish constructing monitorwell BKMW43 1750 4/26/99

Figure 1
SOIL BORING LOG, FORM D1586

PROJECT NUMBER	BORING NUMBER	
6207-015	STS BKMW15	SHEET 1 OF 1

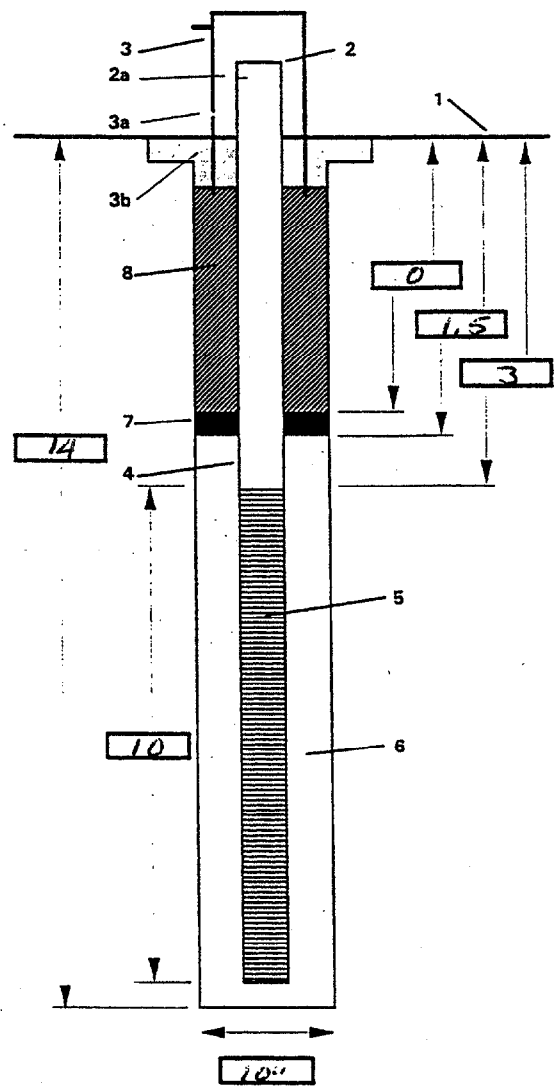
WELL COMPLETION DIAGRAM

PROJECT : ST. Juliens Creek Annex LOCATION : Background #1 Craddock St

ELEVATION : DRILLING CONTRACTOR : GROUNDWATER SYSTEMS

DRILLING METHOD AND EQUIPMENT USED : Acker AD2 6 1/4" HSA

WATER LEVELS : START : END : LOGGER : L. CAMPBELL



1- Ground elevation at well 7.20 ft msl

2- Top of casing elevation 9.52 ft. msl
a) vent hole?

3- Wellhead protection cover type 4" diameter steel/concrete pad
a) weep hole?
b) concrete pad dimensions 3'x3'

4- Diameter/type of well casing 2" Sch. 40 PVC

5- Type/slot size of screen 2" Sch 40 .010-Slot PVC

6- Type screen filter
a) Quantity used #1 Silica sand

7- Type of seal
a) Quantity used Bentonite chips (3/8")

8- Grout
a) Grout mix used None due to shallow
b) Method of placement water table
c) Quantity of well casing grout

Development method Pump and Surge

Development time 4.5 HOURS

Estimated purge volume ~57.1 gallons (3x wellvol)

Comments

ABOVDIAG.XLS

PROJECT NUMBER	BORING NUMBER		
6207-015	SJSBKMW1D	SHEET 1	OF 1

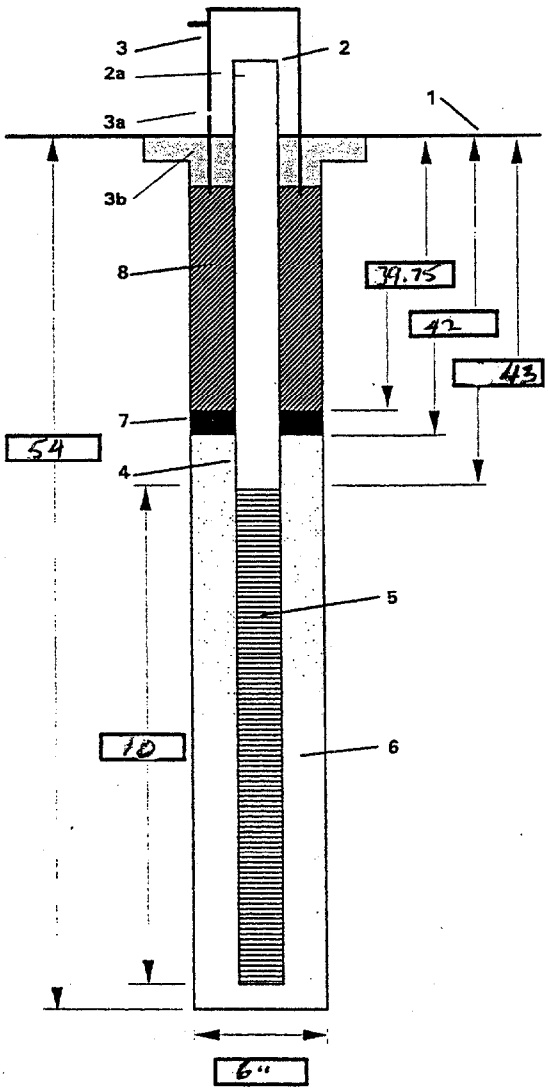
WELL COMPLETION DIAGRAM

PROJECT : St. Juliens Creek Annex LOCATION : Background #1 (Craddock St)

ELEVATION : DRILLING CONTRACTOR : Groundwater Systems

DRILLING METHOD AND EQUIPMENT USED : Acker AD2 8¼" HSA to 16.5' ; 6" Water Rotary to 54'

WATER LEVELS : START : END : LOGGER : L. France



1- Ground elevation at well 7.39' msl

2- Top of casing elevation 9.72' msl
a) vent hole?

3- Wellhead protection cover type 4" steel/concrete pad
a) weep hole?
b) concrete pad dimensions 3x3'

4- Diameter/type of well casing 2" sch. 40 PVC

5- Type/slot size of screen 2" sch 40 PVC, .010 slot

6- Type screen filter
a) Quantity used #1 silica sand

7- Type of seal
a) Quantity used 3/8" bentonite chips - hydrated

8- Grout
a) Grout mix used 5% bentonite
b) Method of placement pressure grouted
c) Quantity of well casing grout

Development method Pump & Surge

Development time ~6.75 hours

Estimated purge volume ~95 gallons

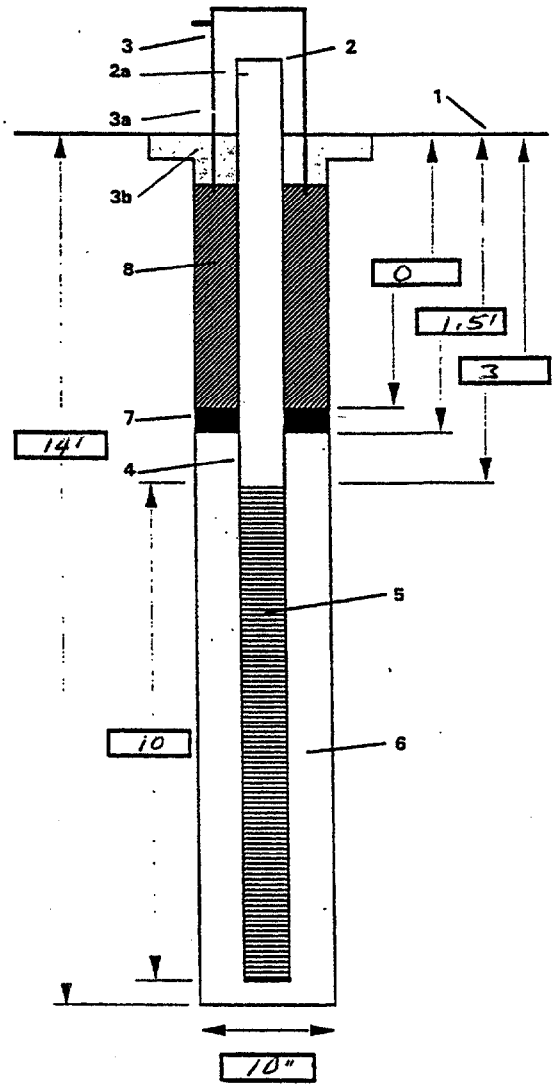
Comments 6" ID PVC ISOLATION CASING INSTALLED 17.0' TO ~~10.5'~~ bgs. Pressure grouted into place in a 13" borehole - Bentonite-Cement grout.

ABOVDIAG.XL5

PROJECT NUMBER	BORING NUMBER
6207-015	SJSBK-MW2S SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT: SJ. Juliens Creek Annex Background Investigation LOCATION: Background Location #2
ELEVATION: DRILLING CONTRACTOR: GROUNDWATER SYSTEMS
DRILLING METHOD AND EQUIPMENT USED: Acker AD2 6 1/4" HSA
WATER LEVELS: START: END: LOGGER: L. CAMPBELL



1- Ground elevation at well: 7.06 ft msl

2- Top of casing elevation: 9.50 ft msl
a) vent hole?

3- Wellhead protection cover type: Concrete Pad, 4"-drum steel casing.
a) weep hole?
b) concrete pad dimensions: 3x3'

4- Diameter/type of well casing: 2" sch. 40 PVC

5- Type/slot size of screen: 2" sch. 40 010-slot PVC

6- Type screen filter
a) Quantity used: #1 Silica Sand

7- Type of seal
a) Quantity used: Bentonite chips (3/8") hydrated

8- Grout
a) Grout mix used: None due to shallow water table
b) Method of placement
c) Quantity of well casing grout

Development method: Pump and surge

Development time: 4 hours

Estimated purge volume: 4.8 based on 3 well vol (210 gallons removed during development)

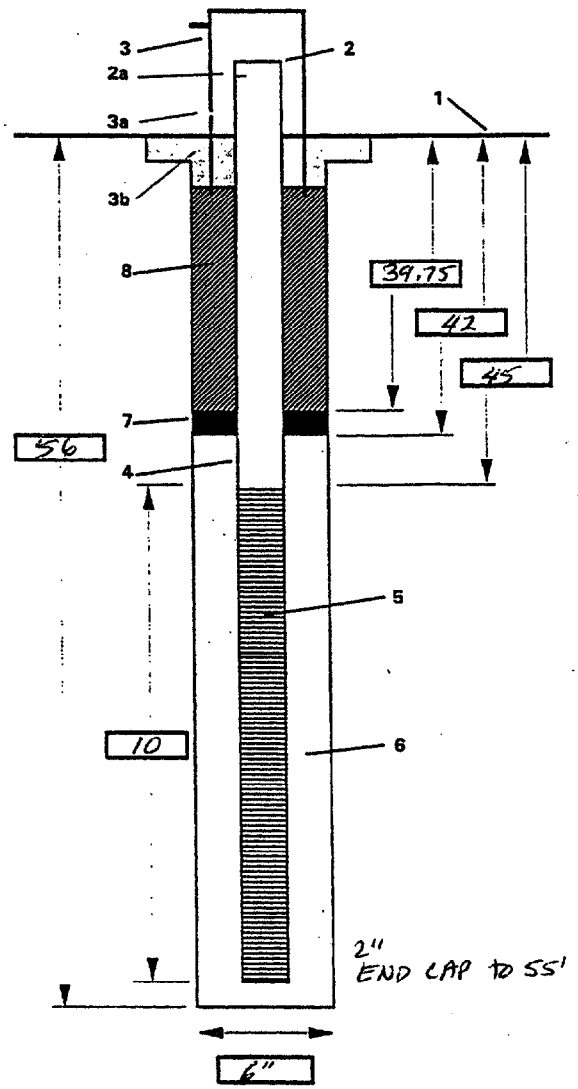
Comments

ABOVDIAG.XLS

PROJECT NUMBER	BORING NUMBER		
6207-015	SJSBK-MW 2D	SHEET 1	OF 1

WELL COMPLETION DIAGRAM

PROJECT : St. Juliens Creek Annex Background Investigation LOCATION : #2D Background location
ELEVATION : Acker AD2 8¼" HSA to 17.5' 6" water rotary to 56' DRILLING CONTRACTOR : Groundwater Systems
DRILLING METHOD AND EQUIPMENT USED :
WATER LEVELS : START : END : LOGGER : L. FRANCE



1- Ground elevation at well: 7.31' msl

2- Top of casing elevation: 9.22' msl
a) vent hole?

3- Wellhead protection cover type: 4" steel/concrete pad
a) weep hole?
b) concrete pad dimensions: 3x3'

4- Diameter/type of well casing: 2" sch. 40 PVC

5- Type/slot size of screen: 2" sch. 40 PVC, 0.10 slot

6- Type screen filter: #00 w.g. qtz filter sand 42-43'
a) Quantity used: #1 silica sand 43 - ~~56~~ 55'. collapsed formation 55-56'.

7- Type of seal
a) Quantity used: 3/8" bentonite chips - hydrated

8- Grout
a) Grout mix used: 5% bentonite
b) Method of placement: pressure grouted
c) Quantity of well casing grout: ~50 ~~~50~~ gallons

Development method: pump + surge

Development time: ~3 hours

Estimated purge volume: ~27 gallons based on 3 well volumes.

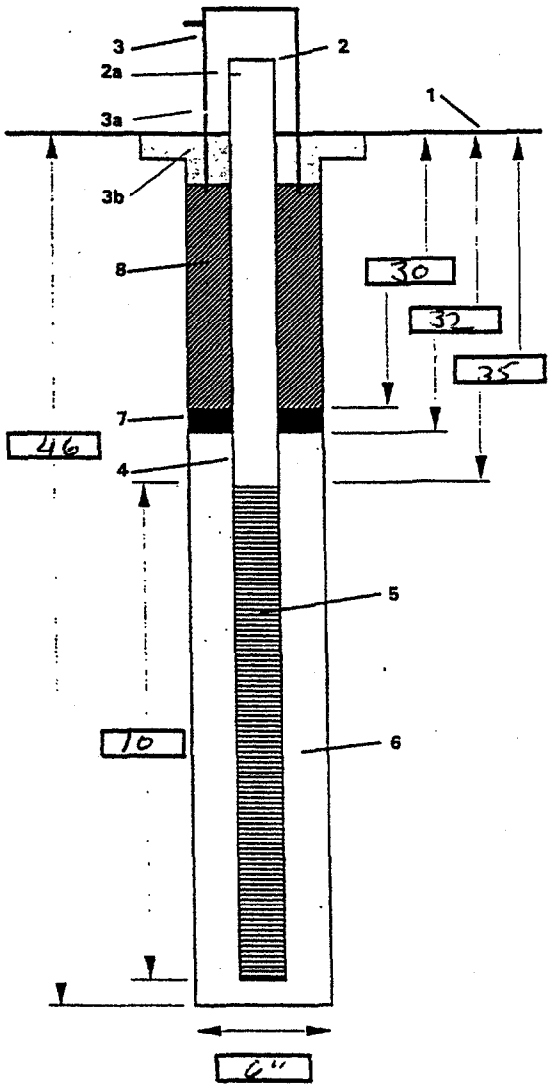
Comments: 6" ID PVC ISOLATION CASING INSTALLED TO 18' bgs. pressure grouted into place in a 13" borehole. Bentonite-cement grout.

ABOVDIAG.XLS

PROJECT NUMBER	BORING NUMBER		
6207-015	SJSBK-MW 3D	SHEET 1	OF 1

WELL COMPLETION DIAGRAM

PROJECT : St. Juliens Creek Annex Background Investigation LOCATION : along St. Juliens Creek Drive
ELEVATION : DRILLING CONTRACTOR : Geoprobe Luxfer System
DRILLING METHOD AND EQUIPMENT USED : Acker AD 2 8¼" HSA to: 6¼" HSA to:
WATER LEVELS : START : END : LOGGER : L. FRANCE



1- Ground elevation at well: 8.76' msl

2- Top of casing elevation: 11.07' msl
a) vent hole?

3- Wellhead protection cover type: 4" Steel / concrete pad
a) weep hole?
b) concrete pad dimensions: 3X3'

4- Diameter/type of well casing: 2" PVC, sch. 40

5- Type/slot size of screen: 2" PVC, sch 40 .010-slot

6- Type screen filter: #00 W.G. Sand 32-3'. #1 Silica Sand 33-46'
a) Quantity used

7- Type of seal
a) Quantity used: 3/8" bentonite chips

8- Grout
a) Grout mix used: 5% bentonit / cement
b) Method of placement: pressure / tremie
c) Quantity of well casing grout: ~34 gallons

Development method: pump and surge

Development time: 3.25 hours

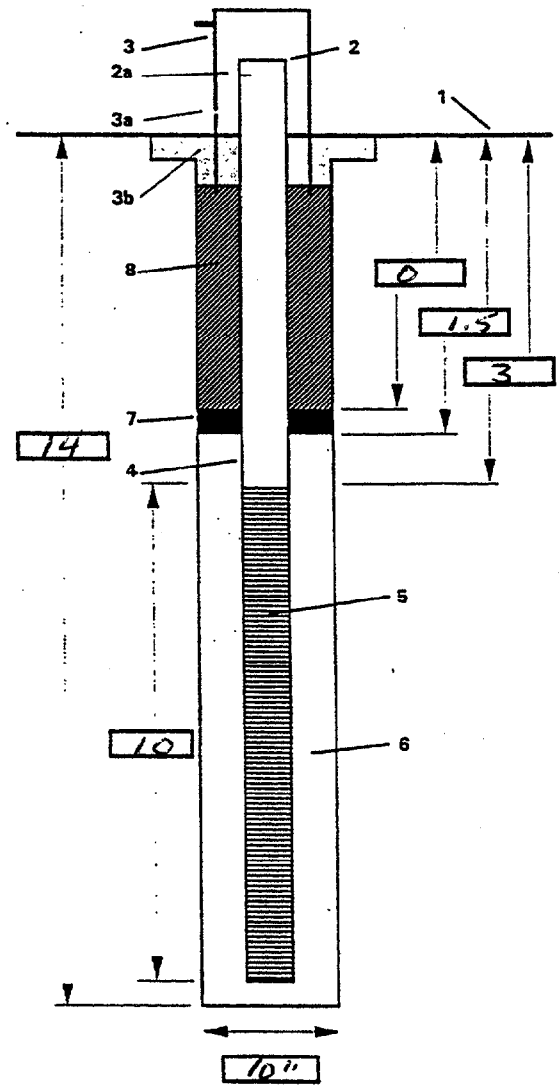
Estimated purge volume: ~20.6 gallons based on 3 well vol.

Comments: 6" PVC isolation casing to 18.5' bgs. Pressure grouted into place, in a 13-inch borehole, with a bentonite/cement grout

PROJECT NUMBER	BORING NUMBER
6207-015	SJSBK-MW 3S SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT : ST Juliens Creek Annex Background invest. LOCATION : Background Location #3
ELEVATION : DRILLING CONTRACTOR : Groundwater Systems
DRILLING METHOD AND EQUIPMENT USED : Acker ADZ 6 1/4" HSA
WATER LEVELS : START : END : LOGGER : Lisa Campbell.



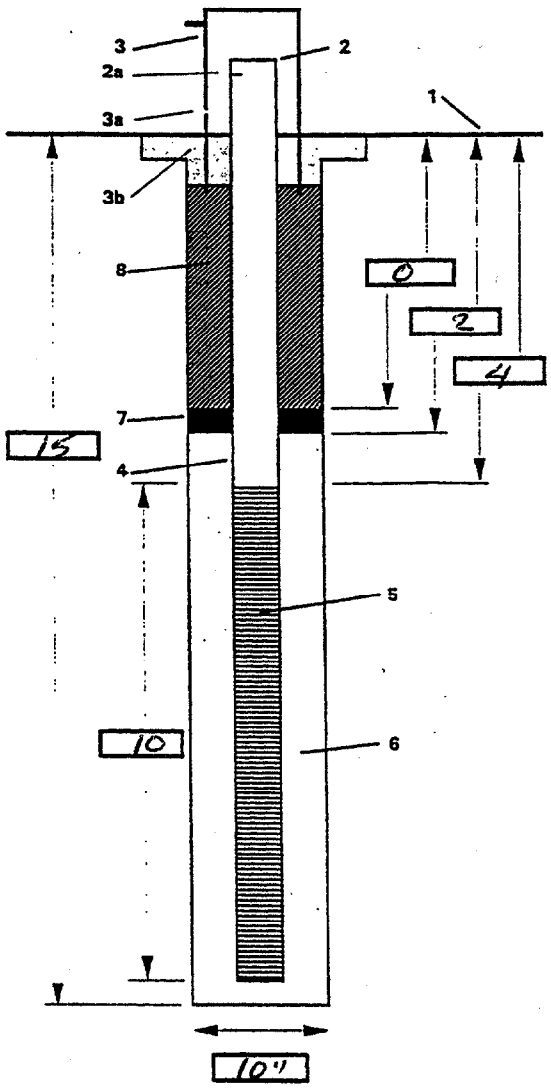
1- Ground elevation at well: 9.00' msl
2- Top of casing elevation: 11.56' msl
a) vent hole?
3- Wellhead protection cover type: 4" diam. steel/concrete pad
a) weep hole?
b) concrete pad dimensions: 3X3'
4- Diameter/type of well casing: 2" Sch. 40 PVC
5- Type/slot size of screen: 2" Sch. 40 PVC, 010-slot
6- Type screen filter
a) Quantity used: #1 silica sand
7- Type of seal
a) Quantity used: bentonite pellets 3/8" hydrated
8- Grout
a) Grout mix used: None due to shallow
b) Method of placement: water table
c) Quantity of well casing grout:

Development method: surge + pump
Development time: 2.25 hours
Estimated purge volume: 5.7 gallons based on 3 well volumes.
Comments:

PROJECT NUMBER	BORING NUMBER	
6207-015	SJS BK-MW4S	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT : ST. Juliens Creek Annex Background Investigation LOCATION : Behind Signal Front Gate
ELEVATION : DRILLING CONTRACTOR : Groundwater Systems
DRILLING METHOD AND EQUIPMENT USED : AKERADZ 6 1/4" HSA
WATER LEVELS : START : END : LOGGER : LISA Campbell.



1- Ground elevation at well: 7.85' msl

2- Top of casing elevation: 10.64' msl
a) vent hole?

3- Wellhead protection cover type: 4" steel / concrete pad
a) weep hole?
b) concrete pad dimensions: 3x3'

4- Diameter/type of well casing: 2" PVC sch. 40

5- Type/slot size of screen: 2" PVC sch. 40, .010 slot

6- Type screen filter
a) Quantity used: #1 silica sand

7- Type of seal
a) Quantity used: 3/8" bentonite chips hydrated

8- Grout
a) Grout mix used: None due to shallow water table
b) Method of placement
c) Quantity of well casing grout

Development method: Surge and pump

Development time: 3.25 hours

Estimated purge volume: 5.7 gallons based on 3 well volumes.

Comments

ABOVDIAG.XLS

Appendix C

Analytical Results for Background Groundwater and Soils

Appendix C
Groundwater Analytical Results
St Juliens Creek Annex Background Investigation

Station ID	SJSBK-MW1D	SJSBK-MW1S		SJSBK-MW2D	SJSBK-MW2S	SJSBK-MW3D	SJSBK-MW3S	SJSBK-MW4S
Sample ID	GW1D-001	GW1S-001	GW1S-001P	GW2D-001	GW2S-001	GW3D-001	GW3S-001	GW4S-001
Sample Date	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99
Chemical Name								
VOCs (UG/L)								
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Hexanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	30.5
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	0.4 B	1.7 B	0.7 B	1.8 B	1.2 B	1.1 B	1 B	2.1 B
Carbon tetrachloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	0.6 B	0.2 B	0.2 B	1.6 B	1 U	0.3 B	0.7 B	0.2 B
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene chloride	1 B	1 B	0.8 B	1.3 B	1.1 B	1.3 B	1.2 B	1.1 B
Styrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1 U	0.8 J	0.8 J	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	1 U	0.2 J	0.2 J	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
SVOCs (UG/L)								
1,2,4-Trichlorobenzene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
1,2-Dichlorobenzene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
1,3-Dichlorobenzene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
1,4-Dichlorobenzene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
2,2'-Oxybis(1-chloropropane)	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
2,4,5-Trichlorophenol	28 UJ	29 U	28 U	27 U	27 U	26 U	26 U	26 U
2,4,6-Trichlorophenol	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
2,4-Dichlorophenol	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
2,4-Dimethylphenol	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
2,4-Dinitrophenol	28 UJ	29 U	28 U	27 U	27 U	26 U	26 U	26 U
2,4-Dinitrotoluene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
2,6-Dinitrotoluene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
2-Chloronaphthalene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
2-Chlorophenol	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
2-Methylnaphthalene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
2-Methylphenol	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
2-Nitroaniline	28 UJ	29 U	28 U	27 U	27 U	26 U	26 U	26 U

Appendix C
Groundwater Analytical Results
St Juliens Creek Annex Background Investigation

Station ID	SJSBK-MW1D	SJSBK-MW1S		SJSBK-MW2D	SJSBK-MW2S	SJSBK-MW3D	SJSBK-MW3S	SJSBK-MW4S
Sample ID	GW1D-001	GW1S-001	GW1S-001P	GW2D-001	GW2S-001	GW3D-001	GW3S-001	GW4S-001
Sample Date	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99
Chemical Name								
2-Nitrophenol	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
3,3'-Dichlorobenzidine	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
3-Nitroaniline	28 UJ	29 U	28 U	27 U	27 U	26 U	26 U	26 U
4,6-Dinitro-2-methylphenol	28 UJ	29 U	28 U	27 U	27 U	26 U	26 U	26 U
4-Bromophenyl-phenylether	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
4-Chloro-3-methylphenol	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
4-Chloroaniline	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
4-Chlorophenyl-phenylether	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
4-Methylphenol	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
4-Nitroaniline	28 UJ	29 U	28 U	27 U	27 U	26 U	26 U	26 U
4-Nitrophenol	28 UJ	29 U	28 U	27 U	27 U	26 U	26 U	26 U
Acenaphthene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Acenaphthylene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Anthracene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Benzo(a)anthracene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Benzo(a)pyrene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Benzo(b)fluoranthene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Benzo(g,h,i)perylene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Benzo(k)fluoranthene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Butylbenzylphthalate	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Carbazole	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Chrysene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Di-n-butylphthalate	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Di-n-octylphthalate	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Dibenz(a,h)anthracene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Dibenzofuran	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Diethylphthalate	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Dimethyl phthalate	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Fluoranthene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Fluorene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Hexachlorobenzene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Hexachlorobutadiene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Hexachlorocyclopentadiene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Hexachloroethane	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Indeno(1,2,3-cd)pyrene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Isophorone	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Naphthalene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Nitrobenzene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Pentachlorophenol	28 UJ	29 U	28 U	27 U	27 U	26 U	26 U	26 U
Phenanthrene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Phenol	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Pyrene	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
bis(2-Chloroethoxy)methane	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
bis(2-Chloroethyl)ether	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
bis(2-Ethylhexyl)phthalate	11 UJ	12 U	11 U	11 U	11 U	1 J	11 U	11 U
n-Nitroso-di-n-propylamine	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
n-Nitrosodiphenylamine	11 UJ	12 U	11 U	11 U	11 U	10 U	11 U	11 U
Total Metals (UG/L)								
Aluminum	38.2 U	357	797	51.7 J	181 J	133 J	184 J	207
Antimony	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
Arsenic	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 J
Barium	32.7 J	26.1 J	21.5 J	29.6 J	63.5 J	11.8 J	63.1 J	58.6 J
Beryllium	0.1 U	0.27 J	0.27 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cadmium	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Calcium	72,000	27,900	23,700	75,200	21,300	38,600	33,100	142,000
Chromium	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Cobalt	0.5 U	13.9 J	11.7 J	0.5 U	8.5 J	0.5 U	5.1 J	0.84 J
Copper	2.8 B	2.7 B	2.7 B	2.7 B	3.5 B	3.3 B	3.5 B	4.2 B
Cyanide	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Iron	419	18,000	15,800	634	374	1,670	715	8,620
Lead	1 U	1 U	1 U	1 U	1.9 J	1 U	1 U	1.1 J

Appendix C
Groundwater Analytical Results
St Juliens Creek Annex Background Investigation

Station ID	SJSBK-MW1D	SJSBK-MW1S		SJSBK-MW2D	SJSBK-MW2S	SJSBK-MW3D	SJSBK-MW3S	SJSBK-MW4S
Sample ID	GW1D-001	GW1S-001	GW1S-001P	GW2D-001	GW2S-001	GW3D-001	GW3S-001	GW4S-001
Sample Date	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99	05/23/99
Chemical Name								
Magnesium	12,000	19,600	17,100	5,650	5,990	2,240 J	4,860 J	14,900
Manganese	226	912	796	117	246	190	121	384
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	1.1 J	15.1 J	12.4 J	0.9 U	7.9 J	0.9 U	7.6 J	2.7 J
Potassium	8,490	5,010	4,760 J	4,340 J	1,620 J	1,620 J	1,650 J	3,830 J
Selenium	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Silver	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
Sodium	39,900	52,700	47,000	35,900	34,200	14,900	18,600	53,900
Thallium	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U
Vanadium	0.6 U	0.79 J	0.6 U	0.6 U	1 J	0.68 J	0.79 J	0.91 J
Zinc	4.8 J	89.7	77.4	2.2 J	44.7	3.5 J	9.5 J	43.7
Dissolved Metals (UG/L)								
Aluminum	38.2 U	399	297	63.1 J	38.2 U	38.2 U	38.2 U	69.9 J
Antimony	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
Arsenic	2 U	2 U	2 U	2 U	2 U	2 U	2.1 J	2.2 J
Barium	27.8 J	24 J	23.3 J	31.2 J	61.7 J	10.1 J	63.2 J	53.2 J
Beryllium	0.1 U	0.31 J	0.29 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cadmium	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Calcium	60,700	30,000	30,100	77,700	21,400	34,600	34,800	141,000
Chromium	2.1 J	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Cobalt	0.5 U	14.4 J	13.6 J	0.5 U	8 J	0.5 U	4.6 J	0.5 U
Copper	3 B	2.2 B	2.6 B	3.6 B	3.2 B	3.7 B	3 B	3.3 B
Iron	390	21,100	21,200	616	65 J	1,360	110	8,780
Lead	1 U	2.1 J	1.1 J	1 U	1.1 J	1 U	1 U	1 U
Magnesium	10,000	22,400	22,400	5,900	5,780	2,000 J	4,890 J	13,700
Manganese	188	1,040	1,050	122	234	174	120	377
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	2.3 J	14.3 J	13.5 J	0.9 U	6.9 J	1.1 J	7.2 J	2.2 J
Potassium	7,200	5,620	5,550	4,540 J	1,600 J	1,480 J	1,610 J	3,910 J
Selenium	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Silver	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
Sodium	33,700	57,700	57,800	37,900	33,500	13,600	18,400	49,100
Thallium	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U
Vanadium	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
Zinc	3.4 J	109	95.1	4.3 J	45.4	10.5 J	9.1 J	25.8
Wet Chem (MG/L)								
Phosphorus	0.02 U	0.02 U	0.02 U	0.095	0.02 U	0.051	0.02 U	0.02 U

Appendix C
Surface Soil Analytical Results
St Juliens Creek Annex Background Ivestigation

Station ID	SJSBK-SS01	SJSBK-SS02	SJSBK-SS03	SJSBK-SS04		SJSBK-SS05	SJSBK-SS06	SJSBK-SS07	SJSBK-SS08	SJSBK-SS09	SJSBK-SS10	SJSBK-SS11	SJSBK-SS12	SJSBK-SS13	SJSBK-SS14	
Sample ID	SS01-000	SS02-000	SS03-000	SS04-000	SS04-000P	SS05-000	SS06-000	SS07-000	SS08-000	SS09-000	SS10-000	SS11-000	SS12-000	SS13-000	S14-00	SS14-000P
Sample Date	02/12/01	02/14/01	02/09/01	02/12/01	02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01	02/12/01	02/13/01	02/13/01	02/13/01	#####	02/13/01
Chemical Name																
VOCs (UG/KG)																
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylene, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs (UG/KG)																
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix C
Surface Soil Analytical Results
St Juliens Creek Annex Background Ivestigation

Station ID	SJSBK-SS01	SJSBK-SS02	SJSBK-SS03	SJSBK-SS04		SJSBK-SS05	SJSBK-SS06	SJSBK-SS07	SJSBK-SS08	SJSBK-SS09	SJSBK-SS10	SJSBK-SS11	SJSBK-SS12	SJSBK-SS13	SJSBK-SS14	
Sample ID	SS01-000	SS02-000	SS03-000	SS04-000	SS04-000P	SS05-000	SS06-000	SS07-000	SS08-000	SS09-000	SS10-000	SS11-000	SS12-000	SS13-000	S14-00	SS14-000P
Sample Date	02/12/01	02/14/01	02/09/01	02/12/01	02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01	02/12/01	02/13/01	02/13/01	02/13/01	#####	02/13/01
Chemical Name																
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	77 U	79 U	81 U	80 U	81 U	81 U	87 U	81 U	84 U	76 U	78 U	77 U	76 U	84 U	91	90 U
Acenaphthylene	95	79 U	81 U	80 U	81 U	81 U	87 U	24 J	84 U	76 U	78 U	77 U	24 J	84 U	91	18 J
Anthracene	31 J	79 U	81 U	80 U	81 U	81 U	87 U	81 U	84 U	76 U	78 U	77 U	76 U	84 U	91	90 U
Benzo(a)anthracene	190	16 J	81 U	120	81	28 J	46 J	45 J	84 U	76 U	78 U	77 U	58 J	18	22	48 J
Benzo(a)pyrene	150	17 J	81 U	83	55 J	26 J	49 J	42 J	84 U	76 U	78 U	77 U	47 J	84 U	91	38 J
Benzo(b)fluoranthene	120	79 U	81 U	86	66 J	34 J	53 J	34 J	84 U	76 U	78 U	77 U	42 J	84 U	91	36 J
Benzo(g,h,i)perylene	120	79 U	81 U	73 J	42 J	32 J	57 J	37 J	84 U	76 U	78 U	77 U	39 J	84 U	91	32 J
Benzo(k)fluoranthene	130	79 U	81 U	65 J	45 J	26 J	38 J	33 J	84 U	76 U	78 U	77 U	39 J	84 U	91	30 J
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	77 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	230	23 J	81 U	150	86	42 J	69 J	51 J	84 U	76 U	21 J	77 U	76	20 J	30	58 J
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	34 J	79 U	81 U	28 J	81 U	81 U	87 U	81 U	84 U	76 U	78 U	77 U	76 U	84 U	91	90 U
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	300	29 J	81 U	180	130	50 J	83 J	58 J	84 U	76 U	26 J	77 U	92	84 U	41	77 J
Fluorene	77 U	79 U	81 U	80 U	81 U	81 U	87 U	81 U	84 U	76 U	78 U	77 U	76 U	84 U	91	90 U
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	97	79 U	81 U	59 J	36 J	25 J	43 J	32 J	84 U	76 U	78 U	77 U	31 J	84 U	91	26 J
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	77 U	79 U	81 U	80 U	81 U	81 U	87 U	81 U	84 U	76 U	78 U	77 U	76 U	84 U	91	90 U
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	98	79 U	81 U	45 J	31 J	81 U	55 J	81 U	84 U	76 U	78 U	77 U	38 J	84 U	91	90 U
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	420	27 J	81 U	220	120	53 J	83 J	75 J	84 U	76 U	30 J	77 U	120	84 U	36	83 J
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pest/PCBs (UG/KG)																
4,4'-DDD	2.3 J	3.9 U	4 U	10	14	7.6	4.3 U	2.9 J	4.2 U	3.8 U	3.8 U	16 J	3.8 U	4.2 U	4.5	4.4 U
4,4'-DDE	34	8.6	4 U	350	410	380	31	280	7.6	41 J	3.7 J	1,900	9.4	4.2 U	11	11
4,4'-DDT	19	6.2	2.8 J	15	14	13	21 K	86	6	28 J	2.8 J	1,600	7.1	2.2 J	9.1	8.8
Aldrin	2 U	2 U	2.1 U	2 U	2.1 U	2.1 U	2.2 U	2.1 U	2.1 U	1.9 U	2 U	5.9 U	1.9 U	2.1 U	2.3	2.3 U
Aroclor-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	3.8 U	3.9 U	4 U	4 U	4 U	4 U	4.3 U	4 U	4.2 U	16 J	3.8 U	11 U	3.8 U	4.2 U	4.5	4.4 U
Endosulfan I	2 U	2 U	2.1 U	2 U	2.1 U	2.1 U	2.2 U	2.1 U	2.1 U	1.9 U	2 U	5.9 U	1.9 U	2.1 U	2.3	2.3 U
Endosulfan II	3.8 U	3.9 U	4 U	4 U	4 U	4 U	4.3 U	4 U	4.2 U	36 J	3.8 U	11 U	3.8 U	4.2 U	4.5	4.4 U
Endosulfan sulfate	3.8 U	3.9 U	4 U	4 U	4 U	4 U	4.3 U	4 U	4.2 U	3.8 U	3.8 U	11 U	3.8 U	4.2 U	4.5	4.4 U
Endrin	3.8 U	3.9 U	4 U	2.5 J	4 U	4 U	4.3 U	4 U	4.2 U	35 J	3.8 U	11 U	3.8 U	4.2 U	4.5	4.4 U
Endrin aldehyde	3.8 U	3.9 U	4 U	4 U	2.5 J	4 U	2.2 J	4 U	4.2 U	17 J	3.8 U	11 U	3.8 U	4.2 U	4.5	2.5 J

Appendix C
Surface Soil Analytical Results
St Juliens Creek Annex Background Ivestigation

Station ID	SJSBK-SS01	SJSBK-SS02	SJSBK-SS03	SJSBK-SS04		SJSBK-SS05	SJSBK-SS06	SJSBK-SS07	SJSBK-SS08	SJSBK-SS09	SJSBK-SS10	SJSBK-SS11	SJSBK-SS12	SJSBK-SS13	SJSBK-SS14	
Sample ID	SS01-000	SS02-000	SS03-000	SS04-000	SS04-000P	SS05-000	SS06-000	SS07-000	SS08-000	SS09-000	SS10-000	SS11-000	SS12-000	SS13-000	S14-00	SS14-000P
Sample Date	02/12/01	02/14/01	02/09/01	02/12/01	02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01	02/12/01	02/13/01	02/13/01	02/13/01	#####	02/13/01
Chemical Name																
Endrin ketone	3.8 U	3.9 U	4 U	4 U	4 U	4 U	4.3 U	4 U	4.2 U	3.8 U	3.8 U	11 U	3.8 U	4.2 U	4.5	4.4 U
Heptachlor	2 U	2 U	2.1 U	2 U	2.1 U	2.1 U	2.2 U	2.1 U	2.1 U	1.9 U	2 U	5.9 U	1.9 U	2.1 U	2.3	2.3 U
Heptachlor epoxide	2 U	2 U	2.1 U	2 U	2.1 U	2.1 U	2.2 U	2.1 U	2.1 U	1.9 U	2 U	5.9 U	1.9 U	2.1 U	2.3	2.3 U
Methoxychlor	20 U	20 U	21 U	20 U	21 U	21 U	22 U	21 U	21 U	19 U	20 U	59 U	19 U	21 U	23	23 U
Toxaphene	200 U	200 U	210 U	200 U	210 U	210 U	220 U	210 U	210 U	190 U	200 U	590 U	190 U	210 U	230	230 U
alpha-BHC	2 U	2 U	2.1 U	2 U	2.1 U	2.1 U	2.2 U	2.1 U	2.1 U	1.9 U	2 U	5.9 U	1.9 U	2.1 U	2.3	2.3 U
alpha-Chlordane	2 U	1.2 J	2.1 U	2 U	2.1 U	2.1 U	1.1 J	2.1 U	2.1 U	45	2 U	5.9 U	1.9 U	2.1 U	2.3	2.3 U
beta-BHC	2 U	2 U	2.1 U	2 U	2.1 U	2.1 U	2.2 U	2.1 U	2.1 U	1.9 U	2 U	5.9 U	1.9 U	2.1 U	2.3	2.3 U
delta-BHC	2 U	2 U	2.1 U	2 U	2.1 U	2.1 U	2.2 U	2.1 U	2.1 U	1.9 U	2 U	5.9 U	1.9 U	2.1 U	2.3	2.3 U
gamma-BHC (Lindane)	2 U	2 U	2.1 U	2 U	2.1 U	2.1 U	2.2 U	2.1 U	2.1 U	1.9 U	2 U	5.9 U	1.9 U	2.1 U	2.3	2.3 U
gamma-Chlordane	2 U	2 U	2.1 U	2 U	2.1 U	2.1 U	2.2 U	2.1 U	2.1 U	8.1 J	2 U	5.9 U	1.9 U	2.1 U	2.3	2.3 U
Total Metals (MG/KG)																
Aluminum	4,160	2,470	5,500	2,070	1,160	992	2,920	4,320	3,010	6,170	6,740	2,780	7,070	6,920	7,040	6,820
Antimony	0.59 B	0.47 UL	0.48 UL	0.48 UL	0.48 UL	0.49 UL	0.73 B	0.49 UL	0.5 UL	0.46 UL	0.47 UL	0.46 UL	0.46 UL	0.5 UL	0.55	0.54 UL
Arsenic	2.1 B	1.6 J	1.8 J	7.1	3.9	1.1 B	9.4	1.8 J	1.9 J	2.4	2.7	1.6 B	2 J	2.4 J	3	3
Barium	19.9 J	15.4 J	23.1 J	13.7 J	10.9 J	8 J	24.7 J	27.4 J	22.6 J	35 J	35.5 J	12.6 J	28.1 J	25.2 J	25.5	26 J
Beryllium	0.16 B	0.092 B	0.14 B	0.11 B	0.092 B	0.071 B	0.099 B	0.21 J	0.081 B	0.26 J	0.18 B	0.044 B	0.11 B	0.15 B	0.1	0.11 B
Cadmium	0.6 U	0.62 U	0.63 U	0.62 U	0.63 U	0.64 U	1.1 B	0.64 U	0.65 U	0.59 U	0.61 U	0.6 U	0.85 B	0.66 U	0.71	0.7 U
Calcium	209 J	56.4 J	96 J	2,070	1,050 J	462 J	115 J	180 J	120 J	304 J	317 J	191 J	335 J	426 J	504	547 J
Chromium	4.7	3	4.2	6.1	4.8	3.9 B	6.6	3.6	3.6	5.2	6.9	3.7 B	7.9	6.9	9.7	9.3
Cobalt	0.95 U	0.97 U	0.99 U	1.5 J	0.99 U	1 U	1.1 U	1.6 J	1 U	1.2 J	1.9 J	0.95 U	2.3 J	1.7 J	2.5	2.2 J
Copper	5.4 J	5.5 J	4 J	8.7	7.4	5 J	21.8	7.8	10.5	8.9	9.2	2.6 J	5.4 J	7.9	12.4	12.2
Cyanide	0.58 U	0.59 U	0.61 U	0.6 U	0.6 U	0.61 U	0.65 U	0.61 U	0.63 U	0.57 U	0.58 U	0.58 U	0.57 U	0.63 U	0.68	0.67 U
Iron	2,660	1,960	2,610	3,180	2,130	1,110	2,400	2,330	2,020	3,250	3,490	1,200	4,390	4,040	5,010	5,140
Lead	17	23.6	11.8	45.6	40.5	22.4	49.5	36.9	33	52.7	28.9	13.2	13.2	22.9	35.7	35.1
Magnesium	185 J	83.1 J	236 J	448 J	360 J	126 J	122 J	155 J	121 J	317 J	363 J	137 J	414 J	455 J	519	513 J
Manganese	7.3	4.7	11.2	25.6	22.8	8.8	8.5	35.3	7.9	10.7	11.6	4.9	13.5	19.4	23.3	23.8
Mercury	0.06 J	0.056 J	0.072 J	0.12	0.081 J	0.048 U	0.26	0.13 B	0.16 B	0.14 B	0.21 B	0.064 J	0.088 B	0.13 B	0.26	0.2 B
Nickel	2.3 U	2.3 U	2.6 J	2.4 U	3.4 J	2.4 U	3.8 B	5.6 B	4.7 B	5.8 B	5.1 B	2.3 U	4.9 B	6.1 B	9.5	8 B
Potassium	122 U	125 U	128 U	267 J	128 U	129 U	137 U	129 U	133 U	146 B	197 B	122 U	204 B	270 B	308	281 B
Selenium	0.62 UL	0.98 J	0.95 J	0.65 UL	0.65 UJ	0.66 UL	0.7 UL	0.66 UL	0.68 UL	0.61 UL	1.2 B	0.62 UL	0.61 UL	0.68 UL	0.74	0.73 UL
Silver	0.49 U	0.5 U	0.51 U	0.5 U	0.51 U	0.51 U	0.55 U	0.63 B	0.53 U	0.48 U	0.49 U	0.49 U	0.48 U	0.53 U	0.58	0.57 U
Sodium	26.6 B	23.2 B	32.7 B	290 J	269 J	30.1 B	42.7 J	39.9 J	41.1 J	67.9 J	49.8 J	48.7 B	44.4 J	170 J	51.9	44.5 J
Thallium	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.5 U	1.4 U	1.5 U	1.3 U	1.4 U	1.4 U	1.3 U	1.5 U	1.9	1.6 U
Vanadium	11.6	15	13	12 J	9.1 J	9.3 J	18.5	20.1	17.2	22.4	19.5	9.3 J	12.6	21.2	37.3	35.8
Zinc	12.2	7	10.4	42.7	34.7	20.7	14.5	16.7	12	22.6	29.9	7.8	15.1	17.7	25.6	26.5
Wet Chem (MG/KG)																
% Solids	88.5	84.6	82.6	83.3	82.7	81.9	77.1	81.9	79.5	87.9	85.7	88.7	87.9	79.3	73.1	74.3
TOC	12,800	19,900	15,200	8,760	4,850	10,100	32,800	17,000	13,300	23,500	27,000	10,000	6,750	20,100	#####	49,200
pH	5	4.1	4.4	7.6	8	6	4	4.5	4.4	4.3	4.4	4.5	5.4	5.1	4.2	4.2

Appendix C
Surface Soil Analytical Results
St Juliens Creek Annex Background Ivestigation

Station ID	SJSBK-SS15	SJSBK-SS16	SJSBK-SS17	SJSBK-SS18	SJSBK-SS19	SJSBK-SS20	SJSBK-SS21	SJSBK-SS22	SJSBK-SS23	SJSBK-SS24		SJSBK-SS25	SJSBK-SS26	SJSBK-SS27	SJSBK-SS28	SJSBK-SS29	SJSBK-SS30
Sample ID	SS15-000	SS16-000	SS17-000	SS18-000	SS19-000	SS20-000	SS21-000	SS22-000	SS23-000	SS24-000	SS24-000P	SS25-000	SS26-000	SS27-000	SS28-000	SS29-000	SS30-000
Sample Date	02/13/01	02/13/01	02/13/01	02/12/01	02/12/01	02/12/01	02/09/01	02/07/01	02/08/01	02/07/01	02/07/01	02/08/01	02/08/01	02/08/01	02/09/01	02/09/01	02/08/01
Chemical Name																	
VOCs (UG/KG)																	
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylene, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs (UG/KG)																	
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix C
Surface Soil Analytical Results
St Juliens Creek Annex Background Ivestigation

Station ID	SJSBK-SS15	SJSBK-SS16	SJSBK-SS17	SJSBK-SS18	SJSBK-SS19	SJSBK-SS20	SJSBK-SS21	SJSBK-SS22	SJSBK-SS23	SJSBK-SS24		SJSBK-SS25	SJSBK-SS26	SJSBK-SS27	SJSBK-SS28	SJSBK-SS29	SJSBK-SS30
Sample ID	SS15-000	SS16-000	SS17-000	SS18-000	SS19-000	SS20-000	SS21-000	SS22-000	SS23-000	SS24-000	SS24-000P	SS25-000	SS26-000	SS27-000	SS28-000	SS29-000	SS30-000
Sample Date	02/13/01	02/13/01	02/13/01	02/12/01	02/12/01	02/12/01	02/09/01	02/07/01	02/08/01	02/07/01	02/07/01	02/08/01	02/08/01	02/08/01	02/09/01	02/09/01	02/08/01
Chemical Name																	
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	86 U	99 U	86 U	82 U	79 U	85 U	49 J	130 U	97 U	130 U	110 U	93 U	100 U	120 U	240 U	290 U	320 U
Acenaphthylene	86 U	99 U	86 U	82 U	79 U	85 U	240	130 U	97 U	130 U	110 U	93 U	100 U	120 U	240 U	290 U	320 U
Anthracene	86 U	99 U	86 U	82 U	79 U	85 U	180 J	130 U	97 U	130 U	110 U	93 U	100 U	120 U	240 U	290 U	320 U
Benzo(a)anthracene	29 J	44 J	24 J	82 U	79 U	85 U	650	33 J	97 U	130 U	110 U	23 J	29 J	78 J	68 B	290 U	100 B
Benzo(a)pyrene	28 J	45 J	22 J	82 U	79 U	85 U	730	30 J	97 U	130 U	110 U	93 U	29 J	92 J	59 J	290 U	99 J
Benzo(b)fluoranthene	66 U	49 J	66 U	82 U	79 U	85 U	820	130 U	97 U	130 U	110 U	93 U	46 J	140	240 U	290 U	130 J
Benzo(g,h,i)perylene	33 J	57 J	28 J	82 U	79 U	85 U	750	130 U	97 U	130 U	110 U	93 U	36 J	120	240 U	290 U	100 J
Benzo(k)fluoranthene	23 J	40 J	20 J	82 U	79 U	85 U	600	130 U	97 U	130 U	110 U	93 U	30 J	66 J	54 J	290 U	89 J
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	99 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	41 J	59 J	31 J	82 U	79 U	85 U	930	43 J	23 J	130 U	110 U	29 J	48 J	110 J	83 J	67 J	140 J
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	86 U	99 U	86 U	82 U	79 U	85 U	260	130 U	97 U	130 U	110 U	93 U	100 U	36 J	240 U	290 U	320 U
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	52 J	72 J	37 J	82 U	79 U	85 U	1,400	54 J	30 J	130 U	110 U	93 U	49 J	160	110 J	100 J	140 J
Fluorene	86 U	99 U	86 U	82 U	79 U	85 U	78 J	130 U	97 U	130 U	110 U	93 U	100 U	120 U	240 U	290 U	320 U
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	26 J	45 J	22 J	82 U	79 U	85 U	600	130 U	97 U	130 U	110 U	93 U	29 J	90 J	240 U	290 U	88 J
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	86 U	99 U	86 U	82 U	79 U	85 U	83 J	130 U	97 U	130 U	110 U	93 U	100 U	120 U	240 U	290 U	320 U
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	38 J	47 J	86 U	82 U	79 U	85 U	490	130 U	97 U	130 U	110 U	93 U	100 U	44 J	240 U	290 U	320 U
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	51 J	77 J	42 J	82 U	79 U	85 U	1,400	59 J	97 U	130 U	110 U	93 U	46 J	130	89 J	290 U	110 J
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pest/PCBs (UG/KG)																	
4,4'-DDD	4.2 U	4.9 U	4.3 U	4.1 U	3.9 U	4.2 U	840	3.6 J	4.8 U	6.2 U	5.7 U	8.9	8.2	4.3 J	36	11 J	16 U
4,4'-DDE	16	250	49	2.6 J	3.9 U	5	430	27	7.7	11	9.8	20	28	5.7 J	28	17	16 U
4,4'-DDT	7.2	110	24	4.1 U	3.9 U	2.9 J	81	4.7 J	4.8 U	13 J	5.7 U	32	5.1 U	5.9 U	12 U	14 U	16 U
Aldrin	2.2 U	2.5 U	2.2 U	2.1 U	2 U	2.2 U	5.5 U	3.2 U	2.5 U	17 J	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
Aroclor-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	4.2 U	4.9 U	4.3 U	4.1 U	3.9 U	4.2 U	11 U	6.2 U	4.8 U	4.3 J	5.7 U	4.6 U	5.1 U	5.9 U	12 U	14 U	16 U
Endosulfan I	2.2 U	1.3 J	2.2 U	2.1 U	2 U	2.2 U	5.5 U	3.2 U	2.5 U	3.2 U	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
Endosulfan II	4.2 U	4.9 U	4.3 U	4.1 U	3.9 U	4.2 U	11 U	6.2 U	4.8 U	6.7 B	5.7 U	4.6 U	5.1 U	5.9 U	12 U	14 U	16 U
Endosulfan sulfate	4.2 U	4.9 U	4.3 U	4.1 U	3.9 U	4.2 U	11 U	6.2 U	4.8 U	6.2 U	5.7 U	4.6 U	5.1 U	5.9 U	12 U	14 U	16 U
Endrin	4.2 U	4.9 U	4.3 U	4.1 U	3.9 U	4.2 U	11 U	6.2 U	4.8 U	9	5.7 U	4.6 U	5.1 U	5.9 U	12 U	14 U	16 U
Endrin aldehyde	4.2 U	7.7 J	4.3 U	4.1 U	3.9 U	4.2 U	15	6.2 U	4.8 U	9.1 J	5.7 U	4.6 U	5.1 U	5.9 U	12 U	14 U	16 U

Appendix C
Surface Soil Analytical Results
St Juliens Creek Annex Background Ivestigation

Station ID	SJSBK-SS15	SJSBK-SS16	SJSBK-SS17	SJSBK-SS18	SJSBK-SS19	SJSBK-SS20	SJSBK-SS21	SJSBK-SS22	SJSBK-SS23	SJSBK-SS24		SJSBK-SS25	SJSBK-SS26	SJSBK-SS27	SJSBK-SS28	SJSBK-SS29	SJSBK-SS30
Sample ID	SS15-000	SS16-000	SS17-000	SS18-000	SS19-000	SS20-000	SS21-000	SS22-000	SS23-000	SS24-000	SS24-000P	SS25-000	SS26-000	SS27-000	SS28-000	SS29-000	SS30-000
Sample Date	02/13/01	02/13/01	02/13/01	02/12/01	02/12/01	02/12/01	02/09/01	02/07/01	02/08/01	02/07/01	02/07/01	02/08/01	02/08/01	02/08/01	02/09/01	02/09/01	02/08/01
Chemical Name																	
Endrin ketone	4.2 U	4.9 U	4.3 U	4.1 U	3.9 U	4.2 U	11 U	6.2 U	4.8 U	6.2 U	5.7 U	4.6 U	5.1 U	5.9 U	12 U	14 U	16 U
Heptachlor	2.2 U	2.5 U	2.2 U	2.1 U	2 U	2.2 U	5.5 U	3.2 U	2.5 U	3.2 U	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
Heptachlor epoxide	2.2 U	2.5 U	2.2 U	2.1 U	2 U	2.2 U	5.5 U	3.2 U	2.5 U	3.2 U	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
Methoxychlor	22 U	25 U	22 U	21 U	20 U	22 U	55 U	32 U	25 U	32 U	29 U	24 U	26 U	30 U	62 U	74 U	83 U
Toxaphene	220 U	250 U	220 U	210 U	200 U	220 U	550 U	320 U	250 U	320 U	290 U	240 U	260 U	300 U	620 U	740 U	830 U
alpha-BHC	2.2 U	2.5 U	2.2 U	2.1 U	2 U	2.2 U	5.5 U	3.2 U	2.5 U	3.2 U	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
alpha-Chlordane	2.2 U	1.4 J	2.2 U	2.1 U	2 U	2.2 U	25 J	3.2 U	2.5 U	3.1 J	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
beta-BHC	2.2 U	2.5 U	2.2 U	2.1 U	2 U	2.2 U	5.5 U	3.2 U	2.5 U	3.2 U	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
delta-BHC	2.2 U	2.5 U	2.2 U	2.1 U	2 U	2.2 U	5.5 U	3.2 U	2.5 U	6 J	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
gamma-BHC (Lindane)	2.2 U	2.5 U	2.2 U	2.1 U	2 U	2.2 U	5.5 U	3.2 U	2.5 U	3.2 U	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
gamma-Chlordane	2.2 U	2.5 U	2.2 U	2.1 U	2 U	2.2 U	24	3.2 U	2.5 U	3.2 U	2.9 U	2.4 U	2.6 U	3 U	6.2 U	7.4 U	8.3 U
Total Metals (MG/KG)																	
Aluminum	5,030	3,720	5,890	4,010	4,640	6,740	38,200	4,440	2,930	4,070	3,480	2,010	7,610	5,970	19,600	25,600	13,200
Antimony	0.51 UL	0.63 J	0.52 UL	0.49 UL	0.69 B	0.7 B	2.3 B	0.76 UL	0.58 UL	0.98 B	0.69 UL	1.2 B	0.62 UL	0.92 B	1.7 B	1.8 UL	2 UL
Arsenic	4	3.9	2 J	1.6 B	1.7 B	2.0 L	32.5	2.2 J	2.7 J	2.6 J	2.1 J	3	1.7 J	5.7	11.8	18.2	7.1 J
Barium	30.2 J	34.4 J	27.5 J	23.2 J	27.3 J	47.3 J	71 J	18.7 J	5.5 J	8.1 J	6.7 J	5.6 J	22.6 J	32 J	43.9 J	67 J	30.7 J
Beryllium	0.16 B	0.22 B	0.18 B	0.11 B	0.2 B	0.33 B	3.4	0.3 B	0.09 B	0.24 B	0.24 B	0.21 B	0.27 B	0.54 B	1.2 B	1.5 B	0.66 B
Cadmium	0.67 U	1.2 B	0.67 U	0.64 U	0.61 U	0.66 U	2.2 B	0.98 U	0.76 U	1.6 B	0.89 U	0.81 B	0.81 U	0.93 U	1.9 U	2.3 U	2.5 U
Calcium	282 J	761 J	345 J	61.5 B	99.7 J	331 J	3,100 J	910 J	327 J	1,020 J	1,000 J	219 J	1,000 J	1,360 J	2,270 J	2,950 J	2,120 J
Chromium	7.7	6.8	7.5	4.9 K	4.9	6.9	49.9	6.8	4.9	10.4	6.9	5.5	8.2	14.8	38.7	56.6	30.4
Cobalt	1.8 J	1.5 B	2 B	1.1 J	1.3 J	1.7 J	20.7 J	1.6 U	1.3 B	1.5 U	1.4 U	3.4 B	1.3 U	7.3 J	11.8 J	14.3 J	7.2 J
Copper	11.2	15.5	9.9	5 J	4 J	7.2	78	10.8	7.2 J	13	11.9	12.2	12.3	74.3	43.9	53.3	29.1
Cyanide	0.64 U	0.74 U	0.65 U	0.61 U	0.59 U	0.63 U	1.6 U	0.94 U	0.73 U	0.94 U	0.86 U	0.7 U	0.78 U	0.89 U	1.8 U	2.2 U	2.4 U
Iron	3,270	3,230	3,880	2,170	2,480	3,990	43,300	1,960	3,450	3,590	2,880	6,780	2,750	15,000	26,500	42,800	12,700
Lead	54	49.3	26.5	34	17.6	26.6	228	40.4	13.1	28.2	24.8	22.1	29.4	161	86.3	89.4	57.2
Magnesium	260 J	149 J	250 J	155 J	200 J	321 J	7,220	829 J	505 J	1,480 J	1,300 J	366 J	1,230 J	2,640	6,780	10,100	5,650
Manganese	15.3	22.3	11.7	3.4 J	11.5	79.6	300	15.9	7.3	19.5	15	15.8	13.7	77.8	149	228	68.3
Mercury	0.24 B	0.24 B	0.2 B	0.079 J	0.12 J	0.14 B	0.89	0.12 J	0.058 UL	0.099 J	0.1 J	0.055 UL	0.061 UL	0.24	0.3 J	0.4 J	0.33 J
Nickel	5.2 B	5.2 J	2.5 U	2.4 U	2.8 J	4.7 J	32.8	3.7 U	4 J	4.5 J	5.9 J	7.7 J	4.3 J	18.6	25 J	26.7 J	16.1 J
Potassium	135 U	156 U	156 J	168 J	178 J	134 U	3,610	233 B	228 B	626 B	522 B	147 U	485 J	1,250 J	3,850	6,000	3,200 J
Selenium	0.62 B	1 J	0.7 UL	0.56 UL	0.64 UL	0.69 UL	2.4 J	1 U	0.83 J	1.2 J	1 J	0.76 U	0.95 J	0.96 U	2 UL	2.4 UL	2.6 UL
Silver	0.54 U	0.62 UL	0.54 UL	0.52 U	0.5 U	0.53 U	1.4 U	0.79 U	0.61 U	0.79 U	0.72 U	0.59 U	0.65 U	0.75 U	1.5 U	1.8 U	2.1 U
Sodium	36.6 J	3.7 U	3.2 U	51.1 B	52 B	40.4 J	8,270	1,160 J	1,320 J	4,770	4,210	612 J	2,770	4,710	16,800	20,700	22,600
Thallium	1.5 U	1.8 U	1.5 U	1.5 U	1.4 U	1.5 U	3.8 U	2.2 U	1.7 U	2.2 U	2 U	1.7 U	1.8 U	2.1 U	4.3 U	5.2 U	5.8 U
Vanadium	27.9	24.7	23.4	14.2	10.8 J	16.7	72.5	15.1 J	8.4 J	13.1 J	10.2 J	7.5 J	16.4	20.8	60.6	68.3	58.3
Zinc	16.9	24.9	32.3	7.3	9.7	23.9	343	19.1	18.3	32.8	29.7	76.3	23.5	230	259	147	73
Wet Chem (MG/KG)																	
% Solids	78	67.5	77.2	81.5	84.7	78.8	30.8	52.9	68.8	53.3	58.2	71.6	64.4	56.1	27.4	22.9	20.5
TOC	24,100	36,600	24,800	13,900	10,400	18,800	81,300	25,300	16,700	35,000	31,300	8,240	32,700	29,700	92,500	126,000	138,000
pH	4.2	4.4	4	4.1	4.2	4.8	7.2	6.9	6.5	6.3	6.6	6.8	6.6	7	7.3	6.6	6.8

Appendix C
Surface Soil Analytical Results
St Juliens Creek Annex Background Ivestigation

Station ID	SJSBK-SS31	SJSBK-SS32	SJSBK-SS33	SJSBK-SS34		SJSBK-SS35	SJSBK-SS36	SJSBK-SS37	SJSBK-SS38	SJSBK-SS39	SJSBK-SS40	SJSBK-SS41	SJSBK-SS42	SJSBK-SS43	SJSBK-SS44	
Sample ID	SS31-000	SS32-000	SS33-000	SS34-000	SS34-000P	SS35-000	SS36-000	SS37-000	SS38-000	SS39-000	SS40-000	SS41-000	SS42-000	SS43-000	SS44-000	SS44-000P
Sample Date	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01
Chemical Name																
VOCs (UG/KG)																
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylene, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs (UG/KG)																
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix C
Surface Soil Analytical Results
St Juliens Creek Annex Background Ivestigation

Station ID	SJSBK-SS31	SJSBK-SS32	SJSBK-SS33	SJSBK-SS34		SJSBK-SS35	SJSBK-SS36	SJSBK-SS37	SJSBK-SS38	SJSBK-SS39	SJSBK-SS40	SJSBK-SS41	SJSBK-SS42	SJSBK-SS43	SJSBK-SS44	
Sample ID	SS31-000	SS32-000	SS33-000	SS34-000	SS34-000P	SS35-000	SS36-000	SS37-000	SS38-000	SS39-000	SS40-000	SS41-000	SS42-000	SS43-000	SS44-000	SS44-000P
Sample Date	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01
Chemical Name																
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	80 U	38 J	78 U	81 U	82 U	78 U	88 U	84 U	79 U	82 U	88 U	19 J	100 U	98 U	96 U	97 U
Acenaphthylene	80 U	42 J	32 J	36 J	24 J	78 U	88 U	84 U	21 J	82 U	88 U	200	64 J	240	210	180
Anthracene	80 U	70 J	39 J	67 J	37 J	78 U	88 U	84 U	16 J	82 U	88 U	130	35 J	130	120	96 J
Benzo(a)anthracene	53 J	300	180	260	150	78 U	44 J	42 J	76 J	70 J	88 U	600	150	610	510	400
Benzo(a)pyrene	57 J	300	170	250	140	78 U	43 J	38 J	82	69 J	88 U	580	180	650	520	420
Benzo(b)fluoranthene	59 J	310	200	420	230	78 U	39 J	31 J	120	110	88 U	1,500	400	1,500	1,600	1,100
Benzo(g,h,i)perylene	51 J	290 J	180	250 J	130 J	78 U	35 J	30 J	63 J	63 J	88 U	990	360	1,300	1,000	820
Benzo(k)fluoranthene	55 J	240	180	270	160	78 U	37 J	29 J	83	68 J	88 U	730	220	850	630	610
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	74 J	380	230	350	210	78 U	58 J	53 J	120	110	88 U	1,200	310	1,200	1,100	820
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	80 U	97	42 J	110	57 J	78 U	88 U	84 U	22 J	82 U	88 U	480	150	630	490	380
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	62	500	310	430	230	78 U	76 J	63 J	120	97	88 U	730	180	670	710	570
Fluorene	80 U	30 J	78 U	81 U	82 U	78 U	88 U	84 U	79 U	82 U	88 U	94 U	100 U	98 U	96 U	97 U
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	42 J	250	160	240	130	78 U	30 J	23 J	58 J	55 J	88 U	960	320	1,300	970	780
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	80 U	14 J	19 J	30 J	78 J	78 U	88 U	84 U	79 U	82 U	88 U	45 J	19 J	56 J	62 J	52 J
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	40 J	310	140	140	61 J	78 U	49 J	67 J	30 J	39 J	88 U	120	35 J	84 J	97	75 J
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	99	520	340	430	240	78 U	83 J	96	130	100	88 U	640	160	570	570	470
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pest/PCBs (UG/KG)																
4,4'-DDD	32 J	21	3.9 U	4 U	4.1 U	3.9 U	2.4 J	2.6 J	2.9 J	2.3 J	4.3 U	4.7 U	5 U	4.8 U	2.6 J	3.8 J
4,4'-DDE	1,700	240	55	4 U	4.1 U	3.9 U	160	6.5	61	15	4.3 U	9.4	6	4.8 U	8	7.7 J
4,4'-DDT	920	38	27	2.9 J	4.1 U	3.9 U	34	12	13 J	15	4.3 U	18	15	4.6 J	22	22
Aldrin	8.1 U	2 U	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U
Aroclor-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	16 U	3.9 U	3.9 U	4 U	4.1 U	3.9 U	4.4 U	4.1 U	3.9 U	4 U	4.3 U	4.7 U	5 U	4.8 U	4.7 U	4.8 U
Endosulfan I	8.1 U	2 U	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U
Endosulfan II	16 U	3.9 U	3.9 U	4 U	4.1 U	3.9 U	4.4 U	4.1 U	3.9 U	4 U	4.3 U	4.7 U	5 U	4.8 U	4.7 U	4.8 U
Endosulfan sulfate	16 U	3.9 U	3.9 U	4 U	4.1 U	3.9 U	4.4 U	4.1 U	3.9 U	4 U	4.3 U	4.7 U	5 U	4.8 U	4.7 U	4.8 U
Endrin	16 U	3.9 U	3.9 U	4 U	4.1 U	3.9 U	4.4 U	4.1 U	3.9 U	4 U	4.3 U	4.7 U	5 U	4.8 U	4.7 U	4.8 U
Endrin aldehyde	16 U	3.9 U	3.9 U	4 U	4.1 U	3.9 U	4.4 U	4.1 U	3.9 U	4 U	4.3 U	4.7 U	5 U	4.8 U	4.7 U	4.8 U

Appendix C
Surface Soil Analytical Results
St Juliens Creek Annex Background Ivestigation

Station ID	SJSBK-SS31	SJSBK-SS32	SJSBK-SS33	SJSBK-SS34		SJSBK-SS35	SJSBK-SS36	SJSBK-SS37	SJSBK-SS38	SJSBK-SS39	SJSBK-SS40	SJSBK-SS41	SJSBK-SS42	SJSBK-SS43	SJSBK-SS44	
Sample ID	SS31-000	SS32-000	SS33-000	SS34-000	SS34-000P	SS35-000	SS36-000	SS37-000	SS38-000	SS39-000	SS40-000	SS41-000	SS42-000	SS43-000	SS44-000	SS44-000P
Sample Date	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01
Chemical Name																
Endrin ketone	16 U	3.9 U	3.9 U	4 U	4.1 U	3.9 U	4.4 U	4.1 U	3.9 U	4 U	4.3 U	4.7 U	5 U	4.8 U	4.7 U	4.8 U
Heptachlor	8.1 U	2 U	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U
Heptachlor epoxide	8.1 U	2 U	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U
Methoxychlor	81 U	20 U	20 U	21 U	21 U	20 U	23 U	21 U	20 U	21 U	22 U	24 U	26 U	25 U	24 U	25 U
Toxaphene	810 U	200 U	200 U	210 U	210 U	200 U	230 U	210 U	200 U	210 U	220 U	240 U	260 U	250 U	240 U	250 U
alpha-BHC	8.1 U	2 U	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U
alpha-Chlordane	8.1 U	23 J	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U
beta-BHC	8.1 U	2 U	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U
delta-BHC	8.1 U	2 U	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U
gamma-BHC (Lindane)	8.1 U	2 U	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U
gamma-Chlordane	8.1 U	5.3	2 U	2.1 U	2.1 U	2 U	2.3 U	2.1 U	2 U	2.1 U	2.2 U	2.4 U	2.6 U	2.5 U	2.4 U	2.5 U
Total Metals (MG/KG)																
Aluminum	3,880	5,550	4,000	18,100	12,600	2,930	9,680	7,690	6,820	3,030	9,780	16,400	17,600	19,900	21,900	18,700
Antimony	0.48 UL	0.48 UL	1 B	0.9 B	0.49 UL	0.51 B	0.53 UL	0.86 B	0.47 UL	0.65 J	0.53 UL	1.2 J	2 J	1.4 J	0.9 J	0.92 J
Arsenic	4.9	5.1	1.8 J	4.1 L	4.2 L	1.3 J	4 L	3.9 L	3.1 L	3.3	3.3	12.1	23.6	16.5	15.3	14.2
Barium	27.5 J	32.2 J	30.9 J	71.8	60.2	18.3 J	50.5 J	40 J	33.8 J	14.4 J	39.2 J	62.2	79	78.1	75.7	71.4
Beryllium	0.14 B	0.22 B	0.14 B	0.6 B	0.34 B	0.13 B	0.27 B	0.3 B	0.21 B	0.3 B	0.33 B	0.63 B	1.3 B	0.61 B	0.68 B	0.59 B
Cadmium	0.62 U	0.62 U	0.61 U	0.63 U	0.64 U	0.61 U	0.69 U	0.65 U	0.61 U	1.1 B	0.68 U	0.86 B	0.79 U	0.76 U	0.82 B	0.76 U
Calcium	367 J	914 J	594 J	2,110	1,800	753 J	578 J	1,050 J	585 J	9,490	1,100 J	656 J	3,260	605 J	1,180 J	1,150 J
Chromium	6.6	10.5	5.5	31.6	22	6.4	13.2	13.3	9.5	7.1	16.6	35.2	35.1	42.1	44.9	41.1
Cobalt	0.98 U	2.5 J	1 J	8.5 J	5.1 J	1.2 J	2.1 J	5 J	1.9 J	3.9 B	2.6 B	8.8 J	15.3	9.7 J	9.3 J	8.6 J
Copper	10.8	12.8	8.9	47.1	39.1	6.2	8.4	9	7.5	6.3	27.1	38	41.4	45	50.8	50.2
Cyanide	0.6 U	0.6 U	0.59 U	0.61 U	0.61 U	0.58 U	0.66 U	0.63 U	0.59 U	0.61 U	0.66 U	0.7 U	0.76 U	0.73 U	0.72 U	0.73 U
Iron	3,020	9,990	4,300	21,500	13,300	3,810	5,800	12,100	5,090	7,170	10,600	32,200	39,200	40,800	38,600	35,500
Lead	58.1	68.6	111	31.6	34.1	32.1	52.9	22.6	23.5	18	39.4	99.7	124	137	98.8	114
Magnesium	216 J	918 J	274 J	2,490	1,610	322 J	563 J	558 J	468 J	718 J	1,320	3,210	4,430	3,680	4,250	3,880
Manganese	12.7	47.9	29.7	91.5	59.3	13.7	29.3	242	29.1	99.3	26.2	126	224	125	136	132
Mercury	0.15 B	0.14 B	0.25 B	0.42	0.7	0.001 B	0.13 B	0.13 B	0.13 B	0.12 B	0.18 B	0.66	0.61	0.96	1.2	1.2
Nickel	2.8 J	7.4 J	4.2 J	20.3	13 K	2.5 J	5.6 J	3.9 J	4.7 J	6.3 J	5.7 J	12.6 K	23.9 K	11.7 J	14 K	10.8 J
Potassium	126 U	556 B	123 U	1,430	1,020 J	158 B	215 B	436 B	218 B	476 J	774 J	3,260	2,850	3,680	3,510	3,410
Selenium	0.64 UL	0.79 B	0.63 UL	0.65 UL	0.66 UL	0.63 UL	0.72 UL	0.68 UL	0.79 B	0.66 UL	1.3 B	1.1 J	0.82 UL	1.9 L	1.6 L	2.4 L
Silver	0.5 U	0.5 U	0.49 U	0.51 U	0.52 U	0.49 U	0.56 U	0.53 U	0.5 U	0.51 UL	0.55 UL	0.59 UL	0.64 UL	0.61 UL	0.6 UL	0.61 UL
Sodium	39.2 B	45.8 J	44.4 J	67.5 J	62 J	32.4 B	47.1 J	31 B	33.2 J	27.6 J	53.8 J	276 J	133 J	197 J	219 J	169 J
Thallium	1.4 U	1.4 U	1.4 U	1.4 U	1.5 U	1.4 U	1.6 U	1.5 U	1.4 U	1.4 U	1.6 U	1.7 U	1.8 U	2.8 B	1.7 U	1.7 U
Vanadium	16.2	24.5	15.4	44.5	31	18.5	28.8	24.6	13.1	17.2	28.8	53.4	50.7	64.4	54	48
Zinc	32	50.9	62.2	164	102	64	45.8	31.2	30.1	34.5	91.1	92.1	162	90	107	99.2
Wet Chem (MG/KG)																
% Solids	83.8	83.9	85.4	82.5	81.4	85.6	75.5	79.7	84.8	81.8	76.1	70.9	65.7	68.4	69.8	68.5
TOC	12,800	17,700	10,900	12,200	22,900	10,100	19,200	20,900	17,900	20,300	6,880	27,300	34,300	22,200	28,400	35,500
pH	5.2	5.2	5.5	6.1	6.3	6.1	5.4	5.8	5.6	7.4	7.1	4.2	4.9	4	4.3	4.6

Appendix C
Surface Soil Analytical Results
St Juliens Creek Annex Background Ivestigation

Station ID	SJSBK-SS45		SJSBK-SS46		SJSBK-SS47		SJSBK-SS48		SJSBK-SS49		SJSBK-SS50	
Sample ID	SS45-000		SS46-000		SS47-000		SS48-000		SS49-000		SS50-000	
Sample Date	02/13/01		02/13/01		04/19/1999		04/19/1999		04/19/1999		04/19/1999	
Chemical Name												
VOCs (UG/KG)												
1,1,1-Trichloroethane	NA		NA		14	UJ	14	U	14	U	17	UJ
1,1,2,2-Tetrachloroethane	NA		NA		14	UJ	14	UJ	14	UJ	17	UJ
1,1,2-Trichloroethane	NA		NA		14	UJ	14	U	14	U	17	UJ
1,1-Dichloroethane	NA		NA		14	U	14	U	14	U	17	UJ
1,1-Dichloroethene	NA		NA		14	U	14	U	14	U	17	UJ
1,2,4-Trichlorobenzene	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
1,2-Dichlorobenzene	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
1,2-Dichloroethane	NA		NA		14	U	14	U	14	U	17	UJ
1,2-Dichloroethene (total)	NA		NA		14	U	14	U	14	U	17	UJ
1,2-Dichloropropane	NA		NA		14	UJ	14	U	14	U	17	UJ
1,3-Dichlorobenzene	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
1,4-Dichlorobenzene	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
2-Butanone	NA		NA		14	U	14	U	14	U	17	UJ
2-Hexanone	NA		NA		14	UJ	14	UJ	14	UJ	17	UJ
4-Methyl-2-pentanone	NA		NA		14	UJ	14	UJ	14	UJ	17	UJ
Acetone	NA		NA		74		37		17		61	J
Benzene	NA		NA		14	UJ	14	U	14	U	17	UJ
Bromodichloromethane	NA		NA		14	UJ	14	U	14	U	17	UJ
Bromoform	NA		NA		14	UJ	14	U	14	U	17	UJ
Bromomethane	NA		NA		14	U	14	U	14	U	17	UJ
Carbon disulfide	NA		NA		14	U	14	U	14	U	17	UJ
Carbon tetrachloride	NA		NA		14	UJ	14	U	14	U	17	UJ
Chlorobenzene	NA		NA		14	UJ	14	UJ	14	UJ	17	UJ
Chloroethane	NA		NA		14	U	14	U	14	U	17	UJ
Chloroform	NA		NA		14	U	14	U	14	U	17	UJ
Chloromethane	NA		NA		14	U	14	U	14	U	17	UJ
Dibromochloromethane	NA		NA		14	UJ	14	U	14	U	17	UJ
Ethylbenzene	NA		NA		14	UJ	14	UJ	14	UJ	17	UJ
Methylene chloride	NA		NA		25	B	17	B	17	B	10	B
Styrene	NA		NA		14	UJ	14	UJ	14	UJ	17	UJ
Tetrachloroethene	NA		NA		14	UJ	14	UJ	14	UJ	17	UJ
Toluene	NA		NA		14	UJ	14	UJ	14	UJ	17	UJ
Trichloroethene	NA		NA		14	UJ	14	U	14	U	17	UJ
Vinyl chloride	NA		NA		14	U	14	U	14	U	17	UJ
Xylene, total	NA		NA		14	UJ	14	UJ	14	UJ	17	UJ
cis-1,3-Dichloropropene	NA		NA		14	UJ	14	U	14	U	17	UJ
trans-1,3-Dichloropropene	NA		NA		14	UJ	14	U	14	U	17	UJ
SVOCs (UG/KG)												
2,2'-Oxybis(1-chloropropane)	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
2,4,5-Trichlorophenol	NA		NA		1,200	UJ	1,200	UJ	1,200	UJ	1,400	UJ
2,4,6-Trichlorophenol	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
2,4-Dichlorophenol	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
2,4-Dimethylphenol	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
2,4-Dinitrophenol	NA		NA		1,200	UJ	1,200	UJ	1,200	UJ	1,400	UJ
2,4-Dinitrotoluene	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
2,6-Dinitrotoluene	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
2-Chloronaphthalene	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
2-Chlorophenol	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
2-Methylnaphthalene	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
2-Methylphenol	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
2-Nitroaniline	NA		NA		1,200	UJ	1,200	UJ	1,200	UJ	1,400	UJ
2-Nitrophenol	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
3,3'-Dichlorobenzidine	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
3-Nitroaniline	NA		NA		1,200	UJ	1,200	UJ	1,200	UJ	1,400	UJ
4,6-Dinitro-2-methylphenol	NA		NA		1,200	UJ	1,200	UJ	1,200	UJ	1,400	UJ
4-Bromophenyl-phenylether	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
4-Chloro-3-methylphenol	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
4-Chloroaniline	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ

Appendix C
Surface Soil Analytical Results
St Juliens Creek Annex Background Ivestigation

Station ID	SJSBK-SS45		SJSBK-SS46		SJSBK-SS47		SJSBK-SS48		SJSBK-SS49		SJSBK-SS50	
Sample ID	SS45-000		SS46-000		SS47-000		SS48-000		SS49-000		SS50-000	
Sample Date	02/13/01		02/13/01		04/19/1999		04/19/1999		04/19/1999		04/19/1999	
Chemical Name												
4-Chlorophenyl-phenylether	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
4-Methylphenol	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
4-Nitroaniline	NA		NA		1,200	UJ	1,200	UJ	1,200	UJ	1,400	UJ
4-Nitrophenol	NA		NA		1,200	UJ	1,200	UJ	1,200	UJ	1,400	UJ
Acenaphthene	94	U	87	U	480	UJ	470	UJ	480	UJ	560	UJ
Acenaphthylene	80	J	31	J	63	J	250	J	88	J	240	J
Anthracene	47	J	20	J	69	J	360	J	91	J	340	J
Benzo(a)anthracene	190		110		210	J	1,400	J	360	J	1,200	J
Benzo(a)pyrene	250		110		150	J	1,200	J	260	J	790	J
Benzo(b)fluoranthene	640		180		790	J	3,300	J	1,200	J	3,200	J
Benzo(g,h,i)perylene	510		140		310	J	1,600	J	500	J	1,400	J
Benzo(k)fluoranthene	340		130		200	J	1,500	J	340	J	1,400	J
Butylbenzylphthalate	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Carbazole	NA		87	U	480	UJ	470	UJ	480	UJ	560	UJ
Chrysene	460		170		430	J	2,700	J	680		2,400	J
Di-n-butylphthalate	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Di-n-octylphthalate	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Dibenz(a,h)anthracene	210		57	J	480	UJ	470	UJ	480	UJ	560	UJ
Dibenzofuran	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Diethylphthalate	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Dimethyl phthalate	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Fluoranthene	210		140		230	J	1,100	J	350	J	880	J
Fluorene	94	U	87	U	480	UJ	470	UJ	480	UJ	560	UJ
Hexachlorobenzene	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Hexachlorobutadiene	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Hexachlorocyclopentadiene	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Hexachloroethane	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Indeno(1,2,3-cd)pyrene	450		120		330	J	1,700	J	520	J	1,800	J
Isophorone	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Naphthalene	24	J	87	U	480	UJ	470	UJ	480	UJ	62	J
Nitrobenzene	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Pentachlorophenol	NA		NA		1,200	UJ	1,200	UJ	1,200	UJ	1,400	UJ
Phenanthrene	53	J	48	J	57	J	260	J	68	J	190	J
Phenol	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Pyrene	190		120		210	J	1,100	J	310	J	890	J
bis(2-Chloroethoxy)methane	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
bis(2-Chloroethyl)ether	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
bis(2-Ethylhexyl)phthalate	NA		NA		53	J	57	J	54	J	57	J
n-Nitroso-di-n-propylamine	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
n-Nitrosodiphenylamine	NA		NA		480	UJ	470	UJ	480	UJ	560	UJ
Pest/PCBs (UG/KG)												
4,4'-DDD	4.7	U	4.3	U	4.9	UJ	4.7	UJ	4.7	UJ	5.5	UJ
4,4'-DDE	4.6	J	4.3	U	2.1	J	4.7	UJ	2.9	J	5.5	UJ
4,4'-DDT	8.5		2.5	J	11	J	11	J	8.1	J	5.5	UJ
Aldrin	2.4	U	2.2	U	2.4	UJ	2.3	UJ	2.3	UJ	2.8	UJ
Aroclor-1016	NA		NA		49	UJ	47	UJ	47	UJ	55	UJ
Aroclor-1221	NA		NA		97	UJ	93	UJ	94	UJ	110	UJ
Aroclor-1232	NA		NA		49	UJ	47	UJ	47	UJ	55	UJ
Aroclor-1242	NA		NA		49	UJ	47	UJ	47	UJ	55	UJ
Aroclor-1248	NA		NA		49	UJ	47	UJ	47	UJ	55	UJ
Aroclor-1254	NA		NA		9.6	J	13	J	16	J	14	J
Aroclor-1260	NA		NA		49	UJ	47	UJ	47	UJ	55	UJ
Dieldrin	4.7	U	4.3	U	4.9	UJ	4.7	UJ	4.7	UJ	5.5	UJ
Endosulfan I	2.4	U	2.2	U	2.4	UJ	2.3	UJ	2.3	UJ	2.8	UJ
Endosulfan II	4.7	U	4.3	U	4.9	UJ	4.7	UJ	4.7	UJ	5.5	UJ
Endosulfan sulfate	4.7	U	4.3	U	4.9	UJ	4.7	UJ	4.7	UJ	5.5	UJ
Endrin	4.7	U	4.3	U	4.9	UJ	4.7	UJ	4.7	UJ	5.5	UJ
Endrin aldehyde	4.7	U	4.3	U	4.9	UJ	4.7	UJ	4.7	UJ	5.5	UJ

Appendix C
Surface Soil Analytical Results
St Juliens Creek Annex Background Ivestigation

Station ID	SJSBK-SS45		SJSBK-SS46		SJSBK-SS47		SJSBK-SS48		SJSBK-SS49		SJSBK-SS50	
Sample ID	SS45-000		SS46-000		SS47-000		SS48-000		SS49-000		SS50-000	
Sample Date	02/13/01		02/13/01		04/19/1999		04/19/1999		04/19/1999		04/19/1999	
Chemical Name												
Endrin ketone	4.7	U	4.3	U	4.9	UJ	4.7	UJ	4.7	UJ	5.5	UJ
Heptachlor	2.4	U	2.2	U	2.4	UJ	2.3	UJ	2.3	UJ	2.8	UJ
Heptachlor epoxide	2.4	U	2.2	U	2.4	UJ	2.3	UJ	2.3	UJ	2.8	UJ
Methoxychlor	24	U	22	U	24	UJ	23	UJ	23	UJ	28	UJ
Toxaphene	240	U	220	U	240	UJ	230	UJ	230	UJ	280	UJ
alpha-BHC	2.4	U	2.2	U	2.4	UJ	2.3	UJ	2.3	UJ	2.8	UJ
alpha Chlordane	2.4	U	2.2	U	2.4	UJ	2.3	UJ	2.3	UJ	2.8	UJ
beta-BHC	2.4	U	2.2	U	2.4	UJ	2.3	UJ	2.3	UJ	2.8	UJ
delta-BHC	2.4	U	2.2	U	2.4	UJ	2.3	UJ	2.3	UJ	2.8	UJ
gamma-BHC (Lindane)	2.4	U	2.2	U	2.4	UJ	2.3	UJ	2.3	UJ	2.8	UJ
gamma-Chlordane	2.4	U	2.2	U	2.4	UJ	2.3	UJ	2.3	UJ	2.8	UJ
Total Metals (MG/KG)												
Aluminum	17,500		8,930		17,000		14,800		17,700		19,100	
Antimony	1.1	J	0.75	J	0.74	U	0.63	U	0.67	U	0.74	U
Arsenic	13.8		8.7		18		20.1		17.2		22.4	
Barium	108		67		75.6		66.3		83.5		71.6	
Beryllium	0.57	B	0.53	B	0.51	J	0.46	J	0.71	J	0.63	J
Cadmium	0.74	U	0.68	U	0.2	B	0.2	B	0.28	B	0.29	B
Calcium	1,310	J	2,990		1,470		556	J	508	J	936	J
Chromium	37.2		21.2	L	39.3		39.7		38.6		45	
Cobalt	8.7	J	7.2	J	6.3	J	4.5	J	5.4	J	5.6	J
Copper	36.2		24.9		38.3		57.8		47.4		46.6	
Cyanide	0.71	U	0.65	U	0.3	U	0.26	U	0.21	U	0.38	U
Iron	33,100		21,200		37,600		38,100		32,100		42,800	
Lead	137		54.9	L	80.3		93.1		112		111	
Magnesium	3,440		2,180		3,620		3,030		3,010		3,610	
Manganese	124		166		157		115		115		137	
Mercury	0.7		0.37		0.59		1.1		0.74		1.2	
Nickel	12.8	K	9.4	J	12.8		11		12.7		13.2	
Potassium	3,150		1,850		2,980		3,830		2,780		4,870	
Selenium	2.1	L	1.8	B	0.92	J	1.8		1.5		1.2	J
Silver	0.59	UL	0.55	U	0.25	U	0.95	J	0.22	U	0.31	J
Sodium	176	J	151	J	168	J	806	J	134	J	392	J
Thallium	1.7	U	1.5	U	0.88	U	0.75	U	0.79	U	0.88	U
Vanadium	56		33.5		57.5		53.2		65.6		63.7	
Zinc	90.6		91.7		99		83.3		78.9		82.1	
Wet Chem (MG/KG)												
% Solids	70.7		76.4		68.7		70.9		70.5		60	
TOC	39,900		30,700		NA		NA		NA		NA	
pH	4.3		5.8		4.26		3.91		3.76		3.84	

Appendix C
Subsurface Soil Analytical Results
St Juliens Creek Annex Background Investigation

Station ID	SJSBK-SB01	SJSBK-SB02	SJSBK-SB03	SJSBK-SB04		SJSBK-SB05	SJSBK-SB06	SJSBK-SB07	SJSBK-SB08	SJSBK-SB09	SJSBK-SB10	SJSBK-SB11	SJSBK-SB12	SJSBK-SB13	SJSBK-SB14	
Sample ID	SB01-001	SB02-001	SB03-001	SB04-001	SB04-001P	SB05-001	SB06-001	SB07-001	SB08-001	SB09-001	SB10-001	SB11-001	SB12-001	SB13-001	SB14-001	SB14-001P
Sample Date	02/12/01	02/14/01	02/09/01	02/12/01	02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01
Chemical Name																
SVOCs (UG/KG)																
Acenaphthene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Acenaphthylene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Anthracene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Benzo(a)anthracene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Benzo(a)pyrene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Benzo(b)fluoranthene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Benzo(g,h,i)perylene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Benzo(k)fluoranthene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Chrysene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Dibenz(a,h)anthracene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Fluoranthene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Fluorene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Indeno(1,2,3-cd)pyrene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Naphthalene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Phenanthrene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Pyrene	75 U	76 U	77 U	99 U	88 U	77 U	80 U	76 U	78 U	79 U	78 U	78 U	77 U	75 U	76 U	75 U
Pest/PCBs (UG/KG)																
4,4'-DDD	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	3.9 U	3.9 U	3.9 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U
4,4'-DDE	3.7 U	3.8 U	3.8 U	12	37	18	3.9 U	2.6 J	3.9 U	3.9 U	7.8 J	18	3.8 U	3.7 U	3.7 U	3.7 U
4,4'-DDT	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	3.9 U	3.9 U	7.2 J	19	3.8 U	3.7 U	3.7 U	3.7 U
Aldrin	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U
Dieldrin	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	3.9 U	3.9 U	4 J	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U
Endosulfan I	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U
Endosulfan II	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	3.9 U	3.9 U	7.4 J	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U
Endosulfan sulfate	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	3.9 U	3.9 U	3.9 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U
Endrin	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	2.2 J	3.9 U	8.9 J	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U
Endrin aldehyde	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	3.9 U	3.9 U	4.2 J	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U
Endrin ketone	3.7 U	3.8 U	3.8 U	4.9 U	4.3 U	3.8 U	3.9 U	3.8 U	3.9 U	3.9 U	3.9 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U
Heptachlor	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U
Heptachlor epoxide	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U
Methoxychlor	19 U	19 U	20 U	25 U	22 U	20 U	20 U	19 U	20 U	20 U	20 U	20 U	20 U	19 U	19 U	19 U
Toxaphene	190 U	190 U	200 U	250 U	220 U	200 U	200 U	190 U	200 U	200 U	200 U	200 U	200 U	190 U	190 U	190 U
alpha-BHC	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U
alpha-Chlordane	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	8.4	2 U	2 U	1.9 U	1.9 U	1.9 U
beta-BHC	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U
delta-BHC	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U
gamma-BHC (Lindane)	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	1.9 U	1.9 U	1.9 U
gamma-Chlordane	1.9 U	1.9 U	2 U	2.5 U	2.2 U	2 U	2 U	1.9 U	2 U	2 U	1.7 J	2 U	2 U	1.9 U	1.9 U	1.9 U
Total Metals (MG/KG)																
Aluminum	6,600	7,150	12,100	4,060	11,400	783	4,930	6,060	9,150	11,300	14,000	9,980	13,500	16,100	12,800	8,190
Antimony	0.45 UL	0.46 UL	0.53 B	0.6 UL	0.53 UL	0.46 UL	0.48 UL	0.46 UL	0.47 UL	0.47 UL	0.47 UL	0.47 UL	0.46 UL	0.45 UL	0.45 UL	0.45 UL
Arsenic	6.9	1.1 J	2.5	1.5 B	4.4	0.48 U	2.9	1.3 J	2.6	1.7 J	4.8	1.9 B	2 J	1.1 J	3	2.1 J
Barium	30.3 J	31 J	38.3 J	33.5 J	45.2 J	4.2 J	44.6 J	37.1 J	28.6 J	50.9	38.3 J	47	51.9	50.1	37.1 J	32.5 J
Beryllium	0.16 B	0.17 B	0.2 B	0.087 B	0.29 B	0.072 B	0.19 B	0.11 B	0.063 B	0.14 B	0.13 B	0.15 B	0.09 B	0.097 B	0.15 B	0.088 B
Cadmium	0.58 U	0.59 U	0.6 U	0.78 U	0.68 U	0.6 U	0.62 U	0.59 U	0.61 U	0.61 U	0.83 B	0.61 U	0.6 U	0.59 U	0.59 U	0.59 U
Calcium	129 J	102 J	76.2 J	1,180 J	2,030	9,060	99 J	293 J	146 J	263 J	167 J	236 J	196 J	223 J	172 J	143 J
Chromium	11.3	7.1	12.4	5.8 K	17.6	2.7 B	3.4	6.5	11.7	13.2	19.7	10.3	13.8	14.3	14.4	9.2
Cobalt	1.3 J	0.94 U	1.3 B	1.2 U	2.9 J	0.95 U	1.2 J	1.4 J	1.3 J	2 J	2.6 J	2.2 J	2.5 J	2.5 J	2.3 J	1.1 J
Copper	2.6 J	2 J	3.4 J	4.1 J	7.2	1.2 J	3.4 J	1.7 B	3.2 J	3.5 J	4.7 J	2.1 J	3.3 J	4 J	3.7 J	2.2 J
Cyanide	0.56 U	0.57 U	0.57 U	0.75 U	0.66 U	0.58 U	0.6 U	0.57 U	0.58 U	0.59 U	0.59 U	0.58 U	0.58 U	0.57 U	0.57 U	0.56 U
Iron	7,110	3,380	5,680	2,690	13,400	1,470	2,370	3,750	5,220	5,630	9,440	4,010	6,550	3,430	7,040	5,090

Appendix C
Subsurface Soil Analytical Results
St Juliens Creek Annex Background Investigation

Station ID	SJSBK-SB01	SJSBK-SB02	SJSBK-SB03	SJSBK-SB04		SJSBK-SB05	SJSBK-SB06	SJSBK-SB07	SJSBK-SB08	SJSBK-SB09	SJSBK-SB10	SJSBK-SB11	SJSBK-SB12	SJSBK-SB13	SJSBK-SB14	
Sample ID	SB01-001	SB02-001	SB03-001	SB04-001	SB04-001P	SB05-001	SB06-001	SB07-001	SB08-001	SB09-001	SB10-001	SB11-001	SB12-001	SB13-001	SB14-001	SB14-001P
Sample Date	02/12/01	02/14/01	02/09/01	02/12/01	02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01	02/13/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01
Chemical Name																
Lead	5.3	6	7.3	14	17.2	3.7	4.7	5.7	6.2	8	8.9	6.5	10.2	8.8	8	5.9
Magnesium	268 J	336 J	448 J	294 J	1,360	155 J	209 J	211 J	421 J	441 J	631 J	430 J	444 J	553 J	590 J	349 J
Manganese	4.6	10	9.1	9.3	40	17.2	12.1	6.3	9.1	8.3	12.2	7.8	7.1	8.5	11.3	7.2
Mercury	0.046 J	0.045 UL	0.048 J	0.077 J	0.084 J	0.051 J	0.13 B	0.095 B	0.1 B	0.094 B	0.09 B	0.046 U	0.088 B	0.09 B	0.087 B	0.085 B
Nickel	2.2 J	3.2 J	4.6 J	2.9 U	7.2 J	2.3 U	5.5 B	3.4 B	5.7 B	5.4 B	6.9 B	3 J	5.4 B	7.5 B	5 B	3.9 B
Potassium	219 J	120 U	218 B	175 J	1,020 J	122 U	126 U	180 B	289 B	194 B	409 B	221 J	367 B	310 B	395 B	119 U
Selenium	0.6 UL	0.62 U	0.62 U	0.81 UL	0.71 UL	0.62 UL	0.65 UL	0.62 UL	0.63 UL	0.64 UL	0.63 UL	0.63 UL	0.62 UL	0.61 UL	0.61 UL	0.61 UL
Silver	0.47 U	0.48 U	0.48 U	0.63 U	0.55 U	0.48 U	0.5 U	0.48 U	0.49 U	0.5 U	0.49 U	0.49 U	0.48 U	0.48 U	0.48 U	0.47 U
Sodium	32.7 B	34.2 B	33.1 B	243 J	443 J	66.1 J	40.1 J	51 J	42.1 J	82.1 J	42.4 J	112 B	46.1 J	58.1 J	44.7 J	36.9 J
Thallium	1.3 U	1.4 U	1.4 U	1.8 U	1.6 U	1.4 U	1.4 U	1.3 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.3 U	1.3 U	1.3 U
Vanadium	17.4	12.2	18.1	7.2 J	20.9	2.8 B	7.5 J	10.2 J	15	16.4	22.5	14.8	20.2	14.3	20.1	13.2
Zinc	3.4 J	8	8.6	29.8	35.7	7.7	11.7	3.8 J	5.9	6.2	9.5	7.1	7.2	8.3	9	5.8
Wet Chem (MG/KG)																
% Solids	89.4	87.6	87	67.1	76.2	86.7	83.7	87.8	85.7	84.6	85.3	85.9	86.8	88.4	88.2	88.7
TOC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix C
Subsurface Soil Analytical Results
St Juliens Creek Annex Background Investigation

Station ID	SJSBK-SB15	SJSBK-SB16	SJSBK-SB17	SJSBK-SB18	SJSBK-SB19	SJSBK-SB20	SJSBK-SB21	SJSBK-SB22	SJSBK-SB23	SJSBK-SB24		SJSBK-SB25	SJSBK-SB26	SJSBK-SB27	SJSBK-SB28	SJSBK-SB29
Sample ID	SB15-001	SB16-001	SB17-001	SB18-001	SB19-001	SB20-001	SB21-001	SB22-001	SB23-001	SB24-001	SB24-001P	SB25-001	SB26-001	SB27-001	SB28-001	SB29-001
Sample Date	02/13/01	02/13/01	02/13/01	02/12/01	02/12/01	02/12/01	02/09/01	02/07/01	02/08/01	02/07/01	02/07/01	02/08/01	02/08/01	02/08/01	02/09/01	02/09/01
Chemical Name																
SVOCs (UG/KG)																
Acenaphthene	74 U	75 U	77 U	80 U	78 U	80 U	46 J	110 U	95 U	110 U	110 U	110 U	110 U	130 U	120 U	150 U
Acenaphthylene	74 U	75 U	77 U	80 U	78 U	80 U	210	110 U	95 U	110 U	110 U	110 U	110 U	130 U	120 U	150 U
Anthracene	74 U	75 U	77 U	80 U	78 U	80 U	170 J	110 U	95 U	110 U	110 U	110 U	26 J	130 U	120 U	150 U
Benzo(a)anthracene	74 U	75 U	77 U	80 U	78 U	80 U	740	27 J	95 U	110 U	110 U	47 J	82 J	63 J	120 U	100 J
Benzo(a)pyrene	74 U	75 U	77 U	80 U	78 U	80 U	770	25 J	95 U	110 U	110 U	39 J	50 J	79 J	120 U	110 J
Benzo(b)fluoranthene	74 U	75 U	77 U	80 U	78 U	80 U	910	110 U	95 U	110 U	110 U	110 U	97 J	92 J	120 U	130 J
Benzo(g,h,i)perylene	74 U	75 U	77 U	80 U	78 U	80 U	620	110 U	95 U	110 U	110 U	35 J	55 J	160	120 U	94 J
Benzo(k)fluoranthene	74 U	75 U	77 U	80 U	78 U	80 U	700	110 U	95 U	110 U	110 U	30 J	58 J	69 J	120 U	100 J
Chrysene	74 U	75 U	77 U	80 U	78 U	80 U	980	35 J	95 U	110 U	110 U	53 J	110 J	87 J	120 U	150
Dibenz(a,h)anthracene	74 U	75 U	77 U	80 U	78 U	80 U	180 J	110 U	95 U	110 U	110 U	110 U	110 U	130 U	120 U	150 U
Fluoranthene	74 U	75 U	77 U	80 U	78 U	80 U	2,500	49 J	95 U	110 U	110 U	72 J	520	140	43 J	170
Fluorene	74 U	75 U	77 U	80 U	78 U	80 U	58 J	110 U	95 U	110 U	110 U	110 U	110 U	130 U	120 U	150 U
Indeno(1,2,3-cd)pyrene	74 U	75 U	77 U	80 U	78 U	80 U	560	110 U	95 U	110 U	110 U	26 J	43 J	75 J	120 U	82 J
Naphthalene	74 U	75 U	77 U	80 U	78 U	80 U	80 J	110 U	95 U	110 U	110 U	110 U	110 U	130 U	120 U	150 U
Phenanthrene	74 U	75 U	77 U	80 U	78 U	80 U	320	110 U	95 U	110 U	110 U	38 J	110 U	130 U	120 U	150 U
Pyrene	74 U	75 U	77 U	80 U	78 U	80 U	2,000	54 J	95 U	110 U	110 U	88 J	400	120 J	120 U	150
Pest/PCBs (UG/KG)																
4,4'-DDD	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	280	6.1	4.7 U	5.3 U	5.4 U	5.4 U	31	6.4 U	6.1 U	7.3 U
4,4'-DDE	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	140	17	4.7 U	5 J	3.4 J	3.4 J	58	6.4 U	6.1 U	7.3 U
4,4'-DDT	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	26	4.9 J	4.7 U	5.3 U	5.4 U	5.4 U	5.7	6.4 U	6.1 U	7.3 U
Aldrin	1.9 U	1.9 U	2 U	2 U	2 U	2 U	5.1 U	2.9 U	2.4 U	2.7 U	2.8 U	2.8 U	2.8 U	3.3 U	3.1 U	3.8 U
Dieldrin	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	9.9 U	5.6 U	4.7 U	5.3 U	5.4 U	5.4 U	5.5 U	6.4 U	6.1 U	7.3 U
Endosulfan I	1.9 U	1.9 U	2 U	2 U	2 U	2 U	8.4 J	2.9 U	2.4 U	2.7 U	2.8 U	2.8 U	2.8 U	3.3 U	3.1 U	3.8 U
Endosulfan II	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	9.9 U	5.6 U	4.7 U	5.3 U	5.4 U	5.4 U	5.5 U	6.4 U	6.1 U	7.3 U
Endosulfan sulfate	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	9.9 U	5.6 U	4.7 U	5.3 U	5.4 U	5.4 U	5.5 U	6.4 U	6.1 U	7.3 U
Endrin	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	9.9 U	5.6 U	4.7 U	5.3 U	5.4 U	5.4 U	5.5 U	6.4 U	6.1 U	7.3 U
Endrin aldehyde	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	9.9 U	5.6 U	4.7 U	5.3 U	5.4 U	5.4 U	5.5 U	6.4 U	6.1 U	7.3 U
Endrin ketone	3.7 U	3.7 U	3.8 U	4 U	3.9 U	4 U	9.9 U	5.6 U	4.7 U	5.3 U	5.4 U	5.4 U	5.5 U	6.4 U	6.1 U	7.3 U
Heptachlor	1.9 U	1.9 U	2 U	2 U	2 U	2 U	5.1 U	2.9 U	2.4 U	2.7 U	2.8 U	2.8 U	2.8 U	3.3 U	3.1 U	3.8 U
Heptachlor epoxide	1.9 U	1.9 U	2 U	2 U	2 U	2 U	5.1 U	2.9 U	2.4 U	2.7 U	2.8 U	2.8 U	2.8 U	3.3 U	3.1 U	3.8 U
Methoxychlor	19 U	19 U	20 U	20 U	20 U	20 U	51 U	29 U	24 U	27 U	28 U	28 U	28 U	33 U	31 U	38 U
Toxaphene	190 U	190 U	200 U	200 U	200 U	200 U	510 U	290 U	240 U	270 U	280 U	280 U	280 U	330 U	310 U	380 U
alpha-BHC	1.9 U	1.9 U	2 U	2 U	2 U	2 U	5.1 U	2.9 U	2.4 U	2.7 U	2.8 U	2.8 U	2.8 U	3.3 U	3.1 U	3.8 U
alpha-Chlordane	1.9 U	1.9 U	2 U	2 U	2 U	2 U	5.1 U	2.9 U	2.4 U	2.7 U	2.8 U	2.8 U	2.8 U	3.3 U	3.1 U	3.8 U
beta-BHC	1.3 J	1.9 U	2 U	2 U	2 U	2 U	5.1 U	2.9 U	2.4 U	2.7 U	2.8 U	2.8 U	2.8 U	3.3 U	3.1 U	3.8 U
delta-BHC	1.9 U	1.9 U	2 U	2 U	2 U	2 U	5.1 U	2.9 U	2.4 U	2.7 U	2.8 U	2.8 U	2.8 U	3.3 U	3.1 U	3.8 U
gamma-BHC (Lindane)	1.9 U	1.9 U	2 U	2 U	2 U	2 U	5.1 U	2.9 U	2.4 U	2.7 U	2.8 U	2.8 U	2.8 U	3.3 U	3.1 U	3.8 U
gamma-Chlordane	1.9 U	1.9 U	2 U	2 U	2 U	2 U	8.9	2.9 U	2.4 U	2.7 U	2.8 U	2.8 U	2.8 U	3.3 U	3.1 U	3.8 U
Total Metals (MG/KG)																
Aluminum	9,530	6,660	12,100	10,500	8,510	11,400	26,700	4,230	5,600	2,930	2,980	9,080	6,060	8,990	12,700	13,300
Antimony	0.44 UL	0.45 UL	0.46 UL	0.48 UL	0.47 UL	1.2 B	1.2 UL	0.68 UL	0.57 UL	0.64 UL	0.95 B	0.87 B	0.67 UJ	1.2 B	0.73 UL	1.1 B
Arsenic	4.7	1.5 J	1.4 J	3.6	1.6 B	2.2 J	23.6	3.6	2.9	2.9 J	2.9 J	5.2	2.3 J	7	7.5	9
Barium	27.8 J	18.4 J	53.9	52.6	44.3 J	59.3	57.1 J	19.4 J	10.5 J	5.8 J	6.4 J	25.5 J	20.3 J	58.2 J	24.9 J	32.6 J
Beryllium	0.091 B	0.18 B	0.17 B	0.3 B	0.2 B	0.23 B	2.4 J	0.36 B	0.15 B	0.13 B	0.14 B	0.76 B	0.22 B	0.73 B	0.73 B	0.85 B
Cadmium	0.58 U	0.82 B	0.6 U	0.62 U	0.61 U	0.63 U	1.6 U	0.88 U	0.74 U	0.84 U	0.85 U	1.1 B	0.87 U	1.1 B	0.95 U	1.2 U
Calcium	119 J	71.9 B	173 J	78.5 J	122 J	273 J	2,530 J	1,120 J	529 J	698 J	726 J	767 J	1,500 J	1,410 J	1,270 J	1,510 J
Chromium	13.4	7.1	15.3	14.1	9.5	12.4	40	6.1	8.4	5.2	5.8	11.8	7.8	17.4	22.9	27.1
Cobalt	1.3 J	1.7 B	1.6 B	2.7 J	1.4 J	1.3 J	16.4 J	2.3 B	1.2 U	1.3 U	1.3 U	43.9	1.4 U	9.9 J	8 J	9.8 J
Copper	3.4 J	1.1 B	5.4 J	4.2 J	2.2 J	0.48 U	64	10.2	5.1 J	10	17.3	10.5	10.5	63.5	11.8	21.3
Cyanide	0.55 U	0.56 U	0.58 U	0.6 U	0.59 U	0.6 U	1.5 U	0.84 U	0.72 U	0.8 U	0.82 U	0.81 U	0.83 U	0.97 U	0.92 U	1.1 U
Iron	6,060	7,310	4,480	17,900	5,120	6,670	36,200	2,740	5,400	4,290	5,820	9,690	3,310	21,700	22,400	23,100

Appendix C
Subsurface Soil Analytical Results
St Juliens Creek Annex Background Investigation

Station ID	SJSBK-SB15	SJSBK-SB16	SJSBK-SB17	SJSBK-SB18	SJSBK-SB19	SJSBK-SB20	SJSBK-SB21	SJSBK-SB22	SJSBK-SB23	SJSBK-SB24		SJSBK-SB25	SJSBK-SB26	SJSBK-SB27	SJSBK-SB28	SJSBK-SB29
Sample ID	SB15-001	SB16-001	SB17-001	SB18-001	SB19-001	SB20-001	SB21-001	SB22-001	SB23-001	SB24-001	SB24-001P	SB25-001	SB26-001	SB27-001	SB28-001	SB29-001
Sample Date	02/13/01	02/13/01	02/13/01	02/12/01	02/12/01	02/12/01	02/09/01	02/07/01	02/08/01	02/07/01	02/07/01	02/08/01	02/08/01	02/08/01	02/09/01	02/09/01
Chemical Name																
Lead	6.5	4.8	7.5	8.8	6.4	8.9	174	37.2	12.2	14.1	16.7	21.5	26.8	116	23	36.8
Magnesium	440 J	217 J	348 J	391 J	325 J	295 J	5,950	988 J	988 J	1,100 J	1,120 J	1,220 J	1,190 J	3,310	4,010	5,050
Manganese	9.4	4.5	6.6	7	9.2	7.6	303	22.7	14.7	14.6	17.4	29.2	17.8	101	173	158
Mercury	0.072 B	0.085 B	0.083 B	0.049 J	0.059 J	0.095 B	0.53 J	0.083 J	0.057 UL	0.064 J	0.065 UL	0.079 J	0.13 J	0.22	0.13 J	0.25
Nickel	4.8 B	2.2 U	3 J	2.4 U	3.1 J	5.1 J	31.3	6.1 J	4.1 J	3.2 U	4.1 J	48.7	3.5 J	21	12 J	14 J
Potassium	201 B	119 U	243 J	246 J	131 J	127 U	2,920 J	265 B	473 B	363 B	361 B	621 J	421 J	1,720 J	2,270	2,760
Selenium	0.6 UL	0.61 UL	0.62 UL	0.65 UL	0.63 UL	0.65 UL	3 J	1.1 J	0.77 U	0.87 U	0.99 J	0.88 U	0.9 U	1.7 J	0.99 UL	1.2 UL
Silver	0.47 U	0.47 UL	0.49 UL	0.5 U	0.49 U	0.51 U	1.5 J	0.71 U	0.6 U	0.68 U	0.69 U	0.68 J	0.7 U	0.82 U	0.77 U	1.3 J
Sodium	34.5 J	2.8 U	3.3 J	129 J	88.4 J	47.2 J	7,660	1,290 J	1,920	3,200	3,170	1,510 J	2,680	5,910	3,560 B	8,680
Thallium	1.3 U	1.3 U	1.4 U	1.4 U	1.4 U	1.4 U	3.5 U	2 U	1.7 U	1.9 U	1.9 U	1.9 U	2 U	2.3 U	2.2 U	2.6 U
Vanadium	15.4	9.5 J	16	22.4	14.6	17.3	55.3	13.2 J	11.4 J	9.4 J	8.9 J	14.6 J	14.5 J	29.6	25.1	32.5
Zinc	6.1	3.5 J	9.7	8.2	8.1	5.3	294	40.4	13.9	14.1	20.4	119	19.6	185	73.7	82.2
Wet Chem (MG/KG)																
% Solids	90.3	88.7	86.5	83.5	85.4	83.2	33.3	59.3	69.9	62.2	61.2	61.6	60.1	51.5	54.5	45
TOC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix C
Subsurface Soil Analytical Results
St Juliens Creek Annex Background Investigation

Station ID	SJSBK-SB30	SJSBK-SB31	SJSBK-SB32	SJSBK-SB33	SJSBK-SB34		SJSBK-SB35	SJSBK-SB36	SJSBK-SB37	SJSBK-SB38	SJSBK-SB39	SJSBK-SB40	SJSBK-SB41	SJSBK-SB42	SJSBK-SB43	SJSBK
Sample ID	SB30-001	SB31-001	SB32-001	SB33-001	SB34-001	SB34-001P	SB35-001	SB36-001	SB37-001	SB38-001	SB39-001	SB40-001	SB41-001	SB42-001	SB43-001	SB44-001
Sample Date	02/08/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01
Chemical Name																
SVOCs (UG/KG)																
Acenaphthene	110 U	79 U	21 J	79 U	79 U	76 U	78 U	78 U	79 U	81 U	91 U	84 U	100 U	110 U	30 J	95 U
Acenaphthylene	110 J	79 U	81 U	79 U	79 U	76 U	78 U	78 U	79 U	81 U	91 U	84 U	53 J	65 J	160	78 J
Anthracene	550	79 U	81 U	79 U	79 U	76 U	78 U	78 U	79 U	81 U	91 U	84 U	72 J	78 J	150	69 J
Benzo(a)anthracene	910	79 U	81 U	79 U	27 B	51 J	18 B	78 U	46 J	81 U	28 B	84 U	260	300	730	340
Benzo(a)pyrene	550	79 U	81 U	79 U	26 J	48 J	78 U	78 U	43 J	81 U	91 U	84 U	250	290	610	300
Benzo(b)fluoranthene	610	79 U	81 U	79 U	79 U	30 J	78 U	78 U	57 J	81 U	91 U	84 U	340	420	910	390
Benzo(g,h,i)perylene	370 J	79 U	81 U	79 U	23 J	36 J	23 J	78 U	33 J	81 U	91 U	84 U	250	310	630	310
Benzo(k)fluoranthene	430	79 U	81 U	79 U	17 J	32 J	78 U	78 U	36 J	81 U	91 U	84 U	250	320	680	300
Chrysene	1,100	79 U	81 U	79 U	36 J	65 J	18 J	78 U	64 J	81 U	26 J	84 U	450	510	1,100	480
Dibenz(a,h)anthracene	140	79 U	81 U	79 U	79 U	76 U	78 U	78 U	79 U	81 U	91 U	84 U	130	150	350	160
Fluoranthene	2,500	79 U	81 U	79 U	44 J	81	78 U	78 U	64 J	81 U	31 J	84 U	300	290	1,100	380
Fluorene	110 U	79 U	81 U	79 U	79 U	76 U	78 U	78 U	79 U	81 U	91 U	84 U	100 U	110 U	24 J	95 U
Indeno(1,2,3-cd)pyrene	350	79 U	81 U	79 U	79 U	29 J	78 U	78 U	31 J	81 U	91 U	84 U	240	300	630	300
Naphthalene	18 J	79 U	24 J	79 U	79 U	76 U	78 U	78 U	79 U	81 U	91 U	84 U	17 J	29 J	45 J	26 J
Phenanthrene	70 J	79 U	81 U	79 U	32 J	61 J	78 U	78 U	79 U	81 U	91 U	84 U	84 J	99 J	140	150
Pyrene	1,900	79 U	81 U	79 U	68 J	120	78 U	78 U	69 J	81 U	30 J	84 U	240	250	800	330
Pest/PCBs (UG/KG)																
4,4'-DDD	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	6	4 U	4.5 U	4.1 U	5 U	5.3 U	5.2 U	4.7 U
4,4'-DDE	5.5 U	3.9 U	4 U	3.9 U	3.9 U	5	3.8 U	3.8 U	70	4 U	4.5 U	4.1 U	5 U	5.3 U	11	4.7 U
4,4'-DDT	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	12	4 U	4.5 U	4.1 U	5 U	5.3 U	12	4.7 U
Aldrin	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U
Dieldrin	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	3.9 U	4 U	4.5 U	4.1 U	5 U	5.3 U	5.2 U	4.7 U
Endosulfan I	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U
Endosulfan II	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	3.9 U	4 U	4.5 U	4.1 U	5 U	5.3 U	5.2 U	4.7 U
Endosulfan sulfate	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	3.9 U	4 U	4.5 U	4.1 U	5 U	5.3 U	5.2 U	4.7 U
Endrin	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	3.9 U	4 U	4.5 U	4.1 U	5 U	5.3 U	5.2 U	4.7 U
Endrin aldehyde	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	3.9 U	4 U	4.5 U	4.1 U	5 U	5.3 U	5.2 U	4.7 U
Endrin ketone	5.5 U	3.9 U	4 U	3.9 U	3.9 U	3.8 U	3.8 U	3.8 U	3.9 U	4 U	4.5 U	4.1 U	5 U	5.3 U	5.2 U	4.7 U
Heptachlor	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U
Heptachlor epoxide	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U
Methoxychlor	28 U	20 U	21 U	20 U	20 U	19 U	20 U	20 U	20 U	21 U	23 U	21 U	26 U	27 U	27 U	24 U
Toxaphene	280 U	200 U	210 U	200 U	200 U	190 U	200 U	200 U	200 U	210 U	230 U	210 U	260 U	270 U	270 U	240 U
alpha-BHC	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U
alpha-Chlordane	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U
beta-BHC	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U
delta-BHC	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U
gamma-BHC (Lindane)	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U
gamma-Chlordane	2.8 U	2 U	2.1 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2.1 U	2.3 U	2.1 U	2.6 U	2.7 U	2.7 U	2.4 U
Total Metals (MG/KG)																
Aluminum	5,170	7,400	2,900	11,600	13,800	12,000	2,910	13,300	13,400	20,700	1,780	6,290	14,500	17,400	13,100	15,400
Antimony	0.67 UL	0.47 UL	0.49 UL	0.47 UL	0.73 B	0.46 UL	0.47 UL	0.66 B	0.57 B	0.49 UL	0.55 UL	0.5 UL	1.2 J	0.83 J	0.63 UL	0.78 J
Arsenic	3.4	1.4 J	0.56 J	2.1 J	2.1 J	2.6 L	1.6 J	6	3.5 L	3.8 L	0.85 J	3.5	11.9	10.4	11.6	9.7
Barium	12.4 J	23.7 J	14.8 J	36.9 J	43.8 J	42.8 J	17.4 J	33.7 J	57.4	53.5	4.7 J	14.2 J	47.9 J	44.7 J	36.4 J	36.1 J
Beryllium	0.3 B	0.078 B	0.066 B	0.18 B	0.24 B	0.21 B	0.14 B	0.24 B	0.24 B	0.28 B	0.18 B	0.69 B	0.43 B	0.58 B	0.4 B	0.92 B
Cadmium	0.87 U	0.62 U	0.63 U	0.61 U	0.61 U	0.6 U	0.61 U	0.61 U	0.62 U	0.63 U	1.2 B	0.65 U	0.78 U	0.83 U	1.2 B	1.1 B
Calcium	551 J	391 J	241 J	399 J	1,100 J	1,090 J	728 J	210 J	826 J	696 J	54,900	105,000	328 J	648 J	537 J	3,970
Chromium	10.5	9.3	4.6	11.8	16.3	14.9	6.4	21.4	14.6	31	3.7 B	11.2	30.1	34	27.6	30.3
Cobalt	4.3 J	0.97 U	1.1 J	2.1 J	2 J	1.8 J	1.1 J	2.8 J	2.7 J	3.8 J	2.6 B	5.7 B	6.4 B	7.8 J	6.3 B	12.1 J
Copper	5.7 J	3.4 J	0.54 J	0.55 J	4.9 J	5.3 J	6.2	6.3	9.9	5.8 J	1.6 B	3.7 B	29	29.5	21.6	17.2
Cyanide	0.83 U	0.59 U	0.61 U	0.59 U	0.59 U	0.57 U	0.58 U	0.58 U	0.59 U	0.61 U	0.68 U	0.63 U	0.75 U	0.8 U	0.79 U	0.71 U
Iron	8,570	4,500	3,090	9,570	6,330	6,010	3,570	11,300	9,530	13,300	4,230	12,000	32,300	27,100	24,600	31,000

Appendix C
Subsurface Soil Analytical Results
St Juliens Creek Annex Background Investigation

Station ID	SJSBK-SB30	SJSBK-SB31	SJSBK-SB32	SJSBK-SB33	SJSBK-SB34		SJSBK-SB35	SJSBK-SB36	SJSBK-SB37	SJSBK-SB38	SJSBK-SB39	SJSBK-SB40	SJSBK-SB41	SJSBK-SB42	SJSBK-SB43	SJSBK
Sample ID	SB30-001	SB31-001	SB32-001	SB33-001	SB34-001	SB34-001P	SB35-001	SB36-001	SB37-001	SB38-001	SB39-001	SB40-001	SB41-001	SB42-001	SB43-001	SB44-001
Sample Date	02/08/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/12/01	02/13/01	02/13/01	02/13/01	02/13/01
Chemical Name																
Lead	14.1	5.5	3	6.9	10	11.3	31.4	7.7	21	9.8	3.1	6.1	88.7	81.3	65	34.3
Magnesium	1,830	409 J	370 J	615 J	854 J	584 J	321 J	814 J	579 J	1,180 J	644 J	2,170	2,660	3,100	2,210	3,790
Manganese	65.4	10.7	12.2	13	18.2	18.3	13.8	18.9	15.6	24.2	47.3	164	93.7	102	70.8	181
Mercury	0.24	0.075 B	0.097 B	0.097 B	0.11 B	0.11 B	0.087 B	0.072 B	0.12 B	0.086 B	0.11 B	0.11 B	0.34	0.39	0.49	0.4
Nickel	6.2 J	2.9 J	2.6 J	4 J	4.8 J	5.2 J	3.8 J	6.2 J	4.3 J	7.7 J	2.7 U	6.8 J	9.5 J	11.8 J	10.2 J	12.8 K
Potassium	1,070 J	125 U	192 B	162 B	412 B	389 B	222 B	541 B	283 B	531 B	365 J	1,060 J	3,710	2,280	2,050	2,180
Selenium	0.9 UL	0.64 UL	0.66 UL	0.64 UL	0.74 B	0.62 UL	0.63 UL	0.63 UL	0.64 UL	0.66 UL	0.74 UL	0.68 UL	1.4 J	0.86 UL	0.86 UL	1 J
Silver	0.7 U	0.5 U	0.51 U	0.5 U	0.5 U	0.48 U	0.49 U	0.49 U	0.5 U	0.51 U	0.57 UL	0.53 UL	0.63 UL	0.67 UL	0.67 UL	0.6 UL
Sodium	3,940	46.9 J	82.9 J	36.9 B	64.4 J	56.4 J	29 B	61.9 J	60.1 J	50.5 J	308 J	1,260	258 J	86.5 J	72.2 J	105 J
Thallium	2 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.6 U	1.5 U	1.8 U	1.9 U	1.9 U	1.7 U
Vanadium	13 J	12.9	5.7 J	18.1	21.7	19.2	19	25.3	26.3	47.4	4.6 J	15	34.6	33.4	32.3	36.4
Zinc	27.9	9.6	7.4	9.4	12.1	11.3	59.2	11.4	21.3	15.9	9.6 B	30.9	61	58.9	41.2	82.6
Wet Chem (MG/KG)																
% Solids	60.1	84.6	82.2	84.7	84.9	87.5	85.8	86	84.3	82.1	73.2	79.8	66.3	62.7	63.1	70.4
TOC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix C
Subsurface Soil Analytical Results
St Juliens Creek Annex Background Investigation

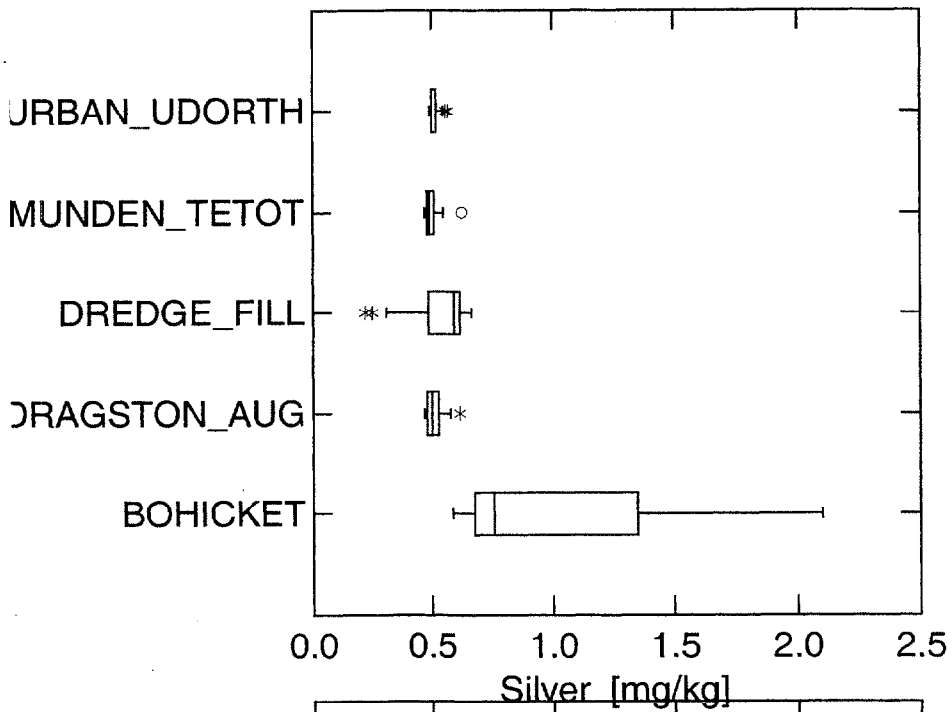
Station ID	.-SB44		SJSBK-SB45		SJSBK-SB46		SJSBK-SB47		SJSBK-SB48		SJSBK-SB49		SJSBK-SB50	
Sample ID	SB44-001P		SB45-001		SB46-001		SB47-001		SB48-001		SB49-001		SB50-001	
Sample Date	02/13/01		02/13/01		02/13/01		02/14/01		02/14/01		02/14/01		02/14/01	
Chemical Name														
SVOCs (UG/KG)														
Acenaphthene	95	U	43	J	75	U	95	U	79	U	20	J	1,200	
Acenaphthylene	53	J	29	J	75	U	45	J	25	J	83	J	73	J
Anthracene	81	J	98	J	75	U	44	J	79	U	68	J	2,400	
Benzo(a)anthracene	250		440		34	J	100		74	J	280		4,400	
Benzo(a)pyrene	240		380		36	J	110		66	J	380		4,200	
Benzo(b)fluoranthene	360		360		41	J	260		88		390		3,500	
Benzo(g,h,i)perylene	210		240		34	J	100		50	J	190		3,300	
Benzo(k)fluoranthene	280		320		33	J	150		54	J	320		2,800	
Chrysene	400		490		43	J	270		94		420		4,600	
Dibenz(a,h)anthracene	97		67	J	75	U	63	J	20	J	92	J	1,000	
Fluoranthene	280		650		39	J	140		100		600		11,000	
Fluorene	95	U	39	J	75	U	95	U	79	U	19	J	1,400	
Indeno(1,2,3-cd)pyrene	200		220		30	J	120		55	J	210		2,700	
Naphthalene	24	J	67	J	14	J	95	U	79	U	32	J	570	
Phenanthrene	120		450		26	J	35	J	79	U	83	J	9,700	
Pyrene	230		860		38	J	90	J	74	J	730		9,200	
Pest/PCBs (UG/KG)														
4,4'-DDD	4.7	U	5	U	3.7	U	4.7	U	3.9	U	4.7	U	4.5	U
4,4'-DDE	4.7	U	5	U	3.7	U	4.7	U	3.9	U	4.7	U	4.5	U
4,4'-DDT	4.7	U	5	U	3.7	U	4.7	U	3.9	U	4.7	U	4.5	U
Aldrin	2.4	U	2.6	U	1.9	U	2.4	U	2	U	2.4	U	2.3	U
Dieldrin	4.7	U	5	U	3.2	J	4.7	U	3.9	U	4.7	U	3.5	J
Endosulfan I	2.4	U	2.6	U	1.9	U	2.4	U	2	U	2.4	U	2.3	U
Endosulfan II	4.7	U	5	U	3.7	U	4.7	U	3.9	U	4.7	U	4.5	U
Endosulfan sulfate	4.7	U	5	U	3.7	U	4.7	U	3.9	U	4.7	U	4.5	U
Endrin	4.7	U	5	U	3.7	U	4.7	U	3.9	U	4.7	U	4.5	U
Endrin aldehyde	4.7	U	5	U	3.7	U	4.7	U	3.9	U	4.7	U	4.5	U
Endrin ketone	4.7	U	5	U	3.7	U	4.7	U	3.9	U	4.7	U	4.5	U
Heptachlor	2.4	U	2.6	U	1.9	U	2.4	U	2	U	2.4	U	2.3	U
Heptachlor epoxide	2.4	U	2.6	U	1.9	U	2.4	U	2	U	2.4	U	2.3	U
Methoxychlor	24	U	26	U	19	U	24	U	20	U	24	U	23	U
Toxaphene	240	U	260	U	190	U	240	U	200	U	240	U	230	U
alpha-BHC	2.4	U	2.6	U	1.9	U	2.4	U	2	U	2.4	U	2.3	U
alpha-Chlordane	2.4	U	2.6	U	1.9	U	2.4	U	2	U	2.4	U	2.3	U
beta-BHC	2.4	U	2.6	U	1.9	U	2.4	U	2	U	2.4	U	2.3	U
delta-BHC	2.4	U	2.6	U	1.9	U	2.4	U	2	U	2.4	U	2.3	U
gamma-BHC (Lindane)	2.4	U	2.6	U	1.9	U	2.4	U	2	U	2.4	U	2.3	U
gamma-Chlordane	2.4	U	2.6	U	1.9	U	2.4	U	2	U	2.4	U	2.3	U
Total Metals (MG/KG)														
Aluminum	14,500		2,430		1,820		10,900		7,680		2,330		5,940	
Antimony	0.75	J	0.7	J	0.45	UL	0.57	UL	0.89	J	0.57	UL	0.54	UL
Arsenic	9.8		5.1		2.8		11.8		6.6		3.3		4.8	
Barium	37.7	J	18.4	J	10.2	J	28	J	20.9	J	9.5	J	16.4	J
Beryllium	1.1	B	0.23	B	0.28	B	0.36	B	0.25	B	0.13	B	0.63	B
Cadmium	0.74	U	0.8	U	0.58	U	0.74	U	0.62	U	0.74	U	0.71	U
Calcium	5,040		453	J	2,250		439	J	352	J	1,680		773	J
Chromium	28.6		6.8		5.1	L	27	L	19.3	L	5.3	L	12	L
Cobalt	13.1	J	2.7	B	2.2	J	6.1	J	4.4	J	1.4	J	10.6	J
Copper	19.9		44.6		26.7		15.9		15.1		7.4		12.9	
Cyanide	0.71	U	0.76	U	0.56	U	0.71	U	0.59	U	0.72	U	0.68	U
Iron	29,400		7,170		5,760		27,200		17,100		6,550		9,510	

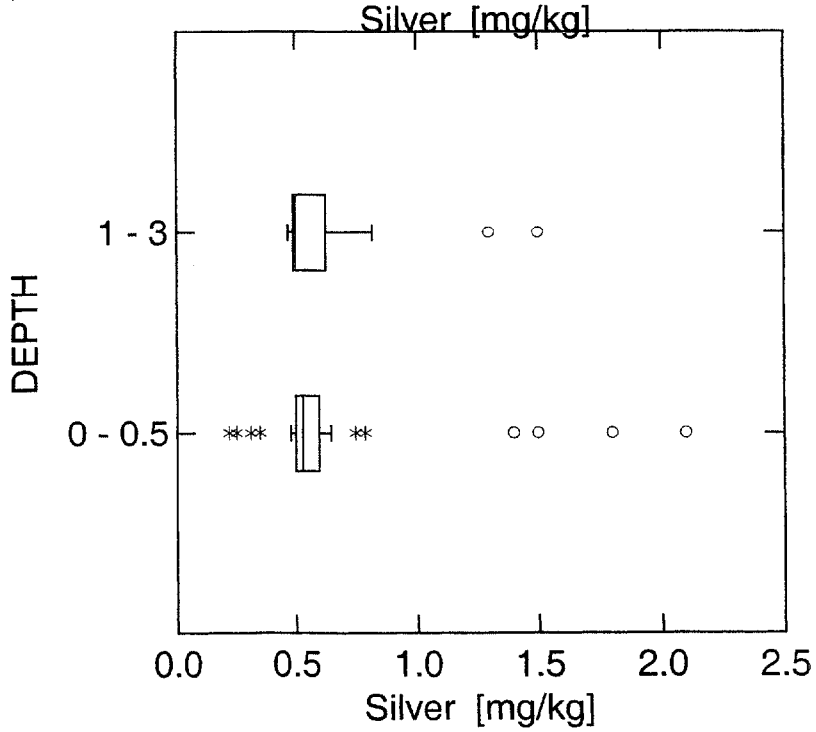
Appendix C
Subsurface Soil Analytical Results
St Juliens Creek Annex Background Investigation

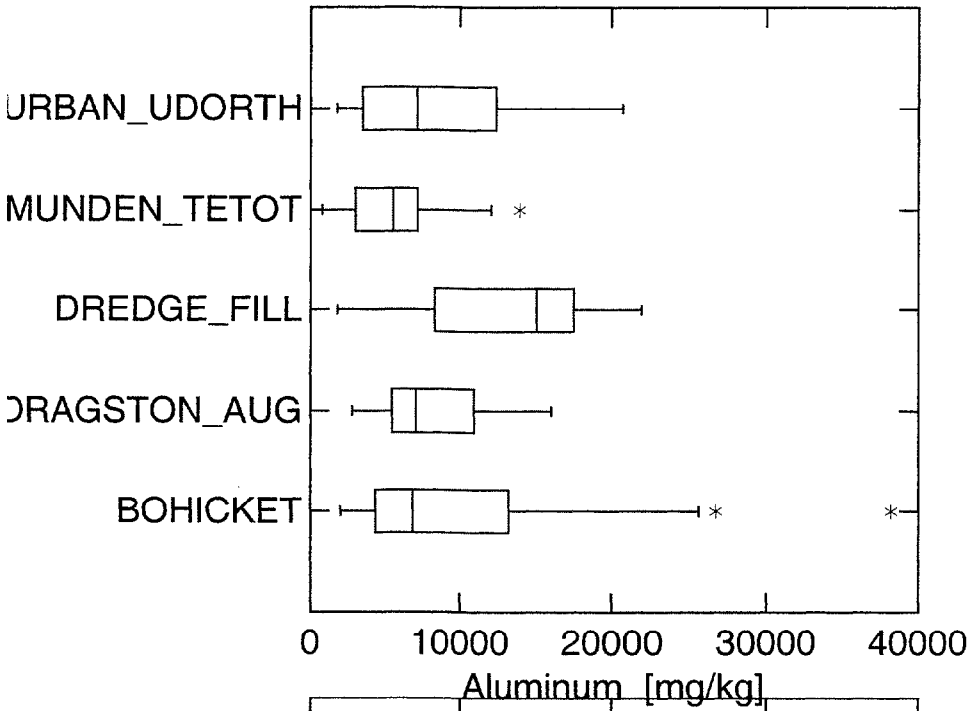
Station ID	.-SB44		SJSBK-SB45		SJSBK-SB46		SJSBK-SB47		SJSBK-SB48		SJSBK-SB49		SJSBK-SB50	
Sample ID	SB44-001P		SB45-001		SB46-001		SB47-001		SB48-001		SB49-001		SB50-001	
Sample Date	02/13/01		02/13/01		02/13/01		02/14/01		02/14/01		02/14/01		02/14/01	
Chemical Name														
Lead	40.4		48.8		35.5	L	34.9	L	24.4	L	26.2	L	19.9	L
Magnesium	3,380		512	J	440	J	2,680		1,800		567	J	1,470	
Manganese	215		29.7		46.3		97		61.1		33		72.9	
Mercury	0.3	B	0.69		0.33		0.4		0.13		0.25		0.29	
Nickel	15.7	K	3	U	2.4	J	10.4	J	4.7	J	3.3	J	14	K
Potassium	2,040		579	J	277	J	2,380		1,720		273	J	814	J
Selenium	0.97	J	0.83	UL	0.61	UL	0.99	J	1.4	L	1.3	J	0.73	UL
Silver	0.6	UL	0.64	UL	0.47	U	0.6	U	0.5	U	0.6	U	0.57	U
Sodium	102	J	3.8	U	42.1	J	101	J	79.7	J	45.2	J	118	J
Thallium	1.7	U	1.8	U	1.3	U	1.7	U	1.4	U	1.7	U	1.6	U
Vanadium	31.4		9.9	J	5.8	J	28.9		16.5		6.7	J	14.4	
Zinc	86.5		20.6		22.2		48.3		34.1		16.8		84.6	
Wet Chem (MG/KG)														
% Solids	70.6		65.4		89.1		70.2		84.2		69.9		73.6	
TOC	NA		NA		NA		NA		NA		NA		NA	
pH	NA		NA		NA		NA		NA		NA		NA	

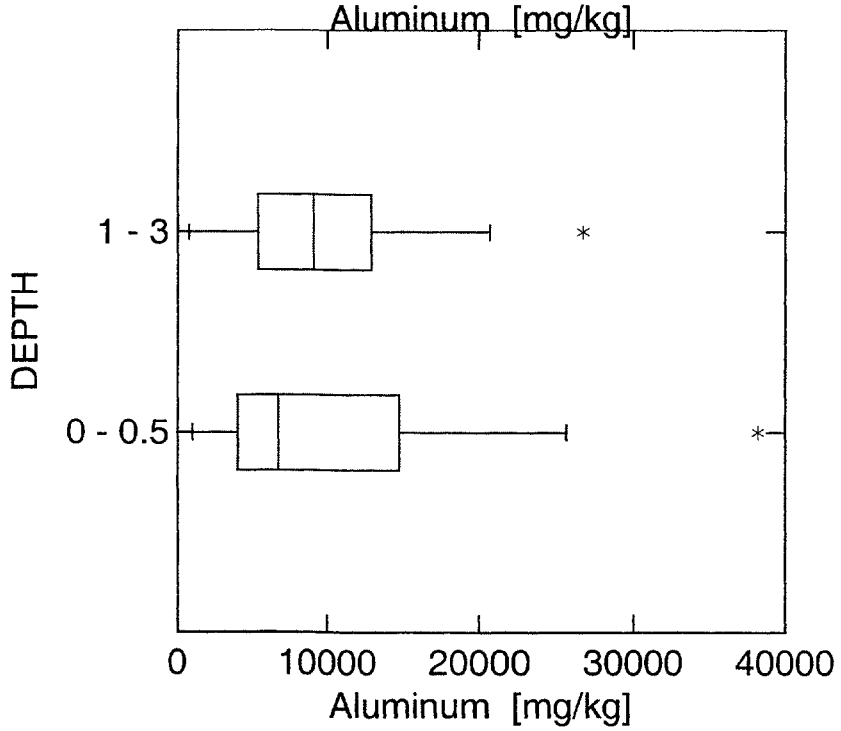
Appendix D

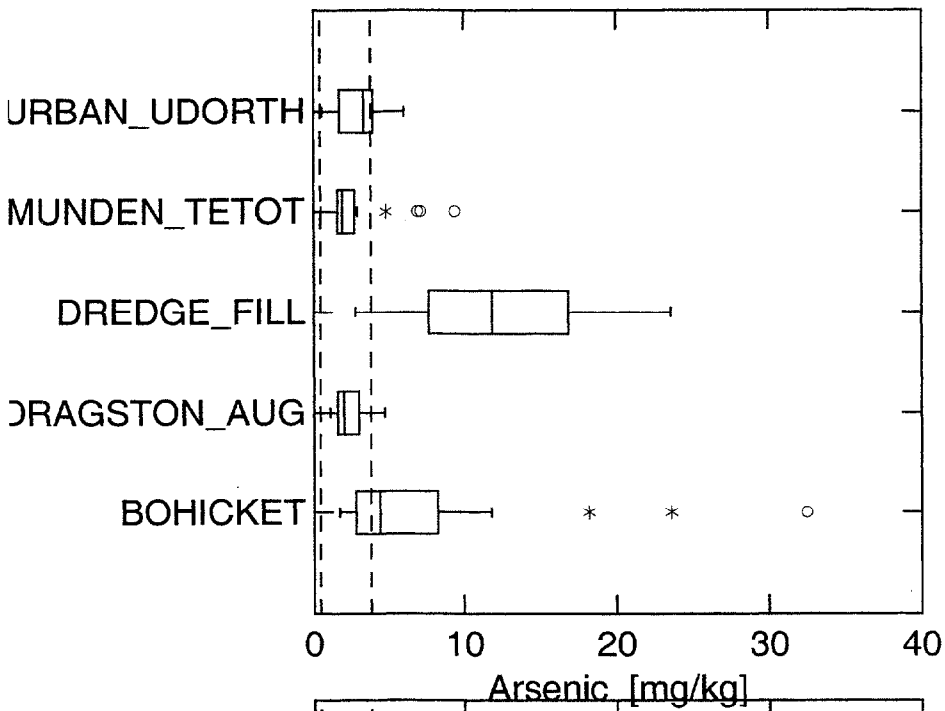
Boxplots for Soils Background Data

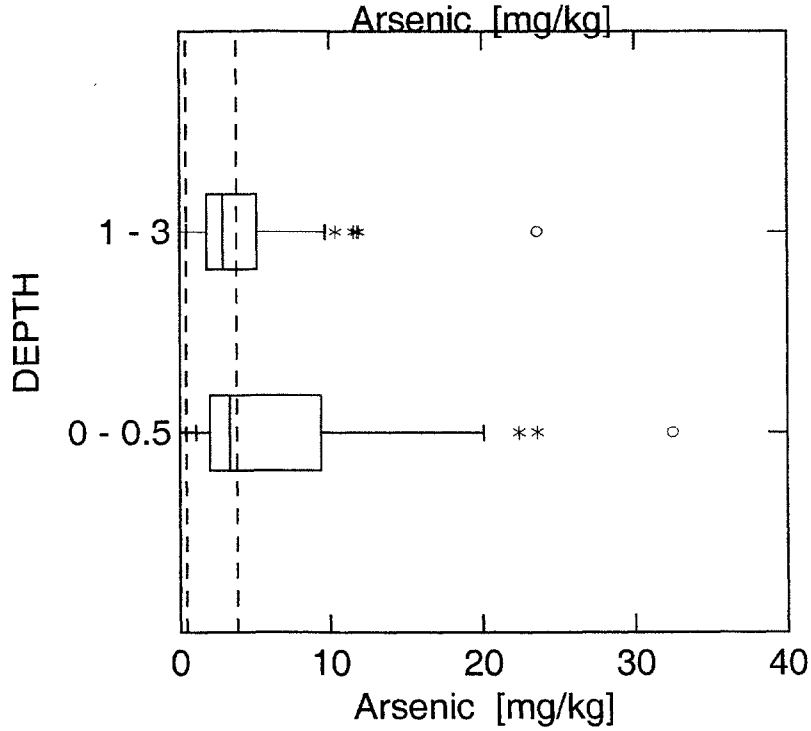

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0.0
0.5
1.0
1.5
2.0
2.5
Silver [mg/kg]

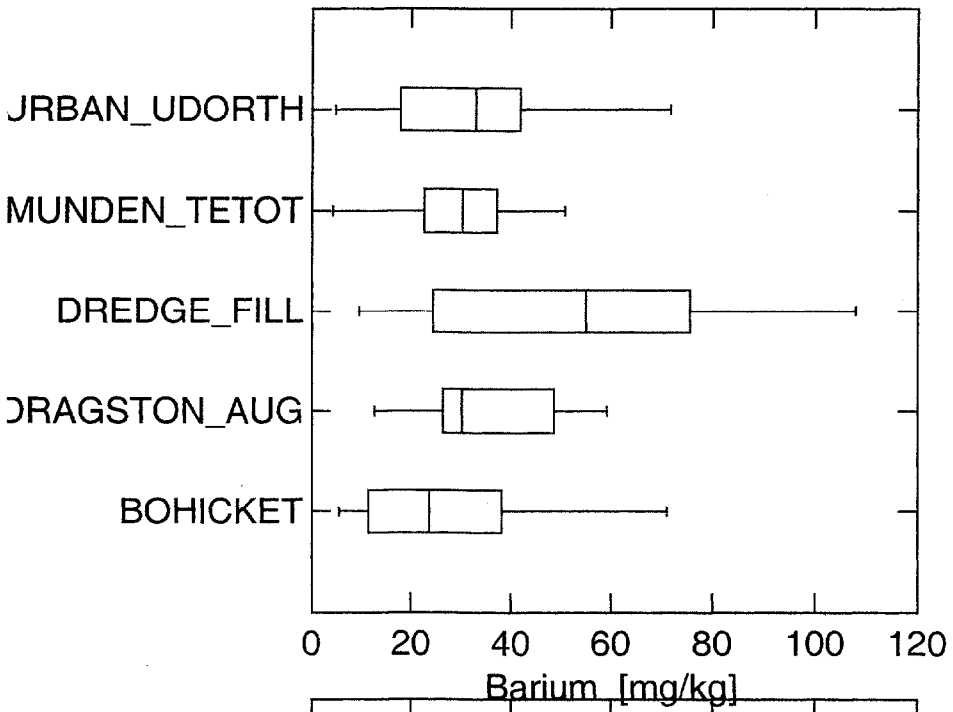

DEPTH
1 - 3
0 - 0.5
0.0
0.5
1.0
1.5
2.0
2.5
Silver [mg/kg]

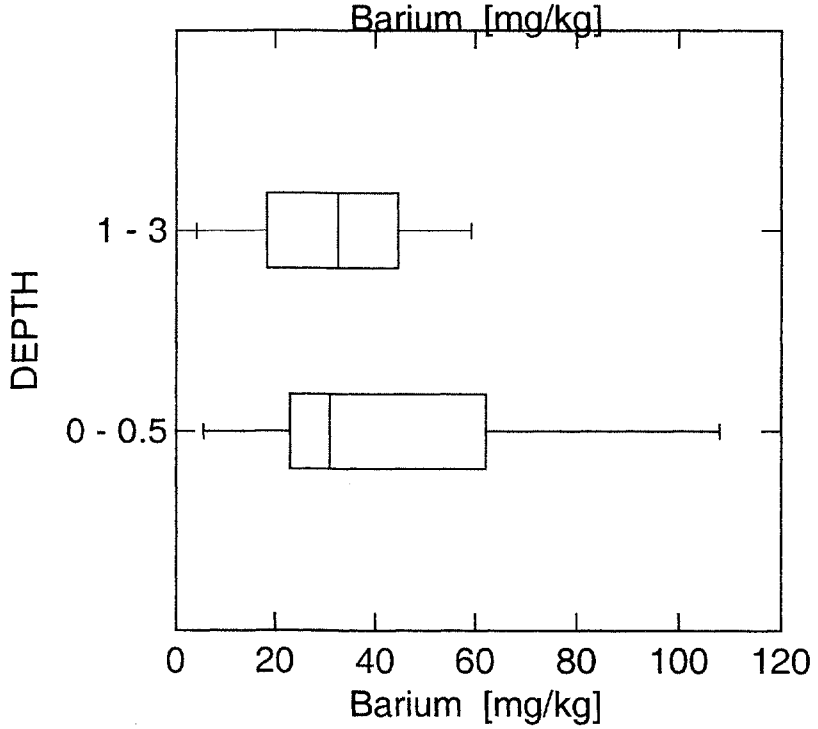

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
10000
20000
30000
40000
Aluminum [mg/kg]

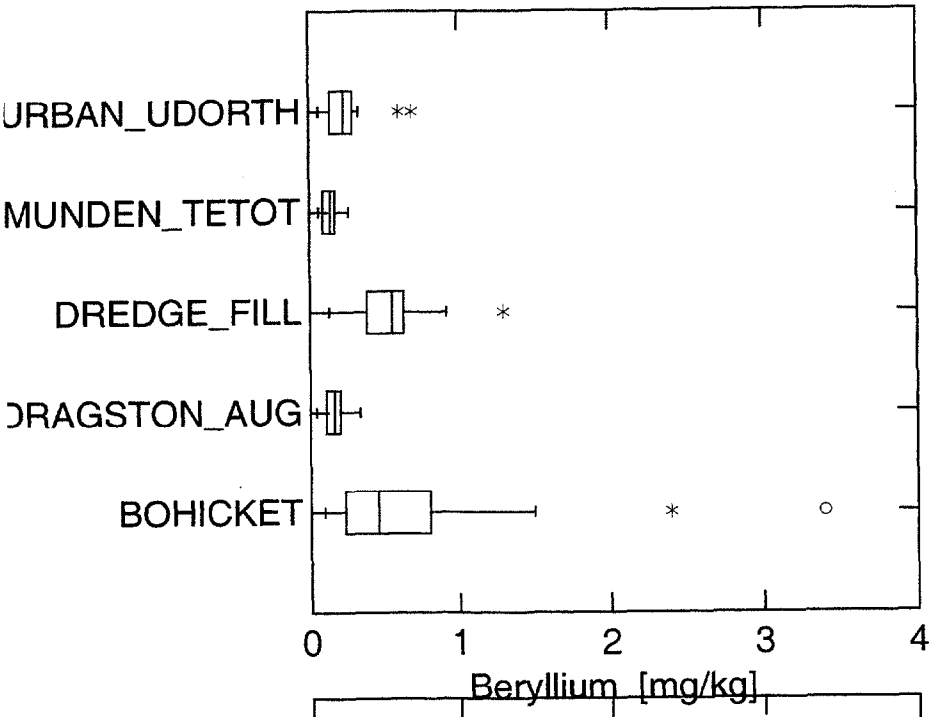

DEPTH
1 - 3
0 - 0.5
0
10000
20000
30000
40000
Aluminum [mg/kg]

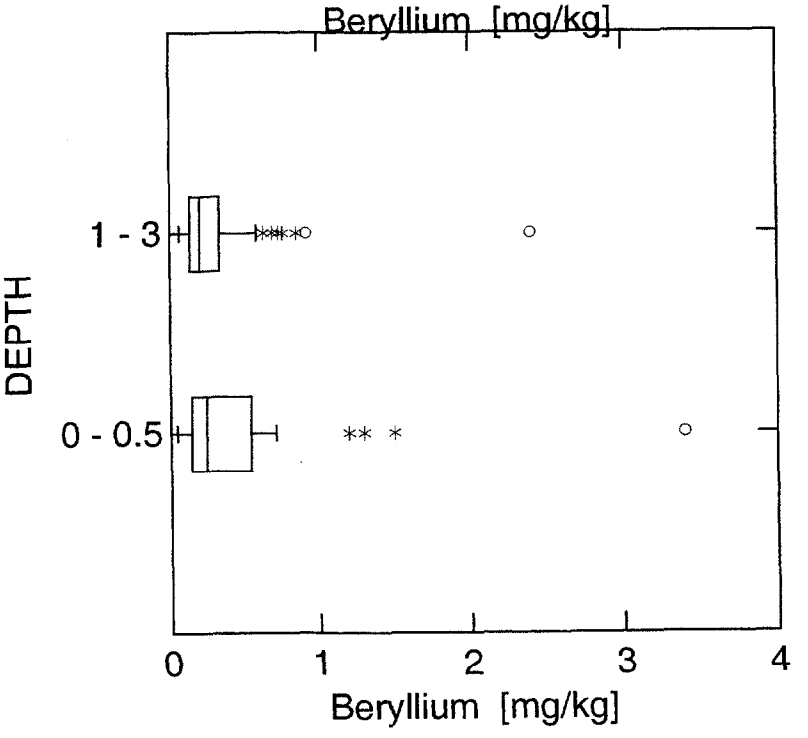

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
10
20
30
40
Arsenic [mg/kg]

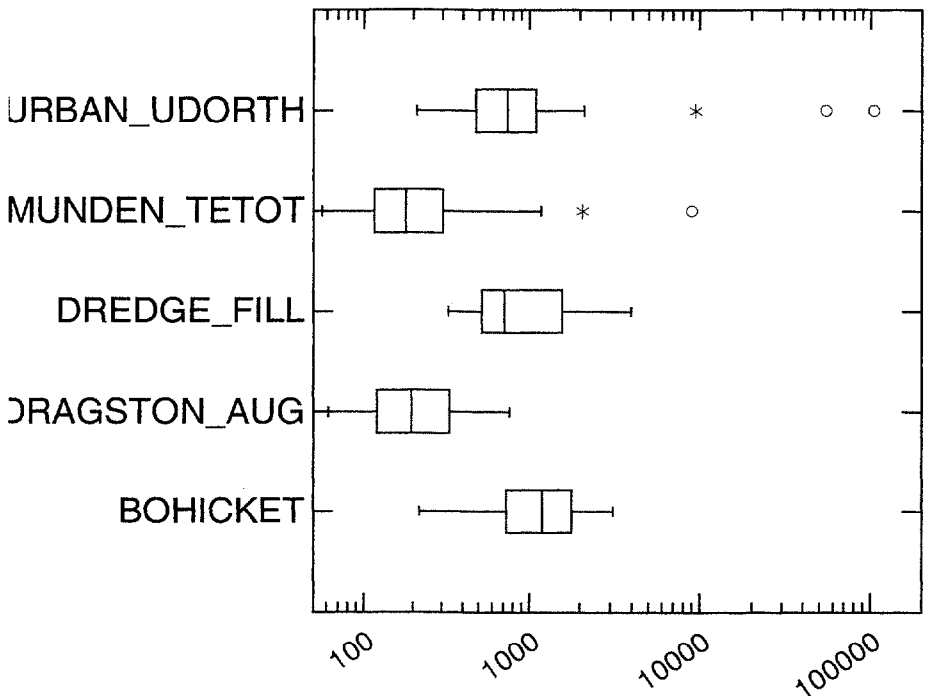

DEPTH
1 - 3
0 - 0.5
0
10
20
30
40
Arsenic [mg/kg]

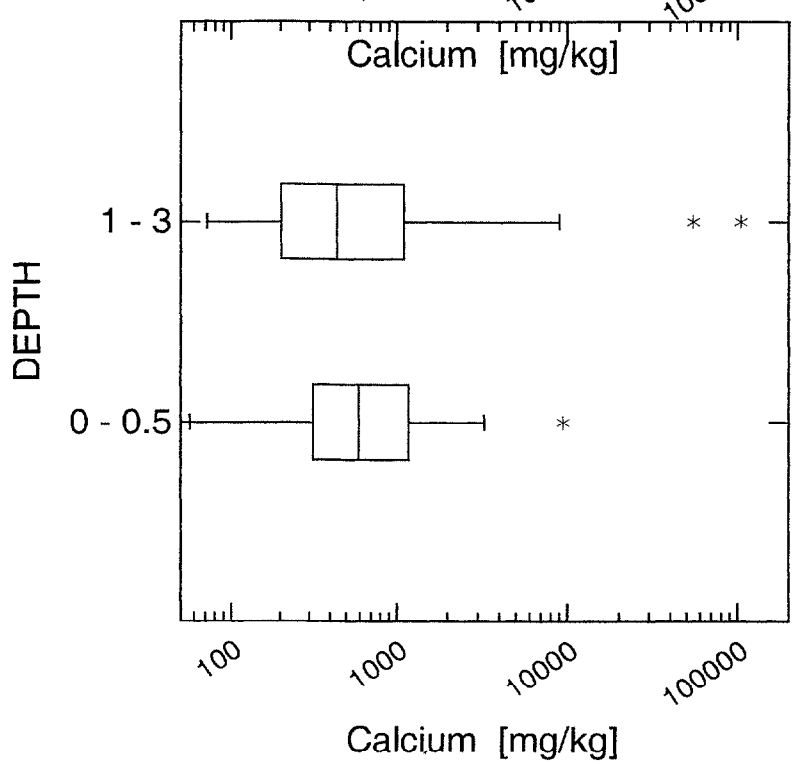

JRBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
20
40
60
80
100
120
Barium [mg/kg]

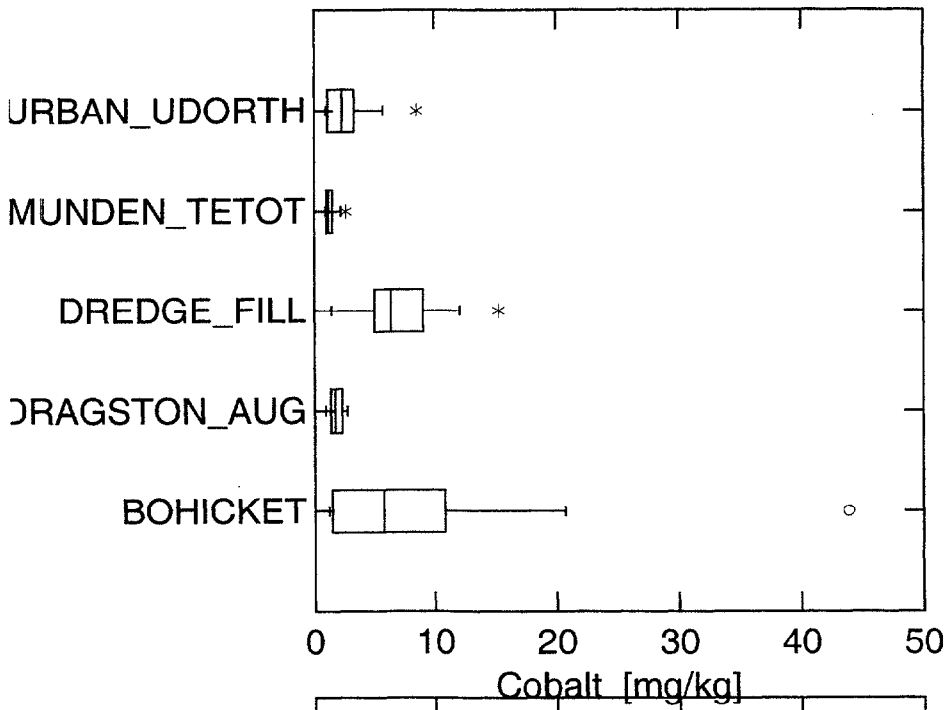

DEPTH
1 - 3
0 - 0.5
0
20
40
60
80
100
120
Barium [mg/kg]

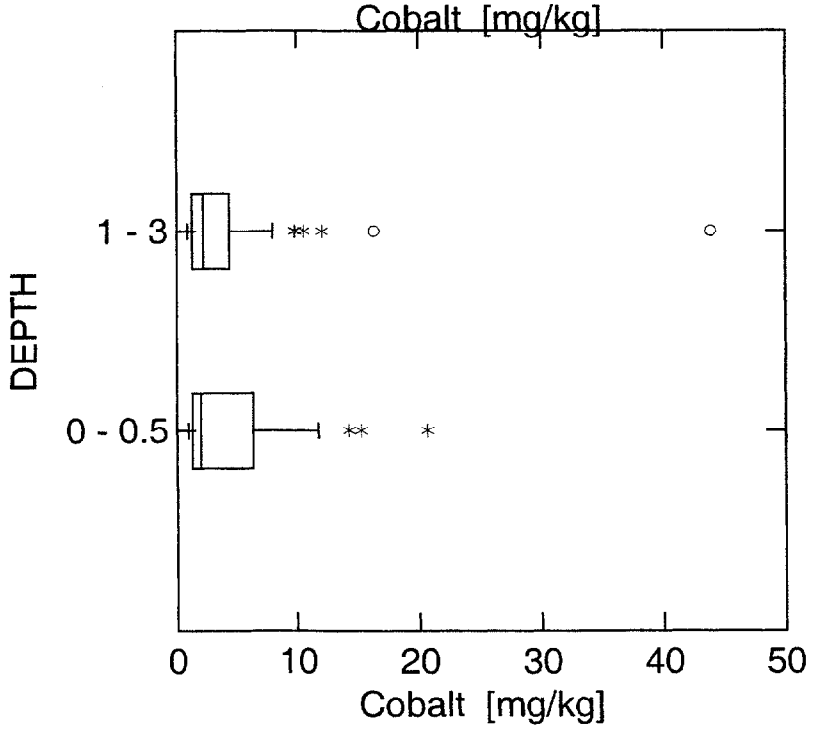

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
1
2
3
4
Beryllium [mg/kg]

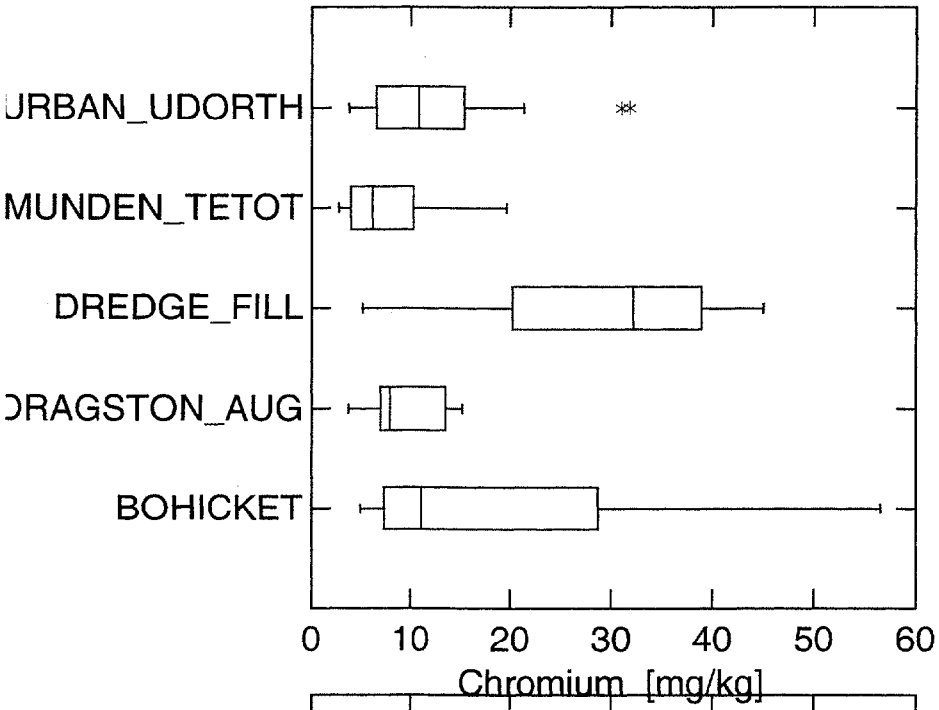

DEPTH
1 - 3
0 - 0.5
0
1
2
3
4
Beryllium [mg/kg]

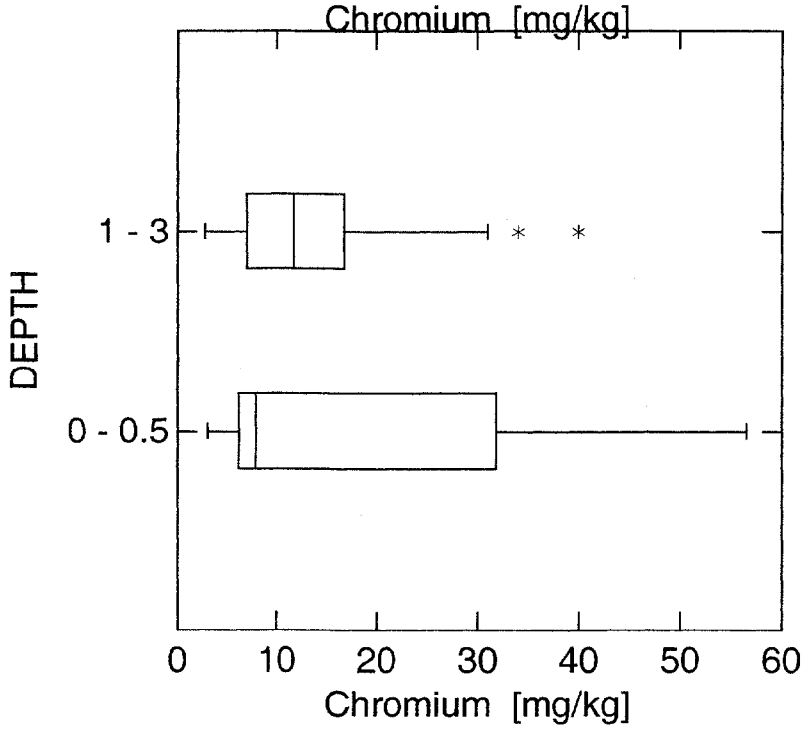

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
100
1000
10000
100000
Calcium [mg/kg]

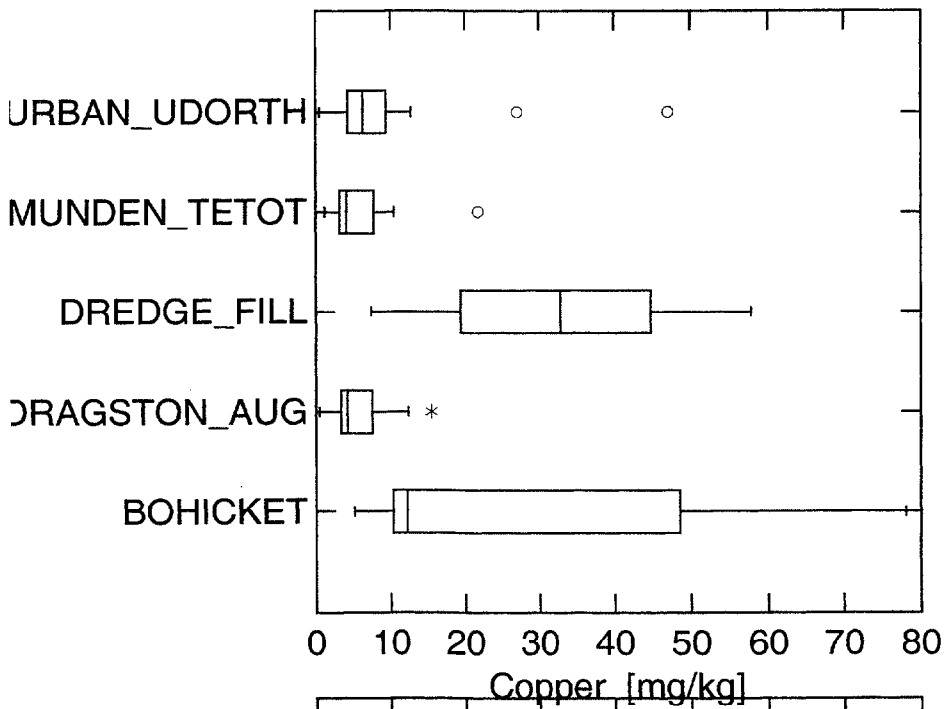

DEPTH
1 - 3
0 - 0.5
100
1000
10000
100000
Calcium [mg/kg]

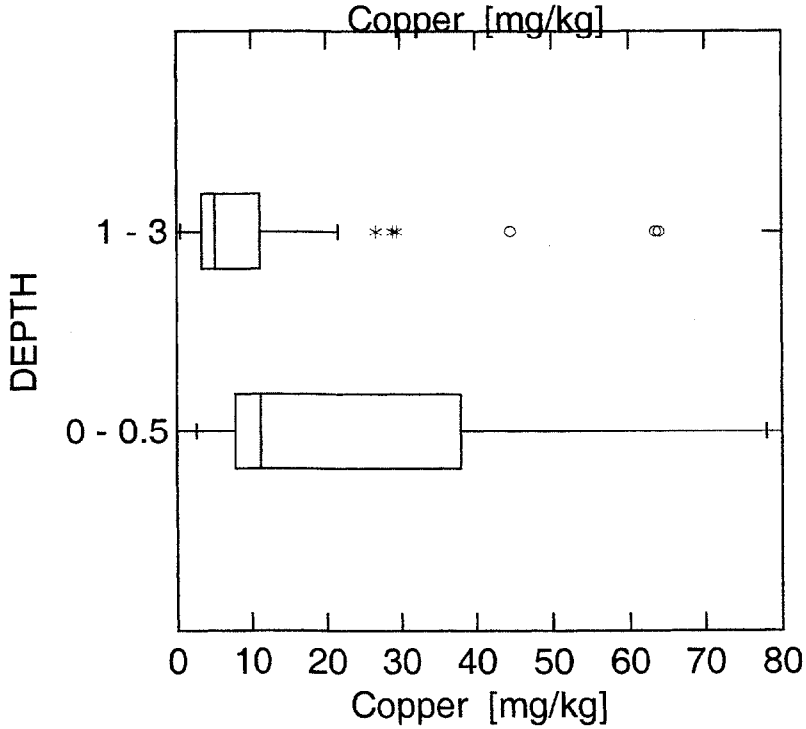

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
10
20
30
40
50
Cobalt [mg/kg]

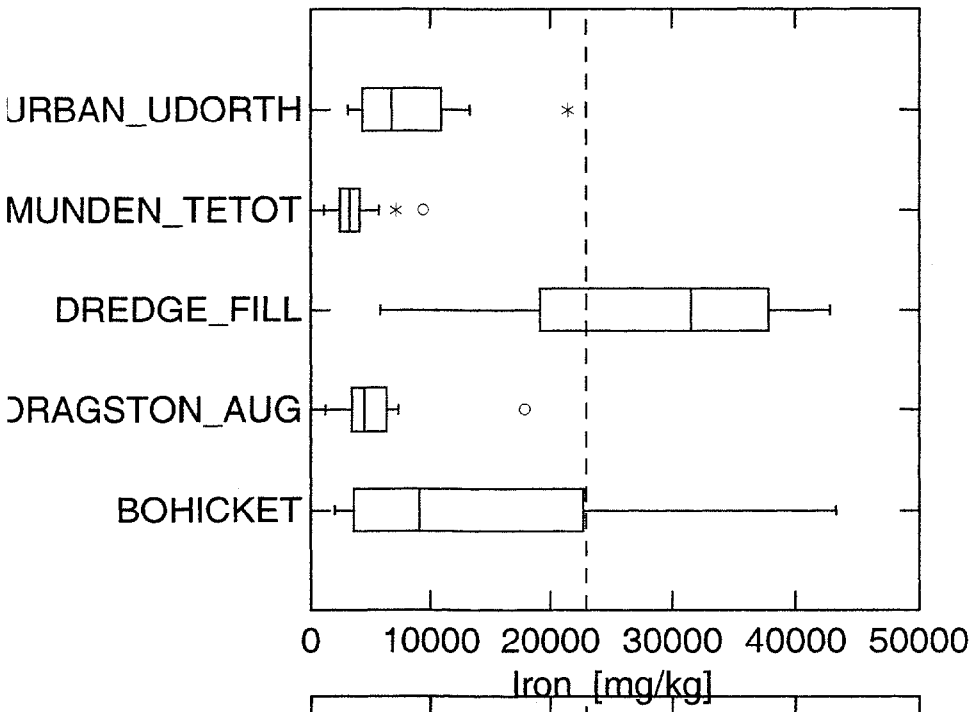

DEPTH
1 - 3
0 - 0.5
0
10
20
30
40
50
Cobalt [mg/kg]

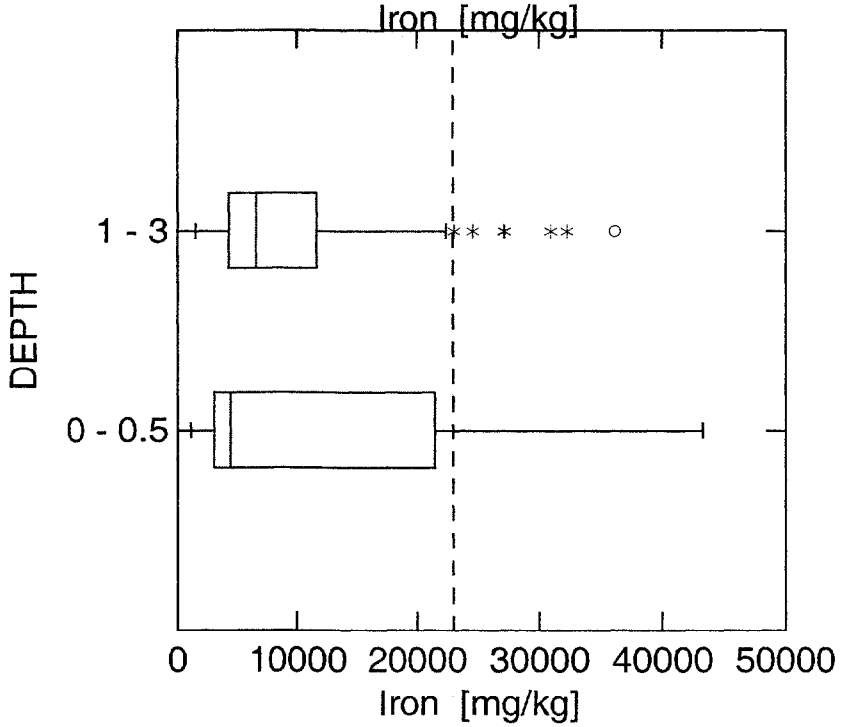

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
10
20
30
40
50
60
Chromium [mg/kg]

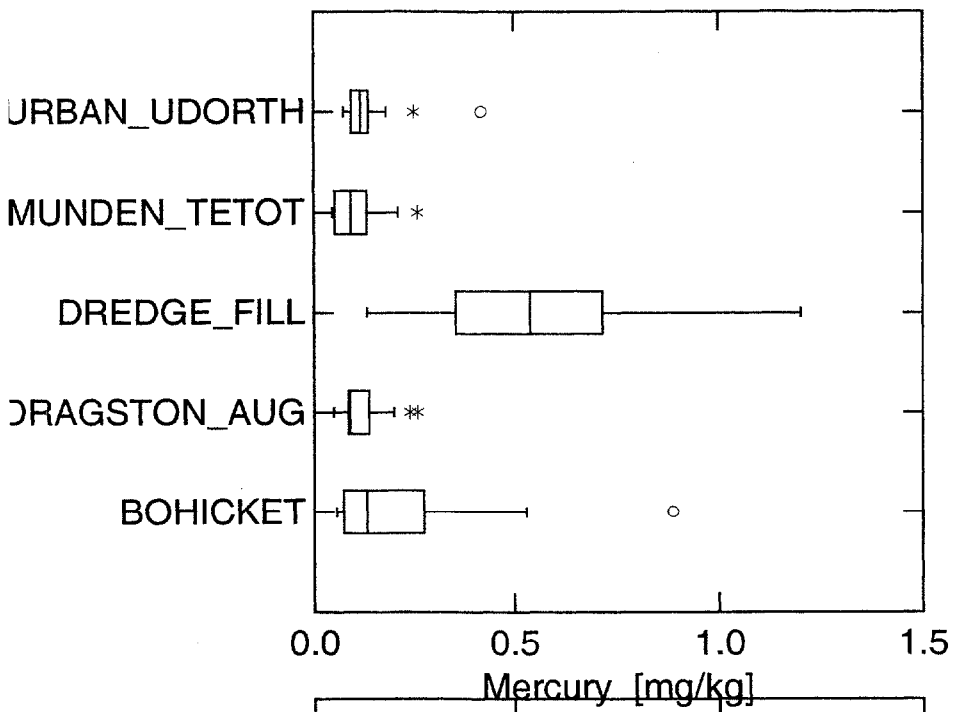

DEPTH
1 - 3
0 - 0.5
0
10
20
30
40
50
60
Chromium [mg/kg]

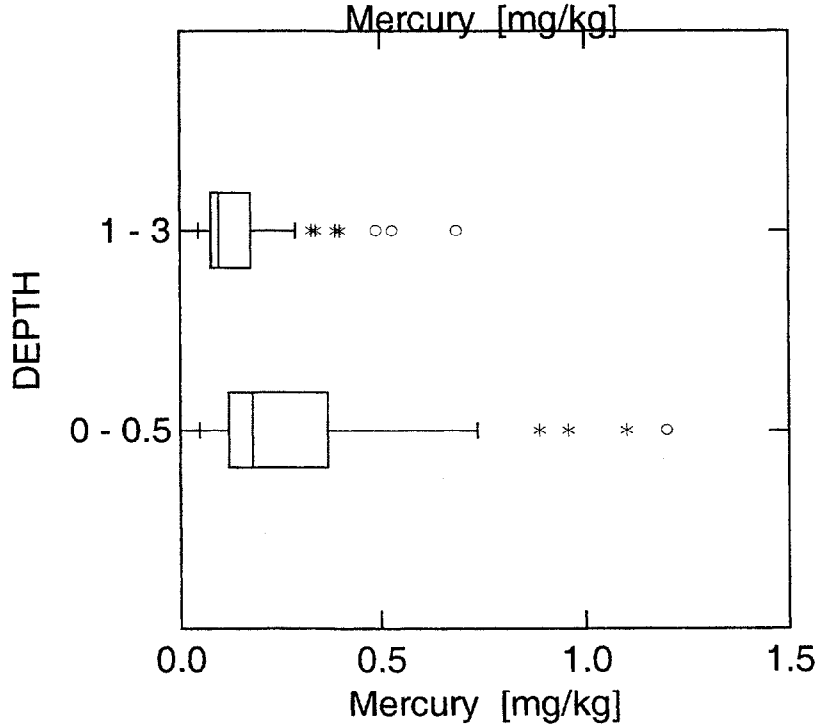

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0 10 20 30 40 50 60 70 80
Copper [mg/kg]

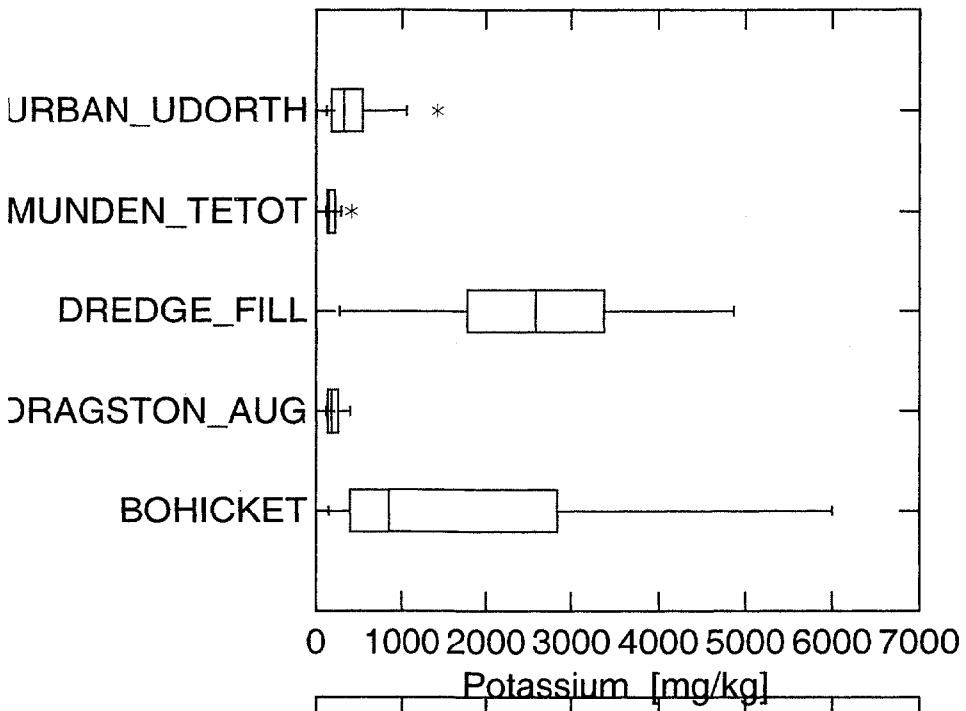

DEPTH
1 - 3
0 - 0.5
0 10 20 30 40 50 60 70 80
Copper [mg/kg]

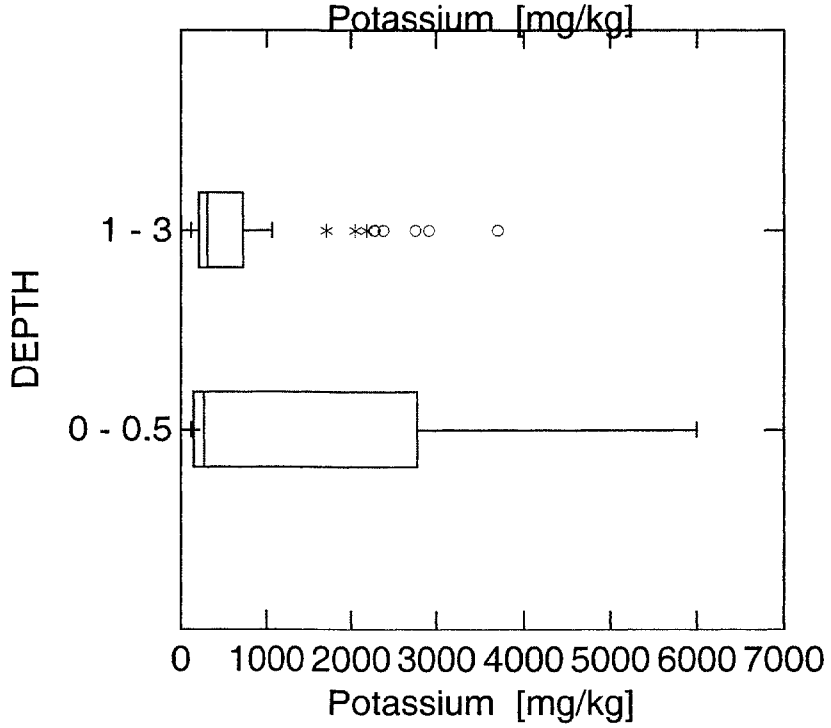

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
10000
20000
30000
40000
50000
Iron [mg/kg]

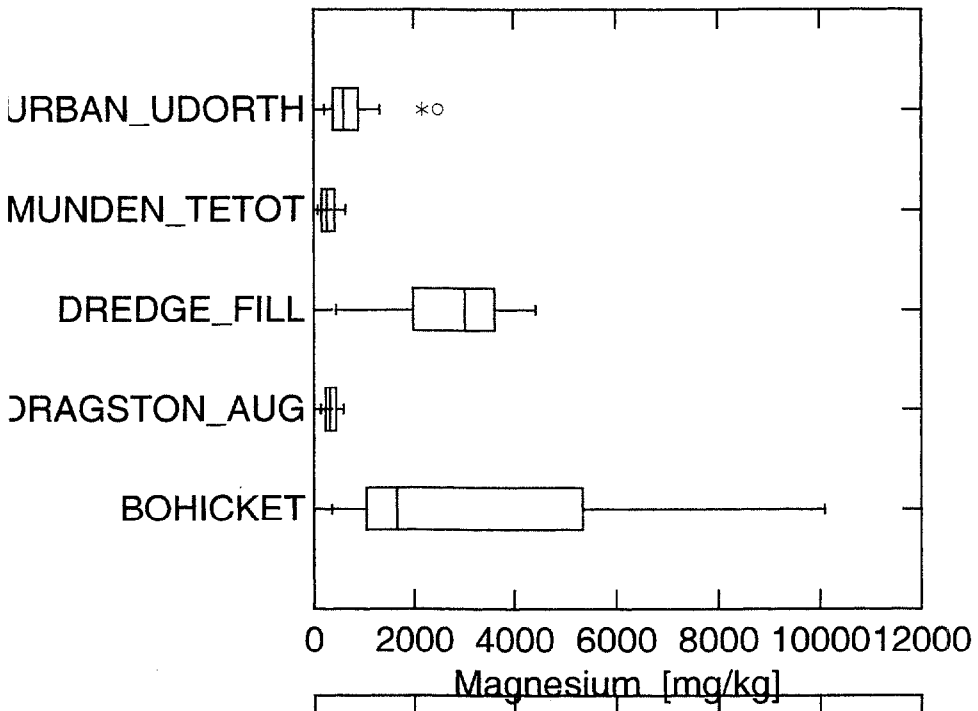

DEPTH
1 - 3
0 - 0.5
0
10000
20000
30000
40000
50000
Iron [mg/kg]

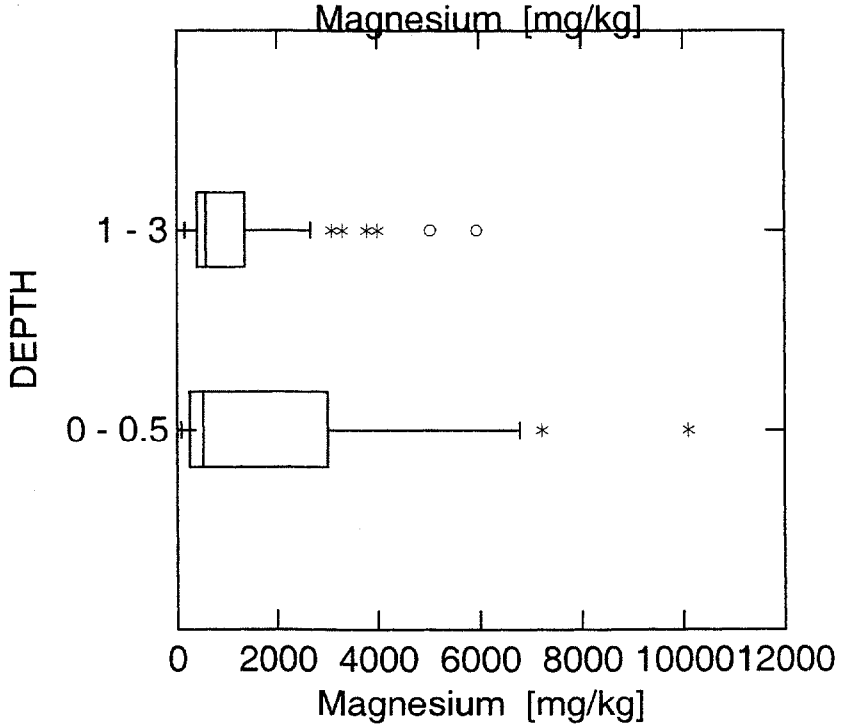

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0.0
0.5
1.0
1.5
Mercury [mg/kg]

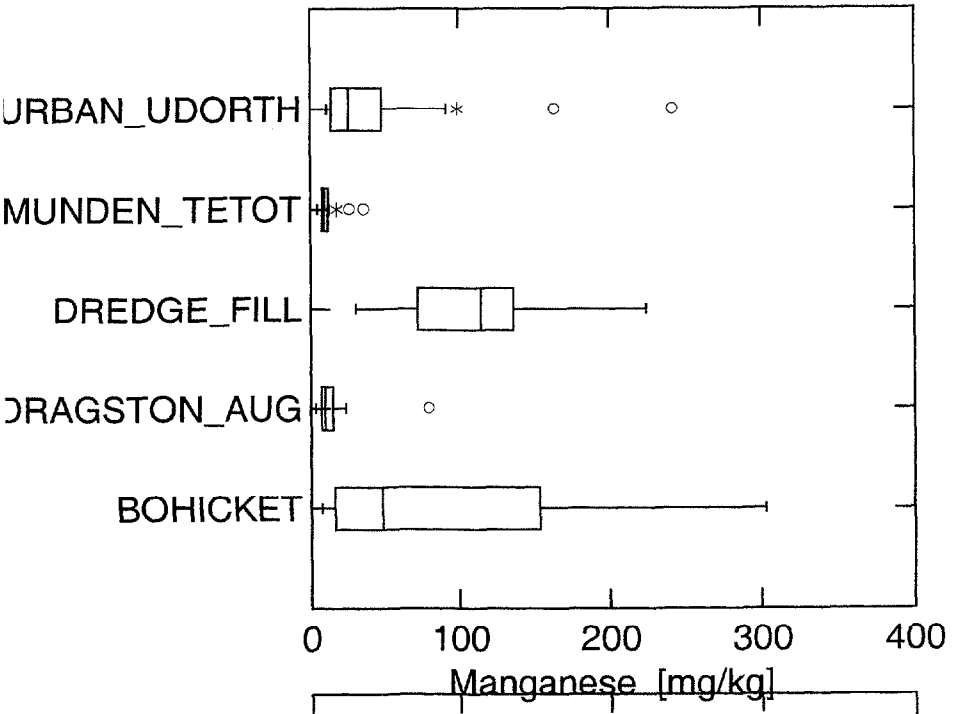

DEPTH
1 - 3
0 - 0.5
0.0
0.5
1.0
1.5
Mercury [mg/kg]

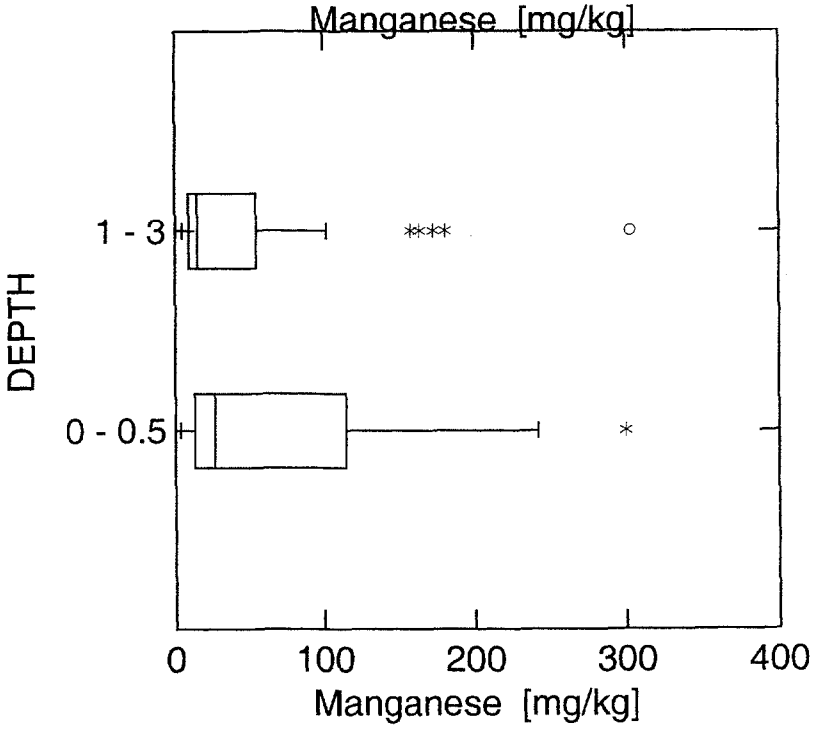

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0 1000 2000 3000 4000 5000 6000 7000
Potassium [mg/kg]

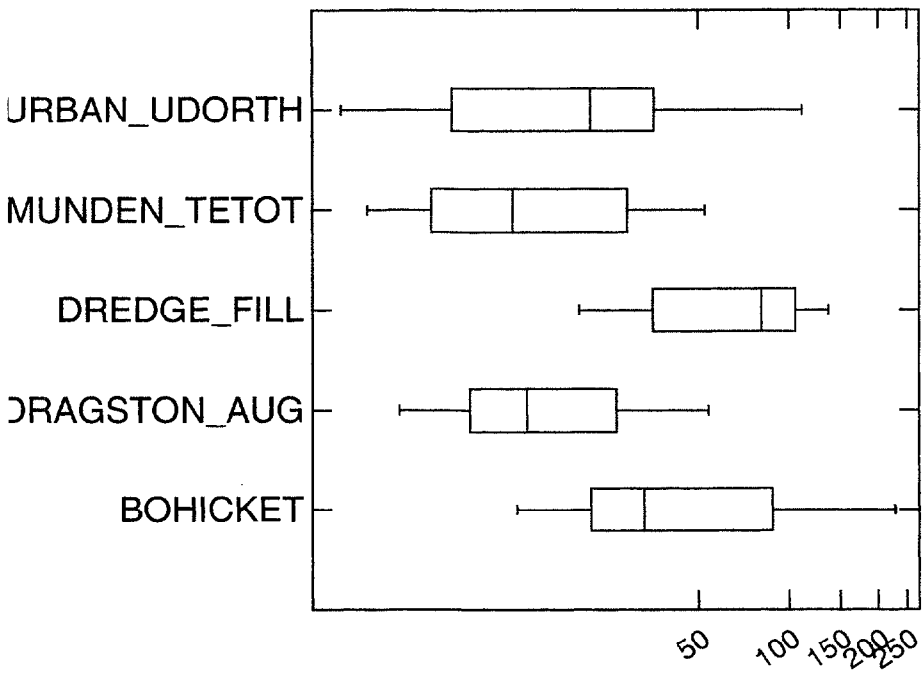

DEPTH
1 - 3
0 - 0.5
0 1000 2000 3000 4000 5000 6000 7000
Potassium [mg/kg]

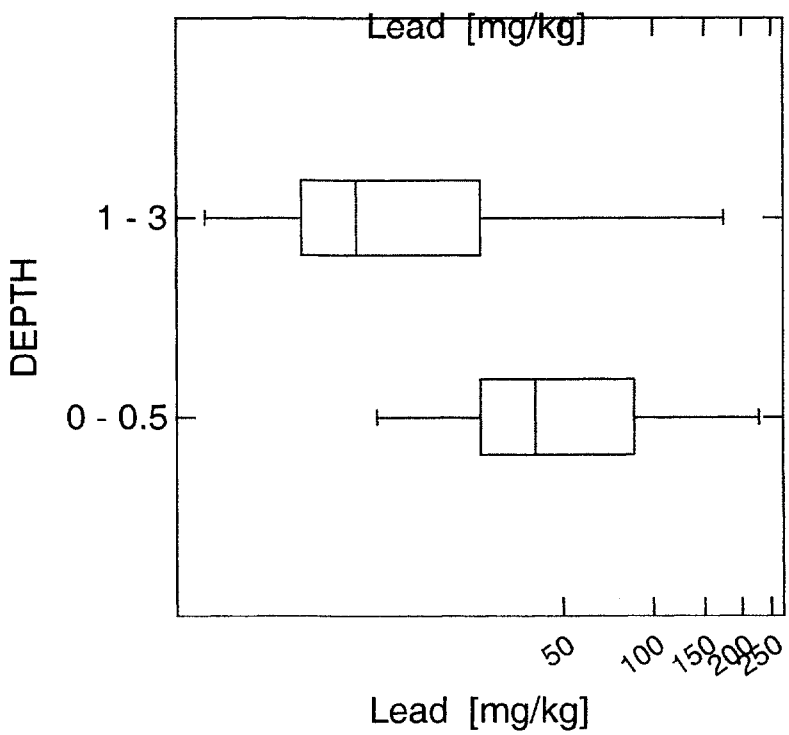

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0 2000 4000 6000 8000 10000 12000
Magnesium [mg/kg]

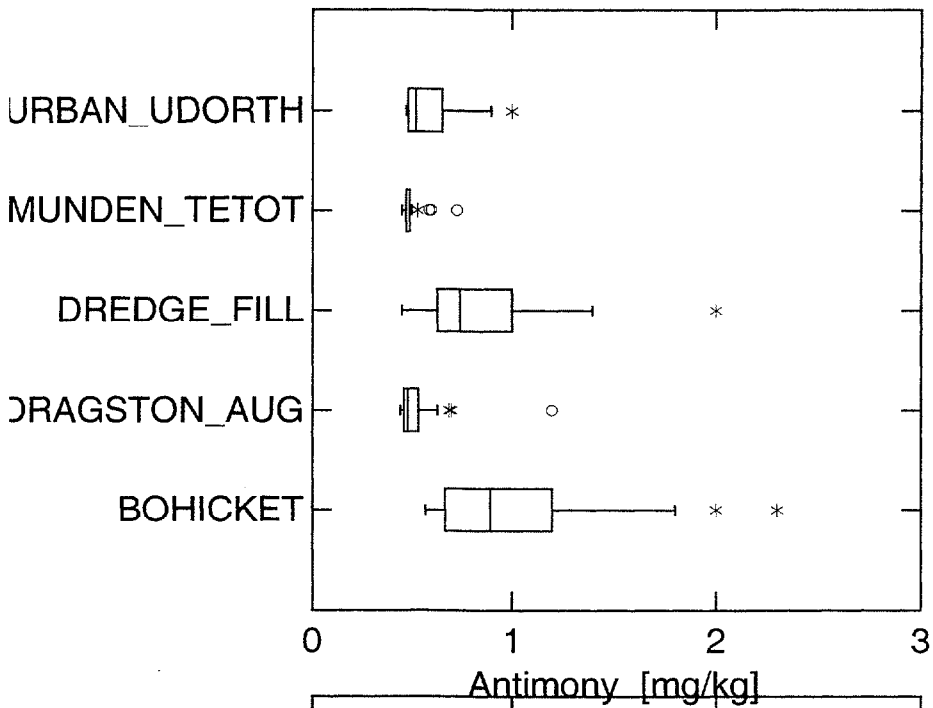

DEPTH
1 - 3
0 - 0.5
0 2000 4000 6000 8000 10000 12000
Magnesium [mg/kg]

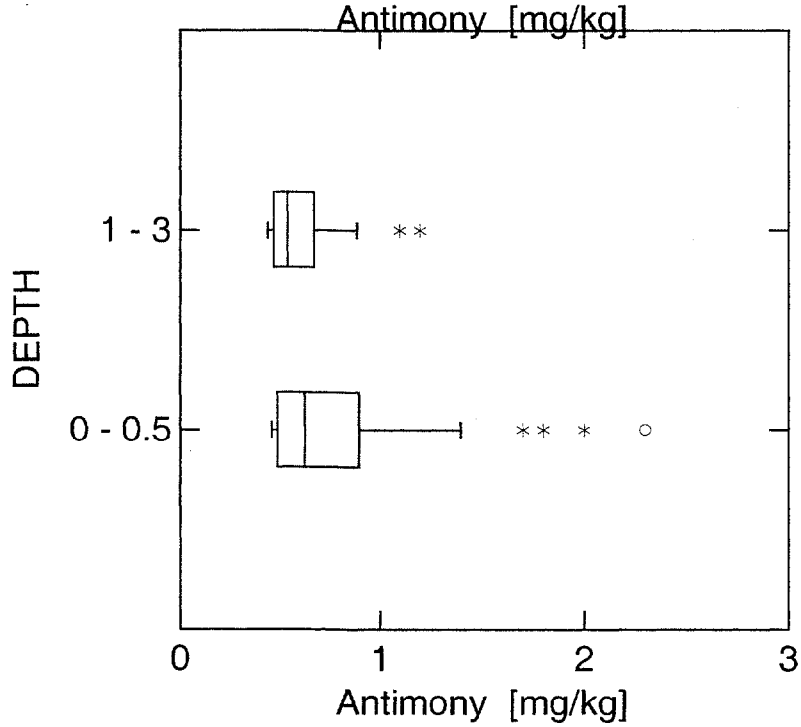

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
100
200
300
400
Manganese [mg/kg]

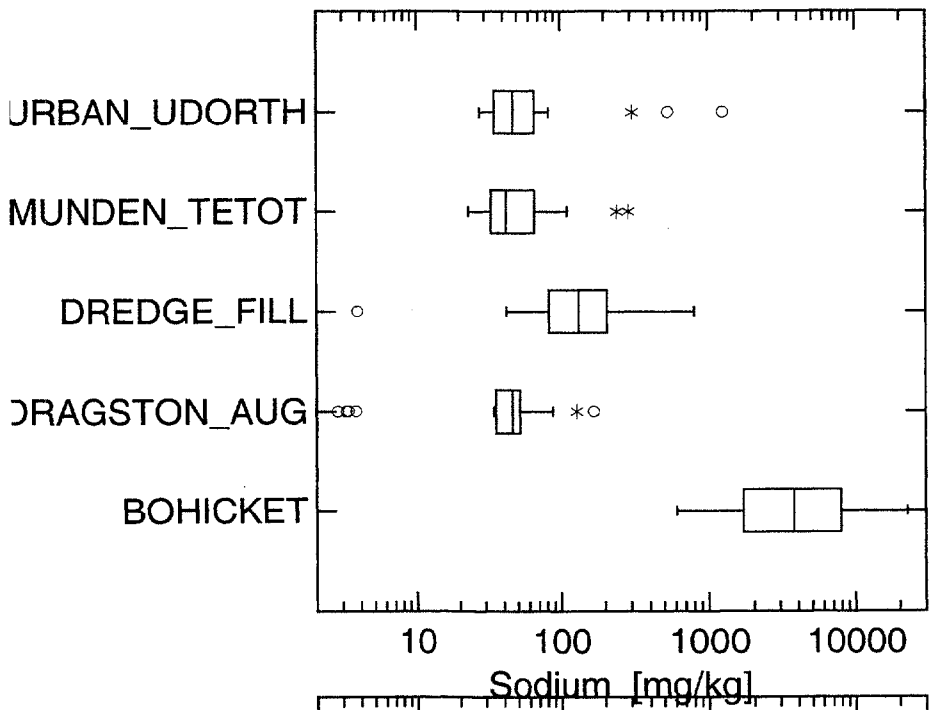

DEPTH
1 - 3
0 - 0.5
0
100
200
300
400
Manganese [mg/kg]

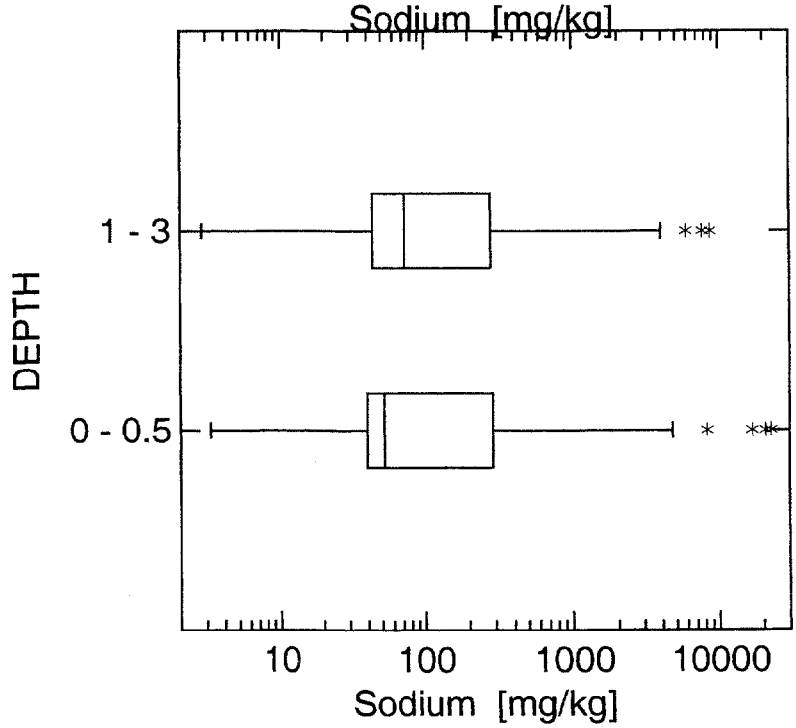

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
50
100
150
200
250
Lead [mg/kg]

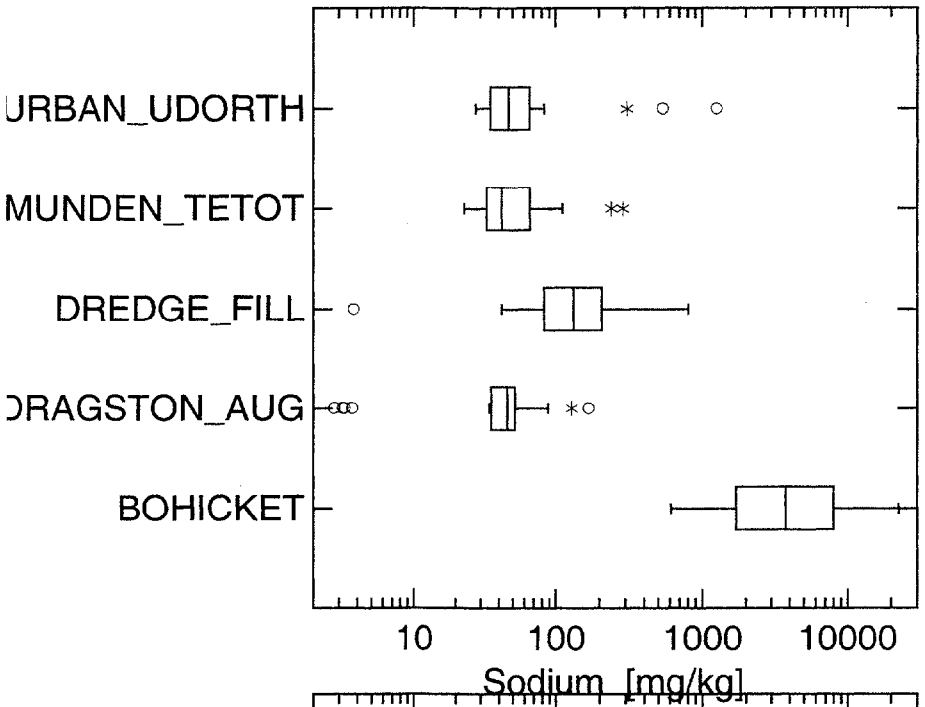

DEPTH
1 - 3
0 - 0.5
50
100
150
200
250
Lead [mg/kg]

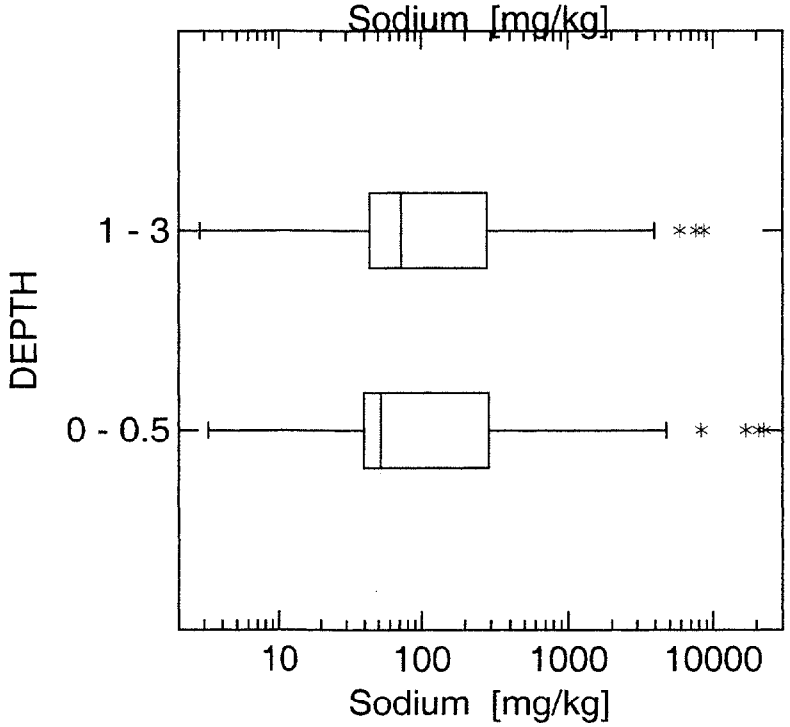

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
1
2
3
Antimony [mg/kg]

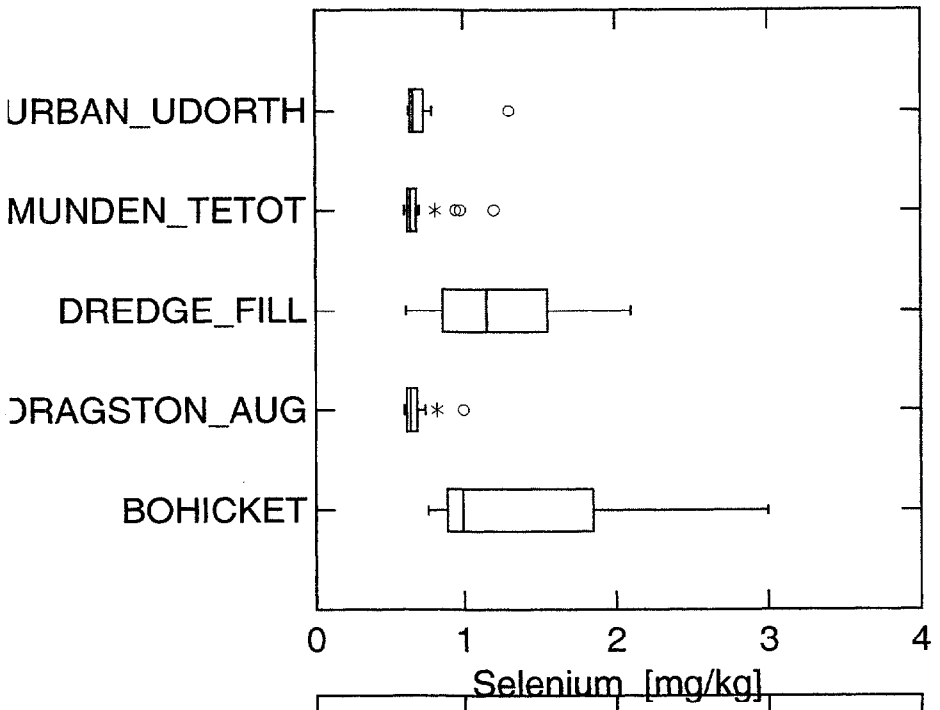

DEPTH
1 - 3
0 - 0.5
0
1
2
3
Antimony [mg/kg]

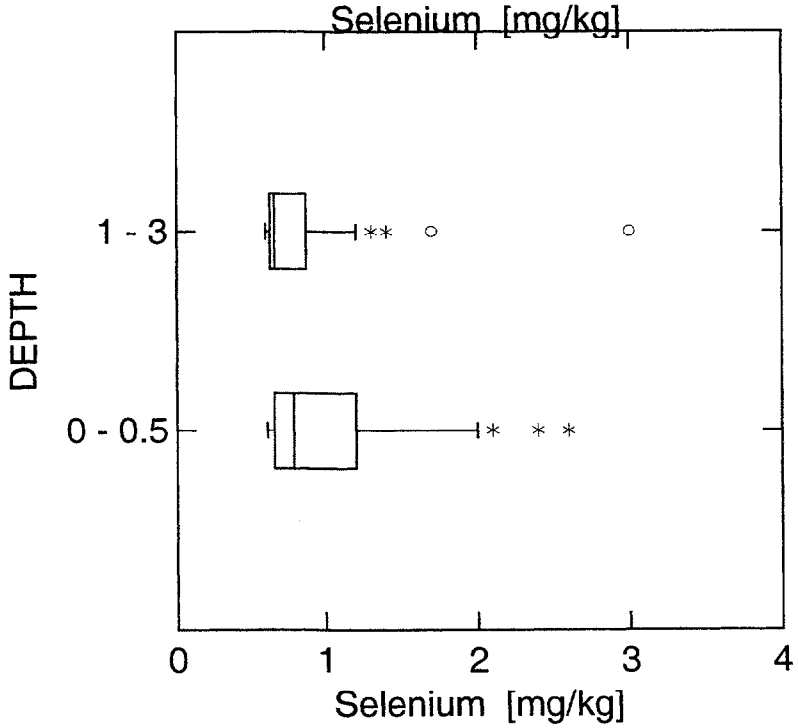

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
10
100
1000
10000
Sodium [mg/kg]

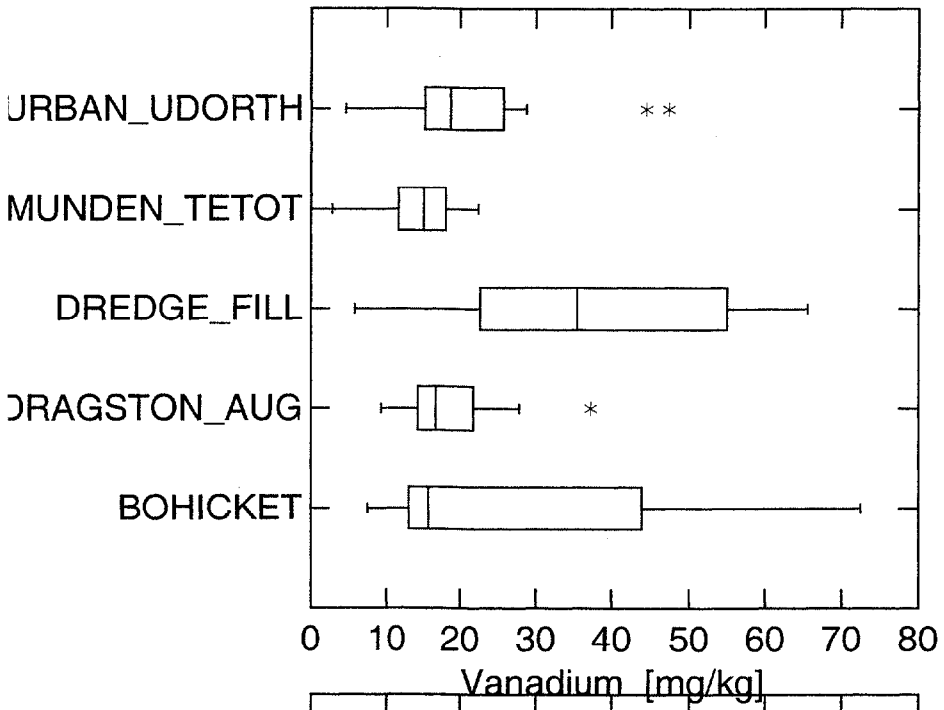

DEPTH
1 - 3
0 - 0.5
10
100
1000
10000
Sodium [mg/kg]

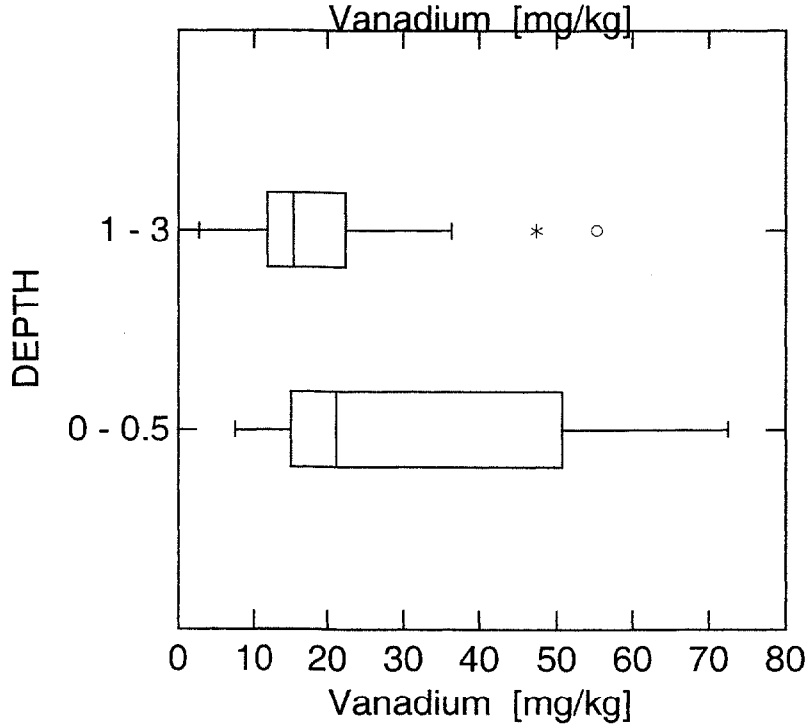

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
10
100
1000
10000
Sodium [mg/kg]

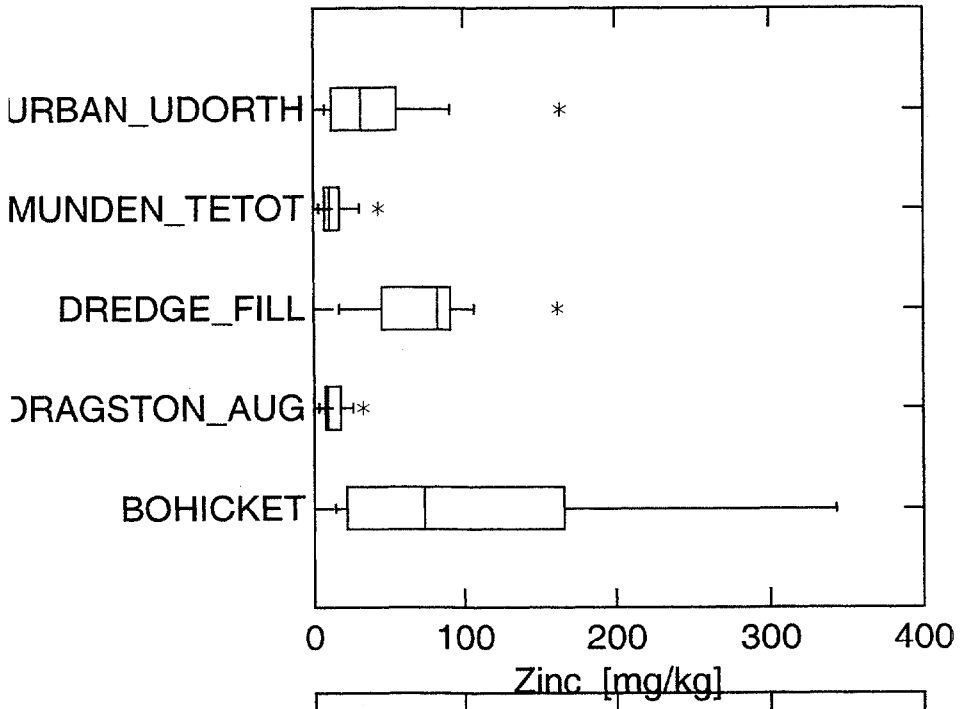

DEPTH
1 - 3
0 - 0.5
10
100
1000
10000
Sodium [mg/kg]

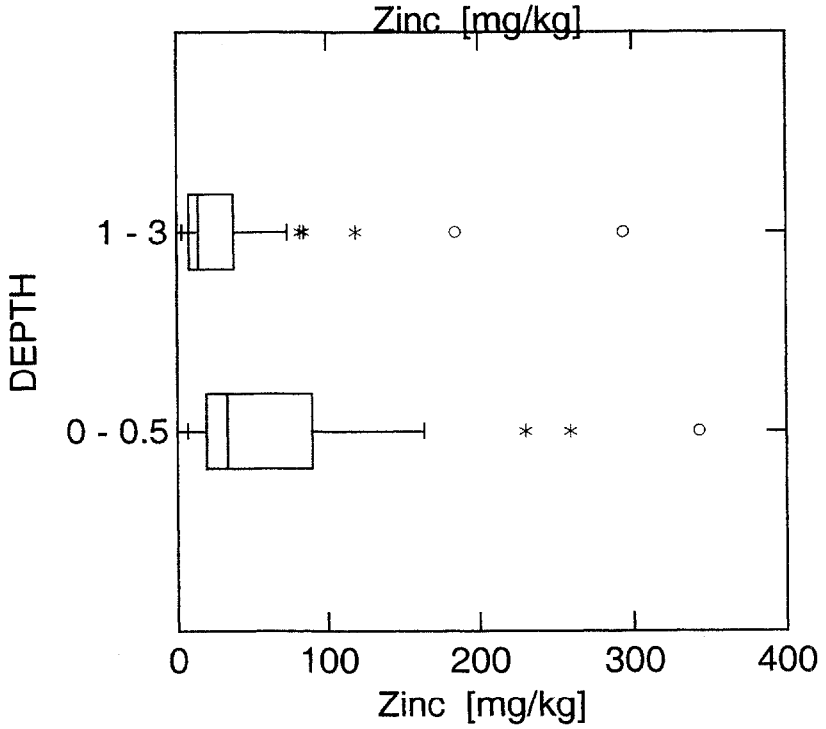

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
1
2
3
4
Selenium [mg/kg]

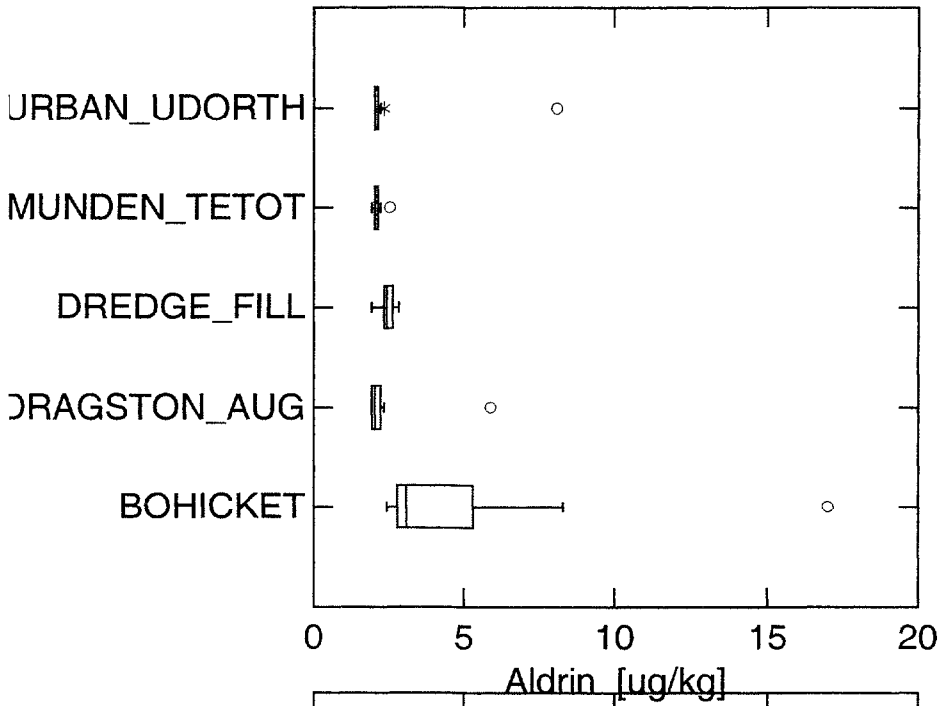

DEPTH
1 - 3
0 - 0.5
0
1
2
3
4
Selenium [mg/kg]

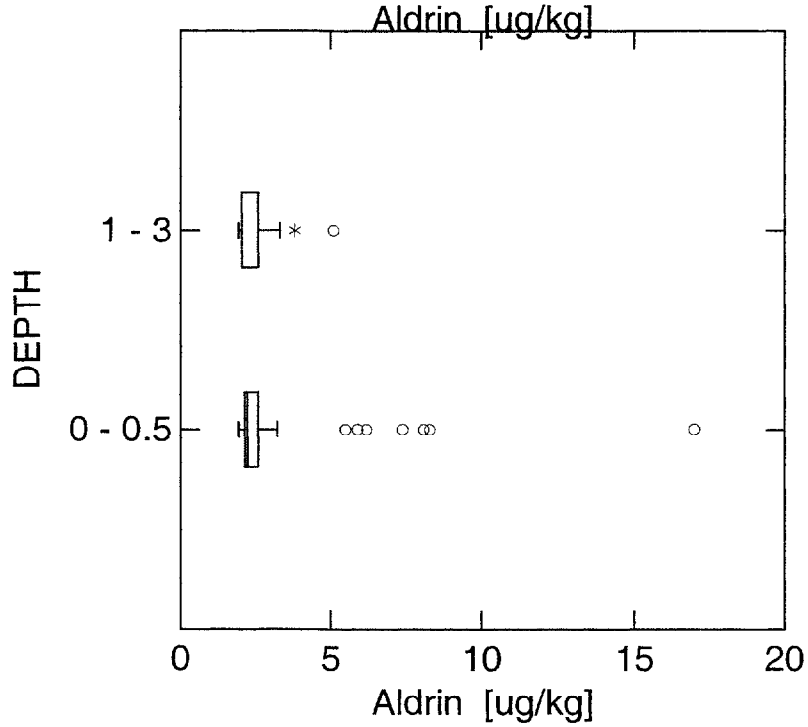

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0 10 20 30 40 50 60 70 80
Vanadium [mg/kg]

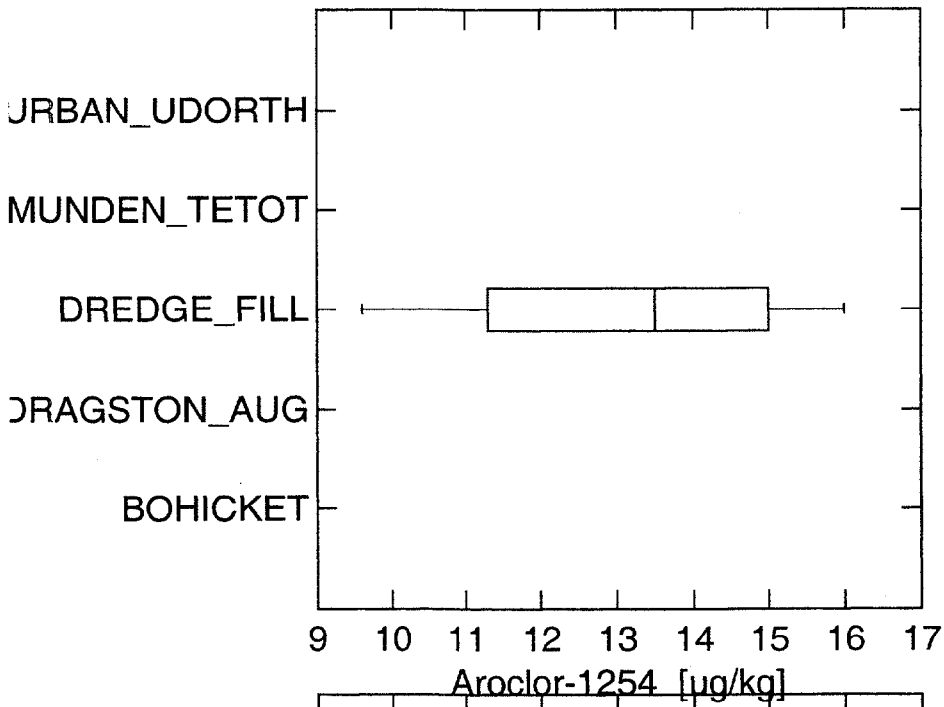

DEPTH
1 - 3
0 - 0.5
0 10 20 30 40 50 60 70 80
Vanadium [mg/kg]

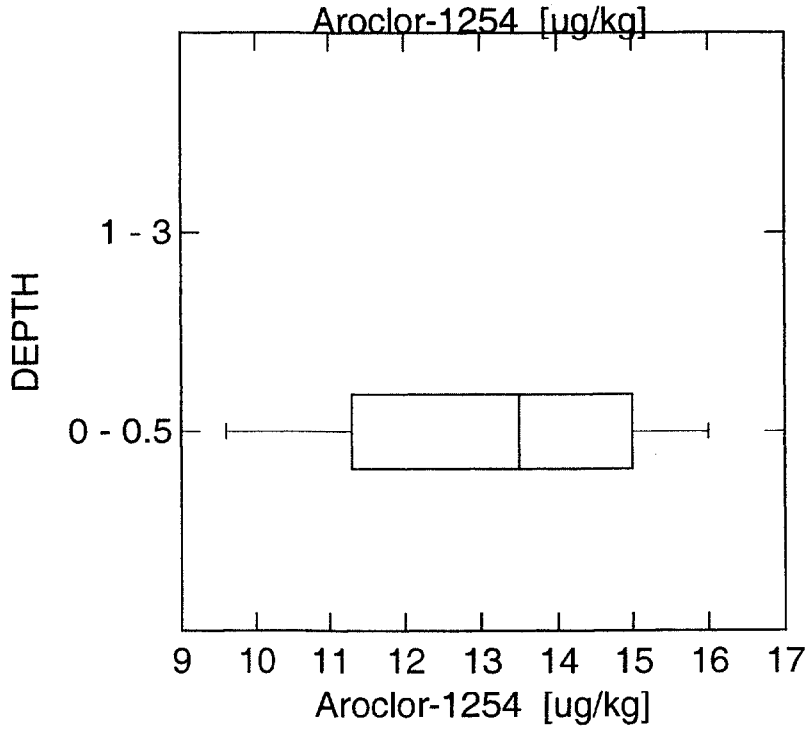

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
100
200
300
400
Zinc [mg/kg]

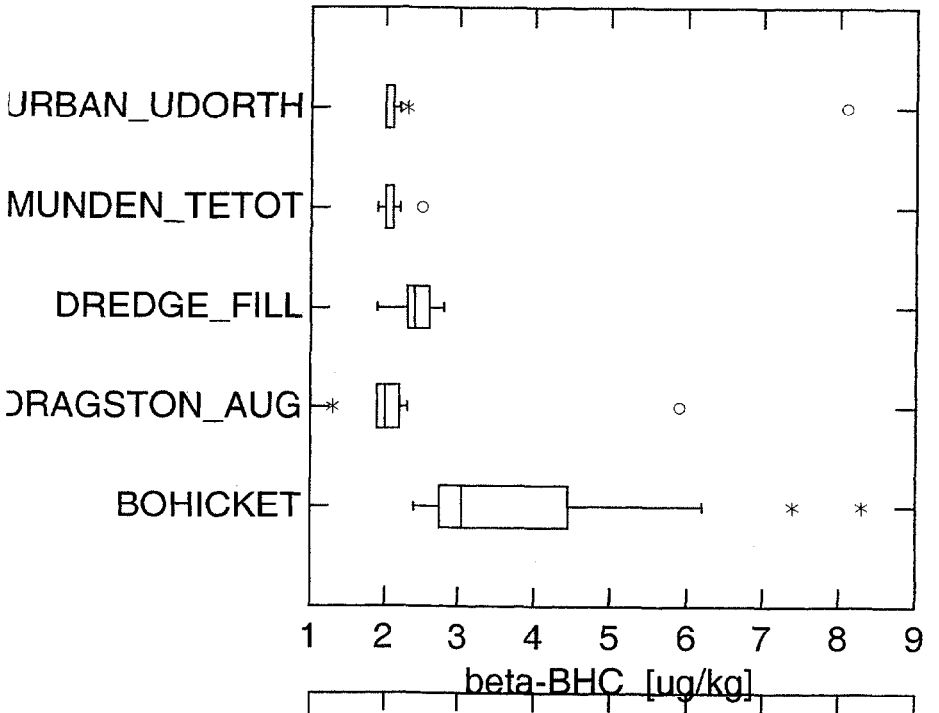

DEPTH
1 - 3
0 - 0.5
0
100
200
300
400
Zinc [mg/kg]

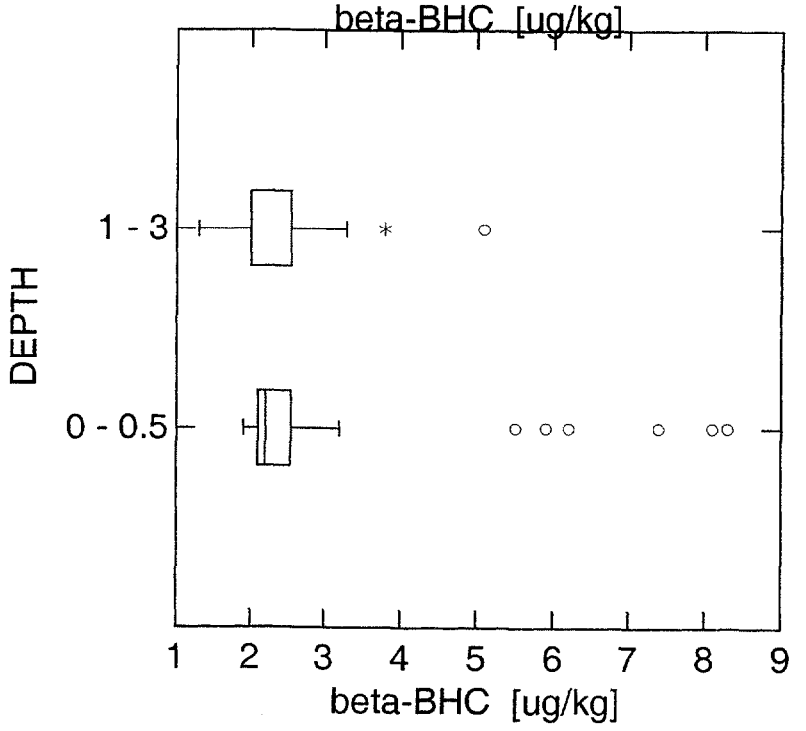

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
5
10
15
20
Aldrin [ug/kg]

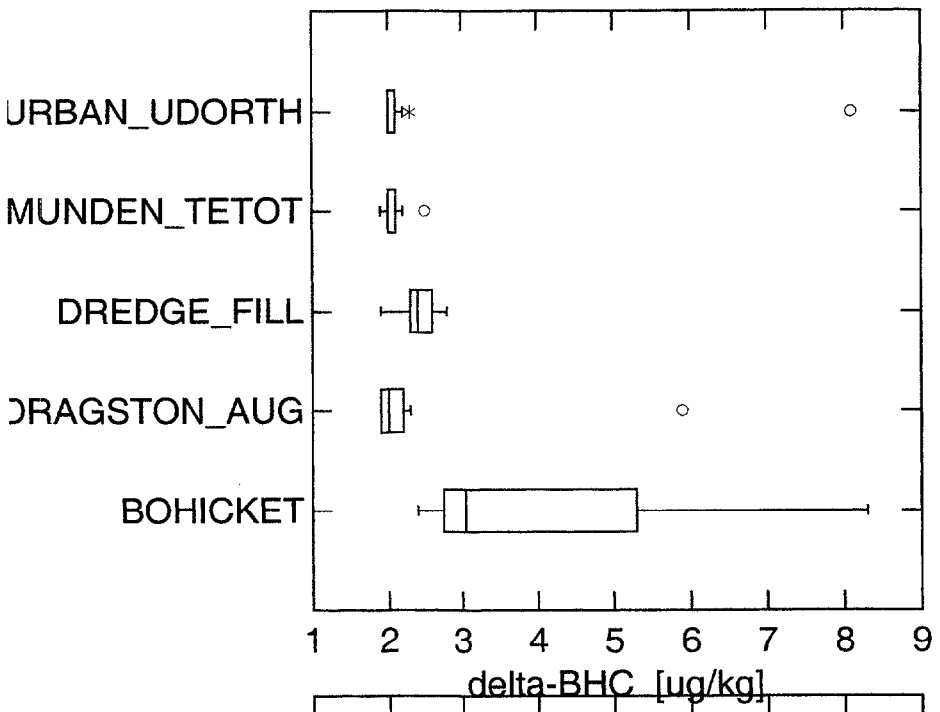

DEPTH
1 - 3
0 - 0.5
0
5
10
15
20
Aldrin [ug/kg]

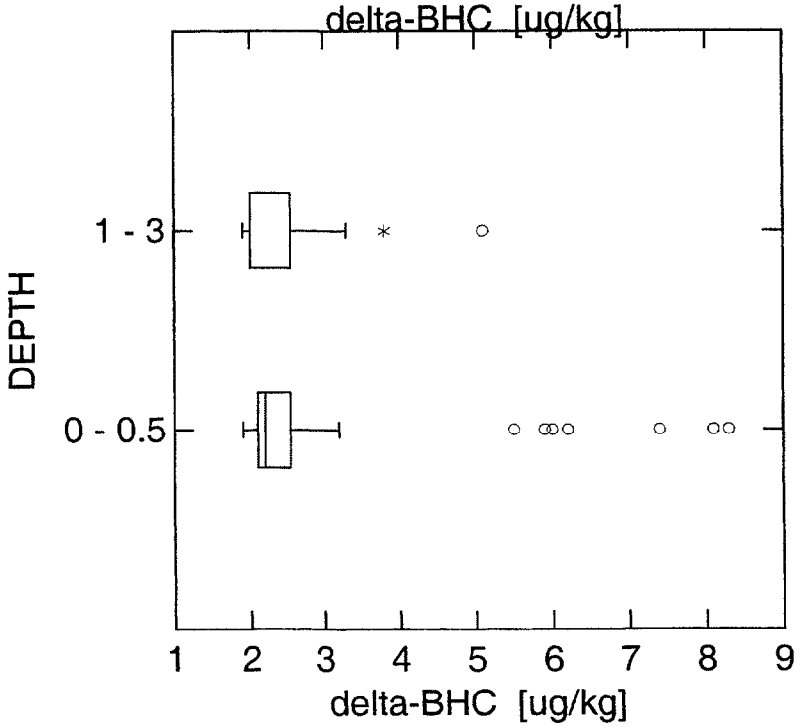

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
9 10 11 12 13 14 15 16 17
Aroclor-1254 [ug/kg]

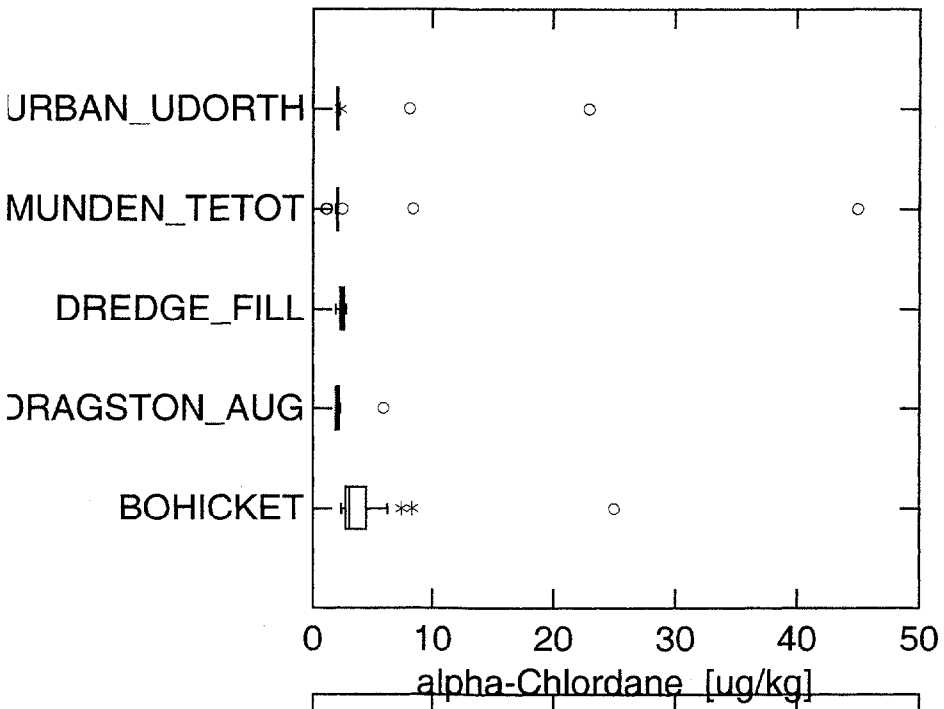

DEPTH
1 - 3
0 - 0.5
9 10 11 12 13 14 15 16 17
Aroclor-1254 [ug/kg]

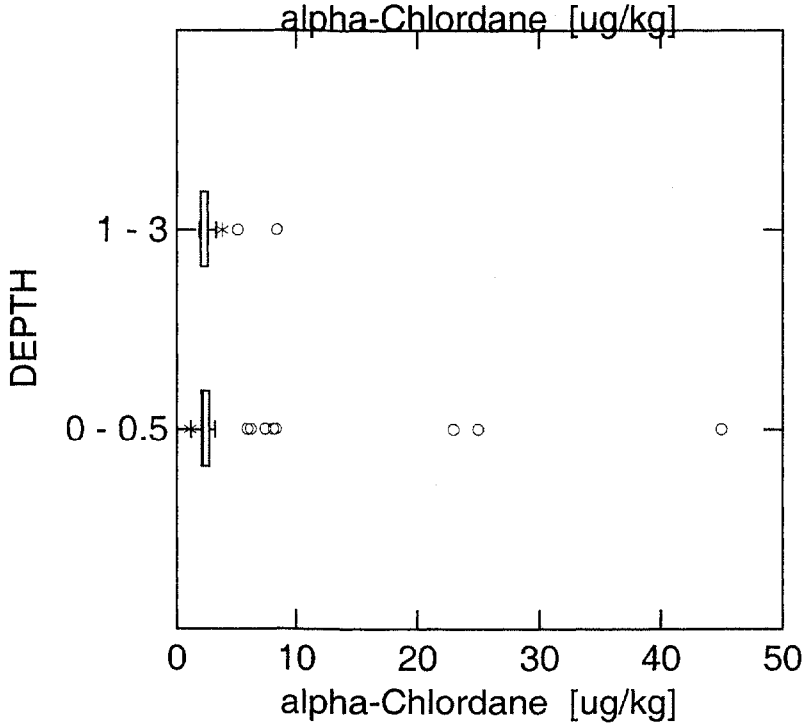

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
1 2 3 4 5 6 7 8 9
beta-BHC [ug/kg]

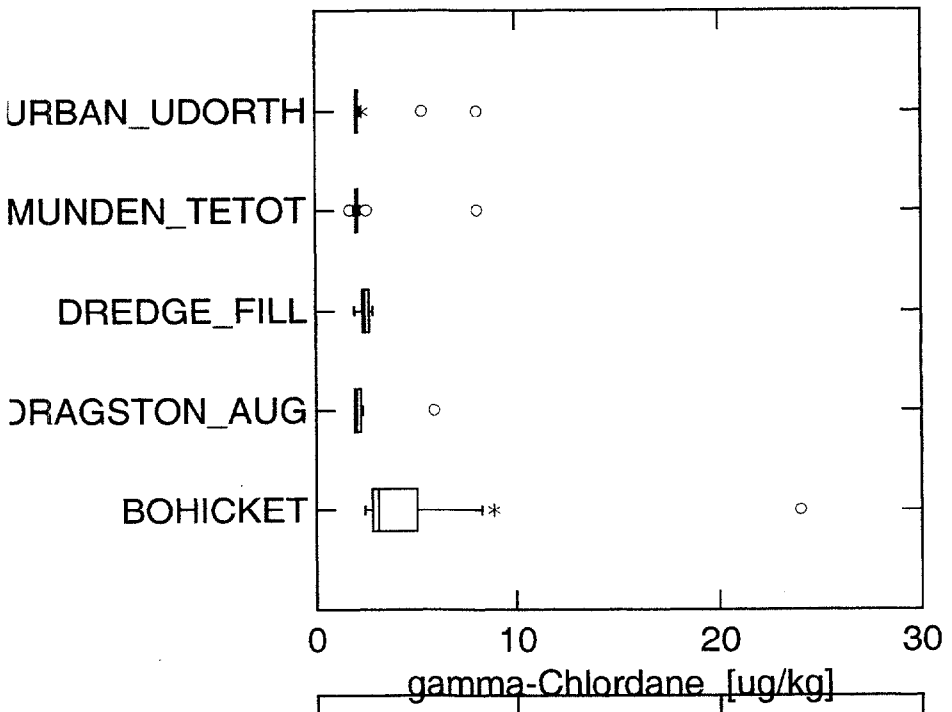

DEPTH
1 - 3
0 - 0.5
1 2 3 4 5 6 7 8 9
beta-BHC [ug/kg]

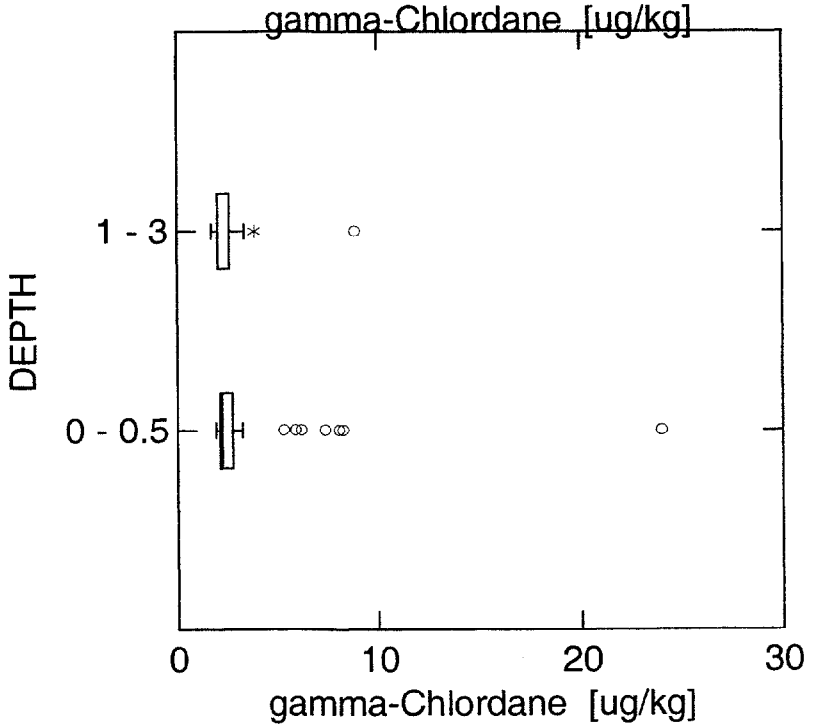

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
1 2 3 4 5 6 7 8 9
delta-BHC [ug/kg]

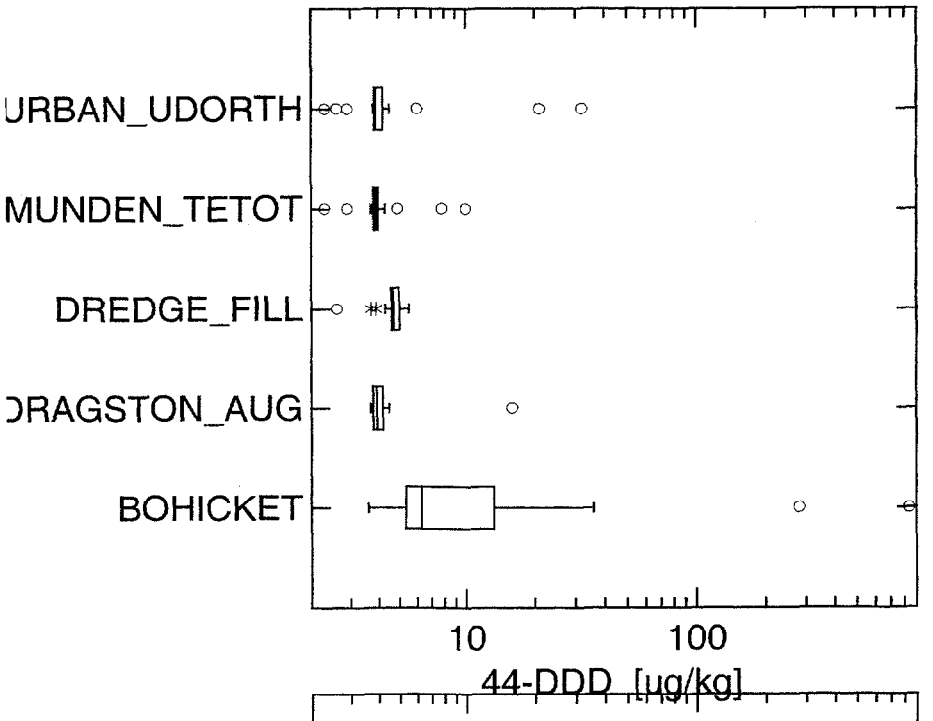

DEPTH
1 - 3
0 - 0.5
1 2 3 4 5 6 7 8 9
delta-BHC [ug/kg]

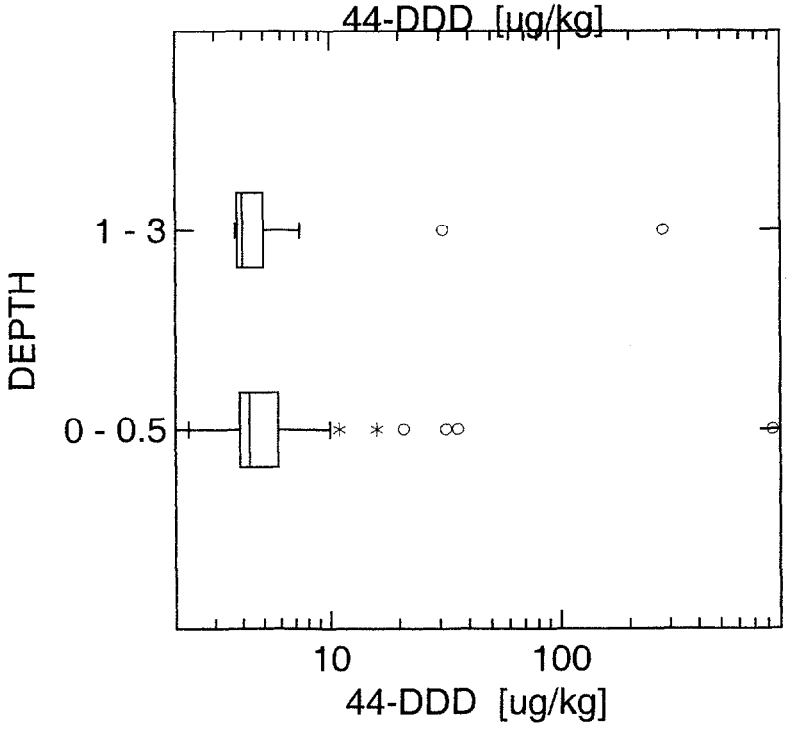

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
10
20
30
40
50
alpha-Chlordane [ug/kg]

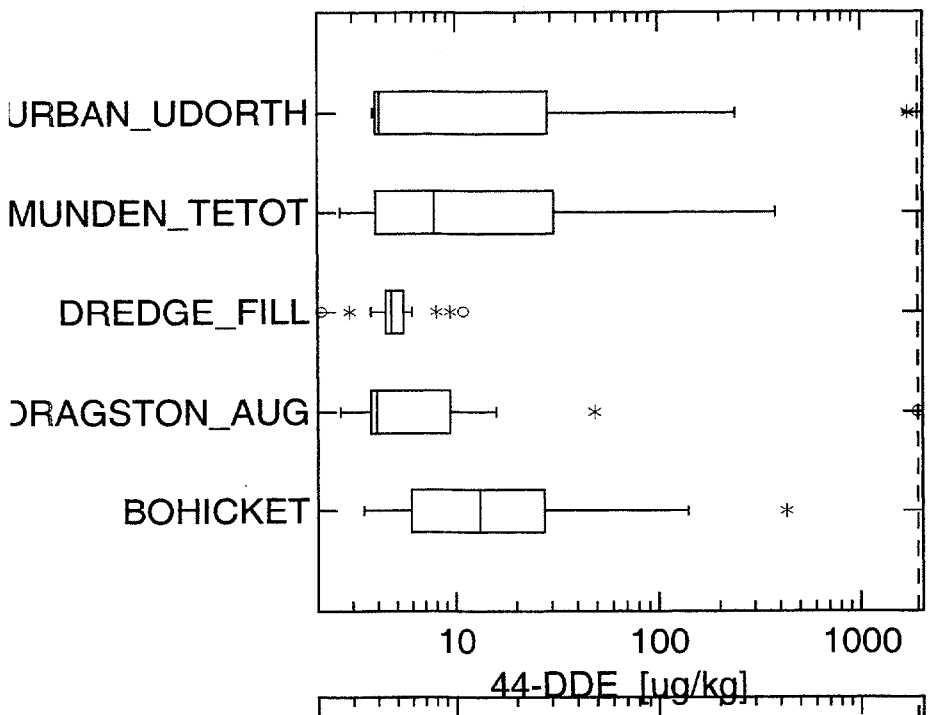

DEPTH
1 - 3
0 - 0.5
0
10
20
30
40
50
alpha-Chlordane [ug/kg]

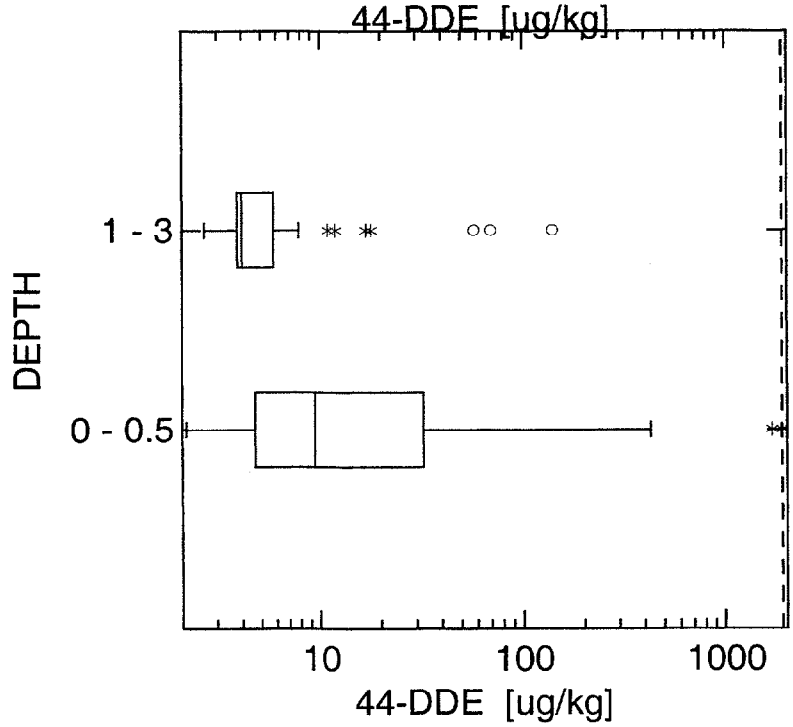

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
10
20
30
gamma-Chlordane [ug/kg]

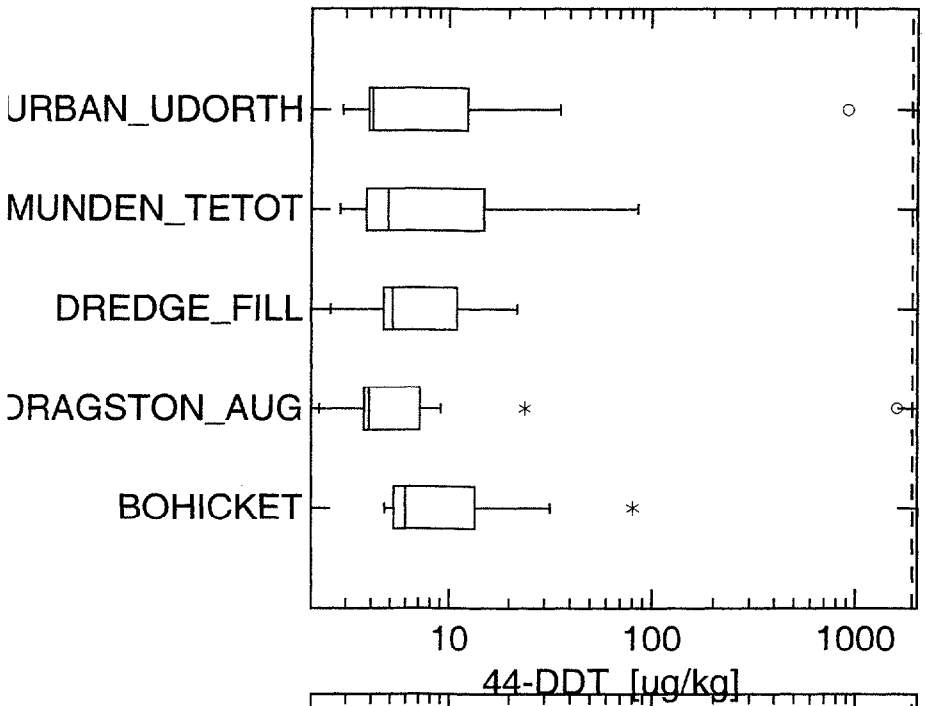

DEPTH
1 - 3
0 - 0.5
0
10
20
30
gamma-Chlordane [ug/kg]

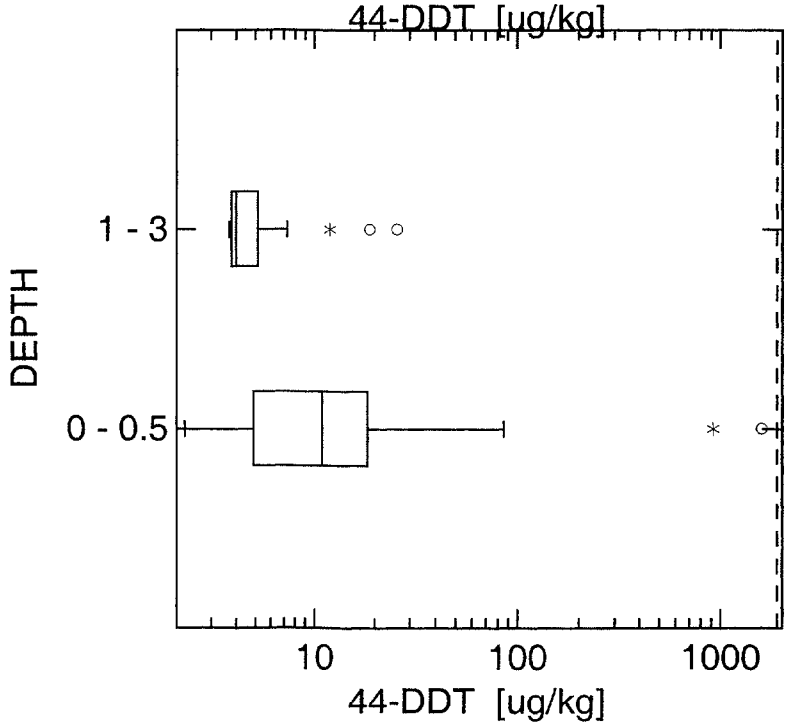

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
10
100
44-DDD [ug/kg]

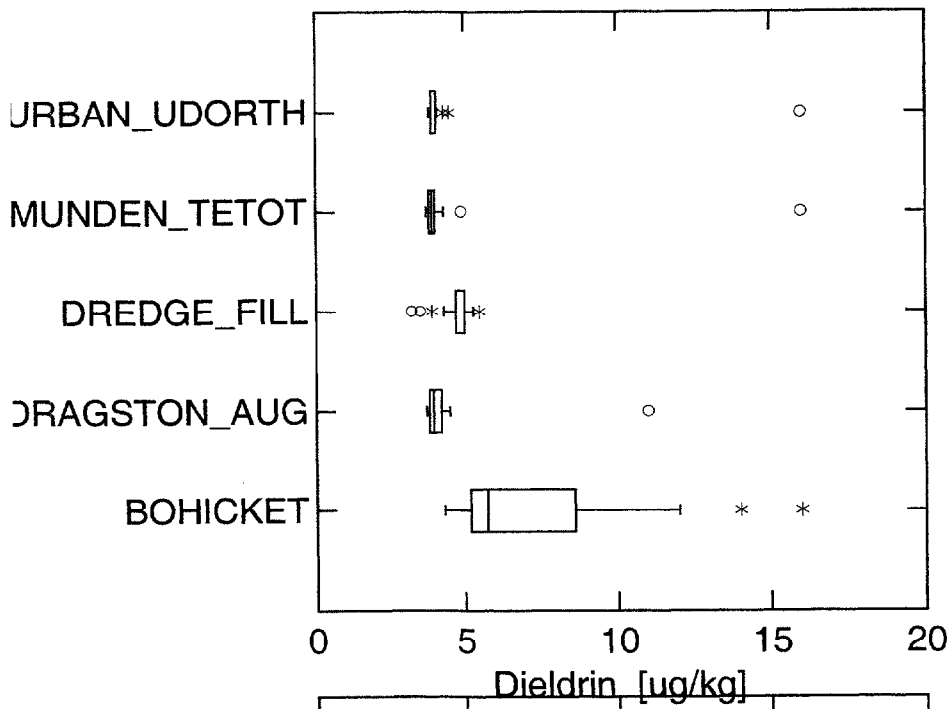

DEPTH
1 - 3
0 - 0.5
10
100
44-DDD [ug/kg]

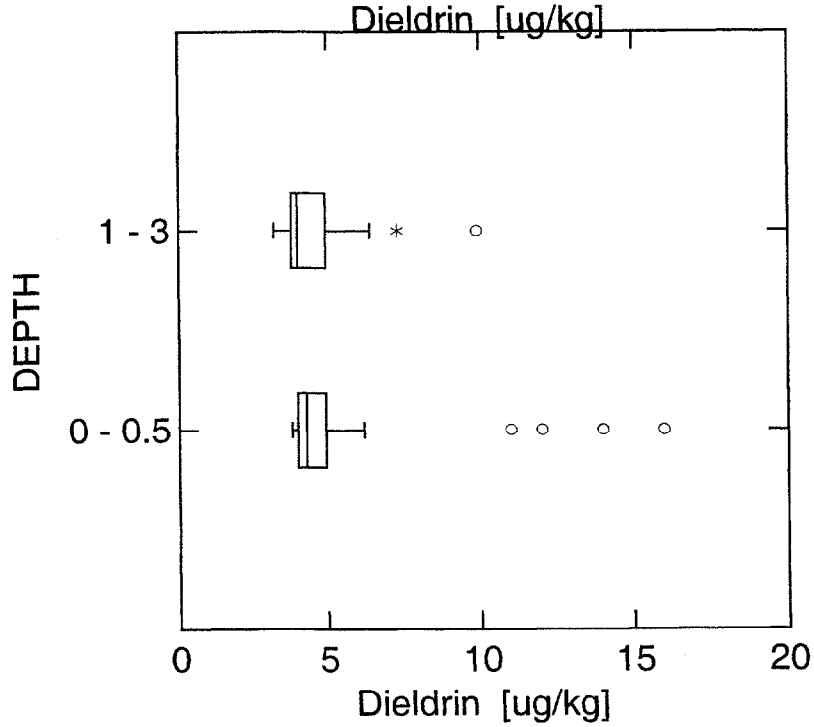

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
10
100
1000
44-DDE [ug/kg]

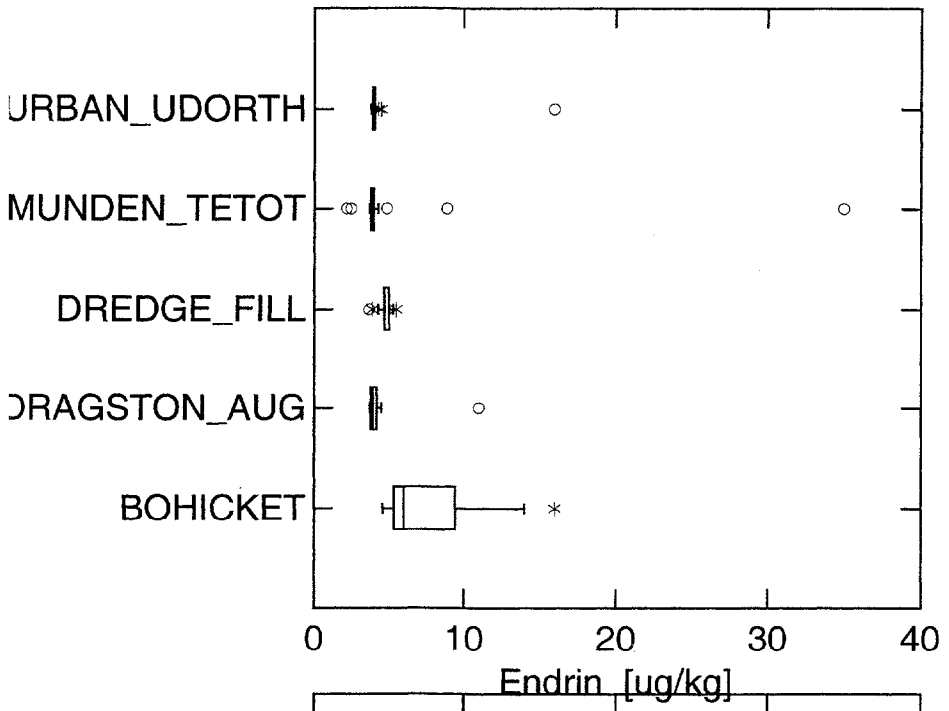

DEPTH
1 - 3
0 - 0.5
10
100
1000
44-DDE [ug/kg]

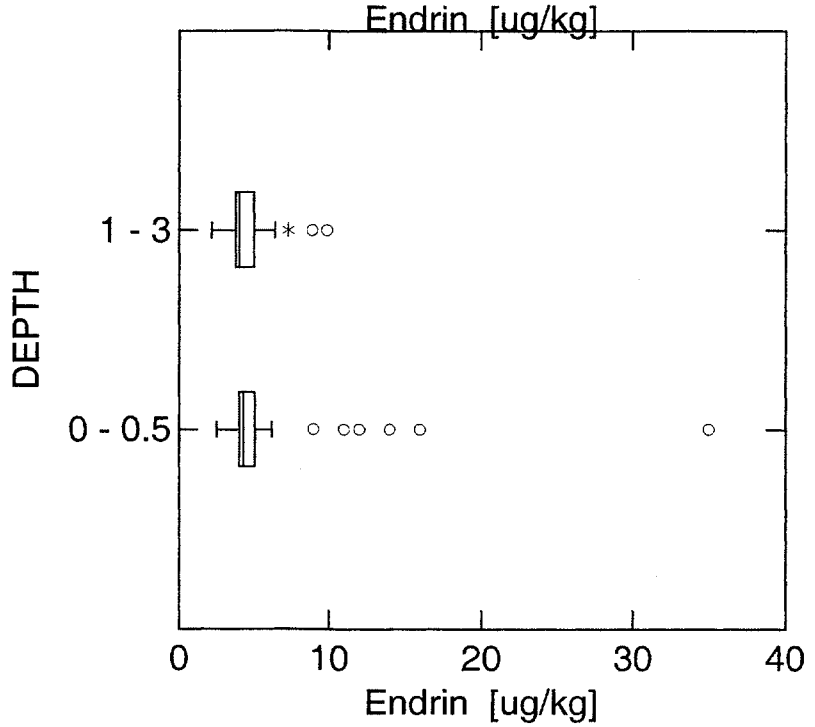

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
10
100
1000
44-DDT [ug/kg]

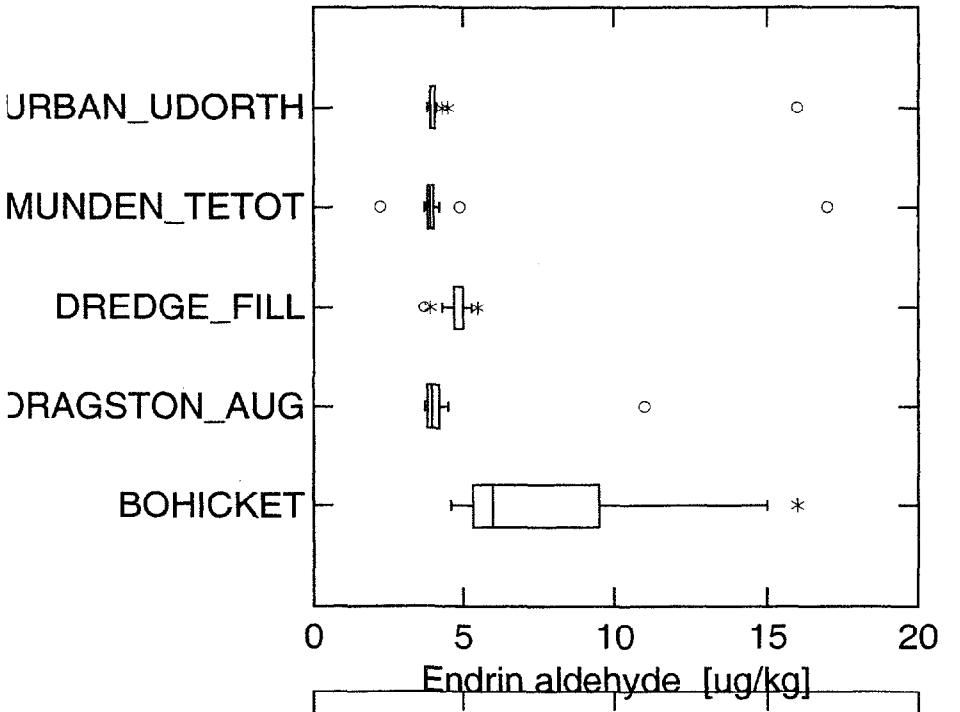

DEPTH
1 - 3
0 - 0.5
10
100
1000
44-DDT [ug/kg]

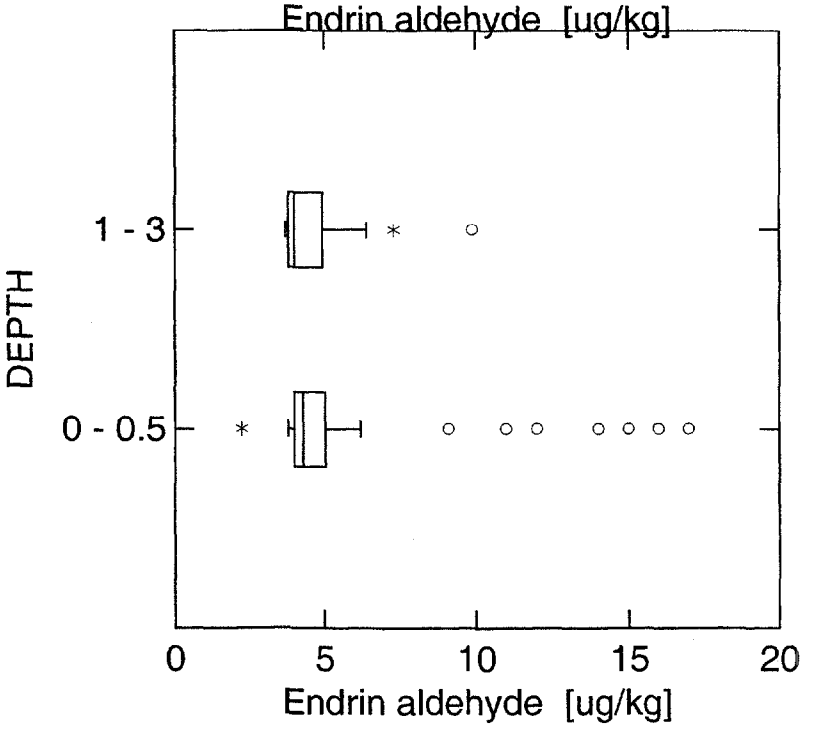

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
5
10
15
20
Dieldrin [ug/kg]

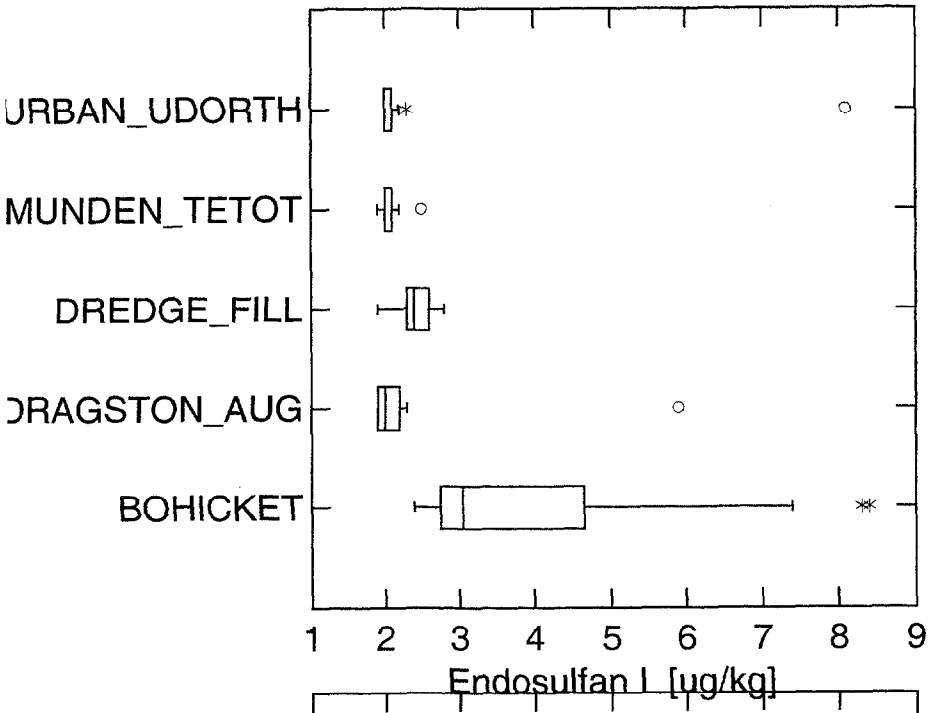

DEPTH
1 - 3
0 - 0.5
0
5
10
15
20
Dieldrin [ug/kg]

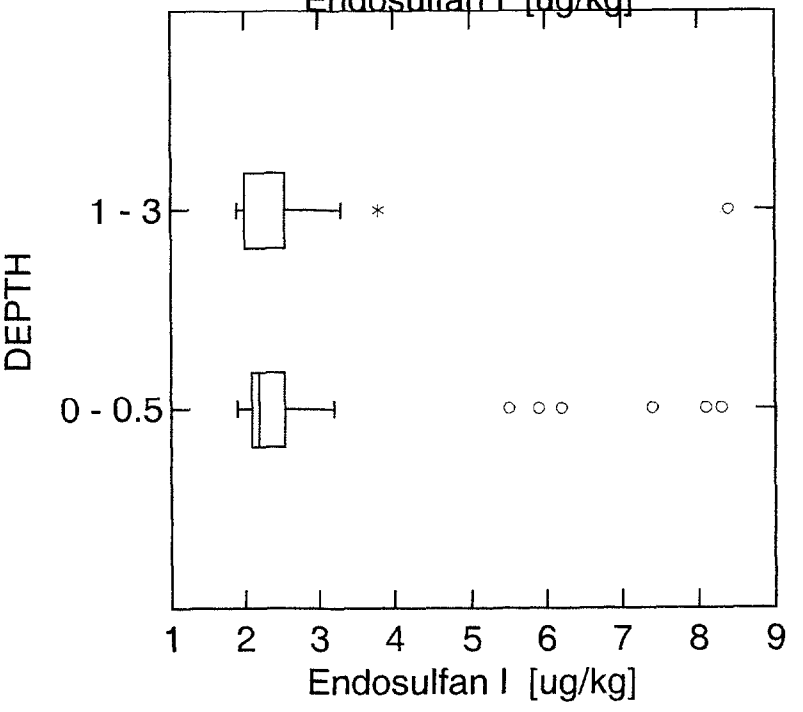

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
10
20
30
40
Endrin [ug/kg]

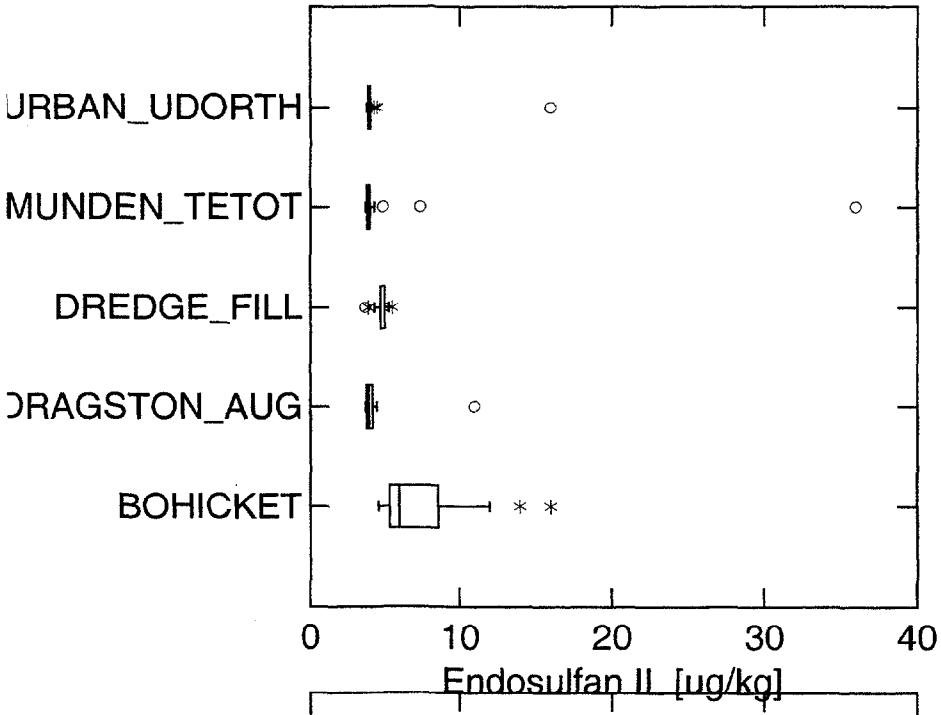

DEPTH
1 - 3
0 - 0.5
0
10
20
30
40
Endrin [ug/kg]

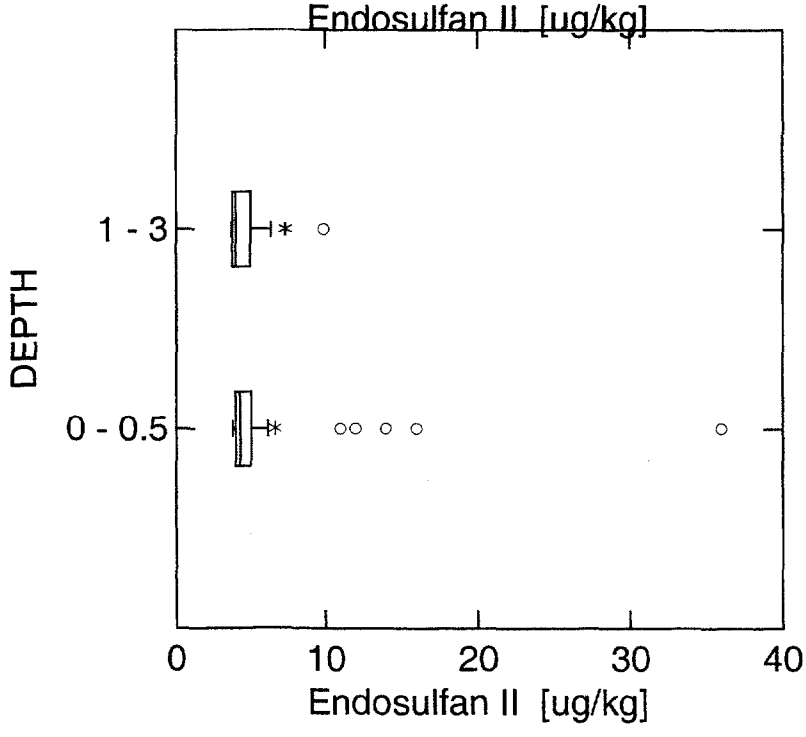

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
5
10
15
20
Endrin aldehyde [ug/kg]

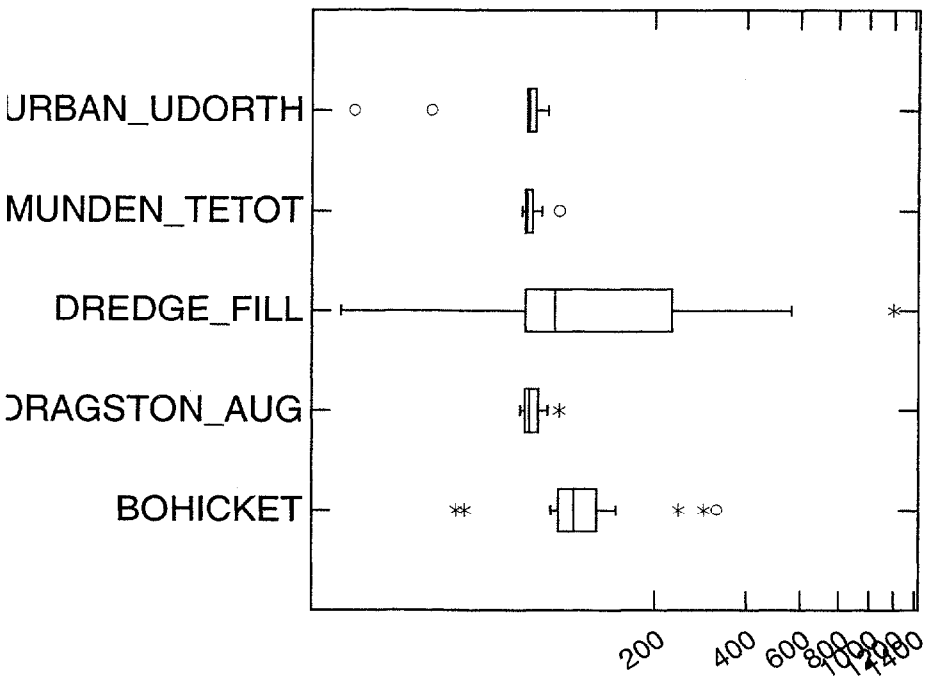

DEPTH
1 - 3
0 - 0.5
0
5
10
15
20
Endrin aldehyde [ug/kg]

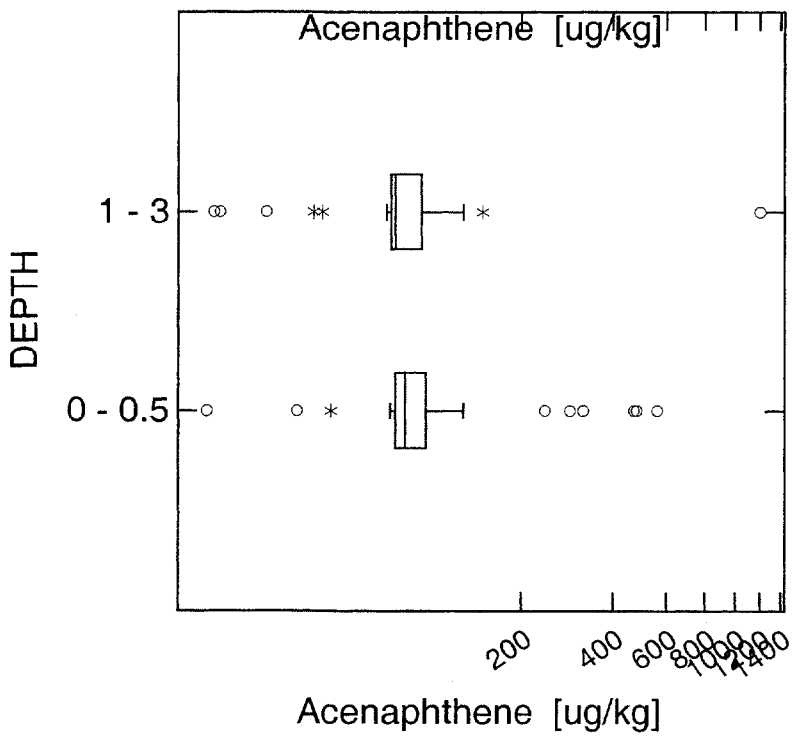

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
1 2 3 4 5 6 7 8 9
Endosulfan I [ug/kg]

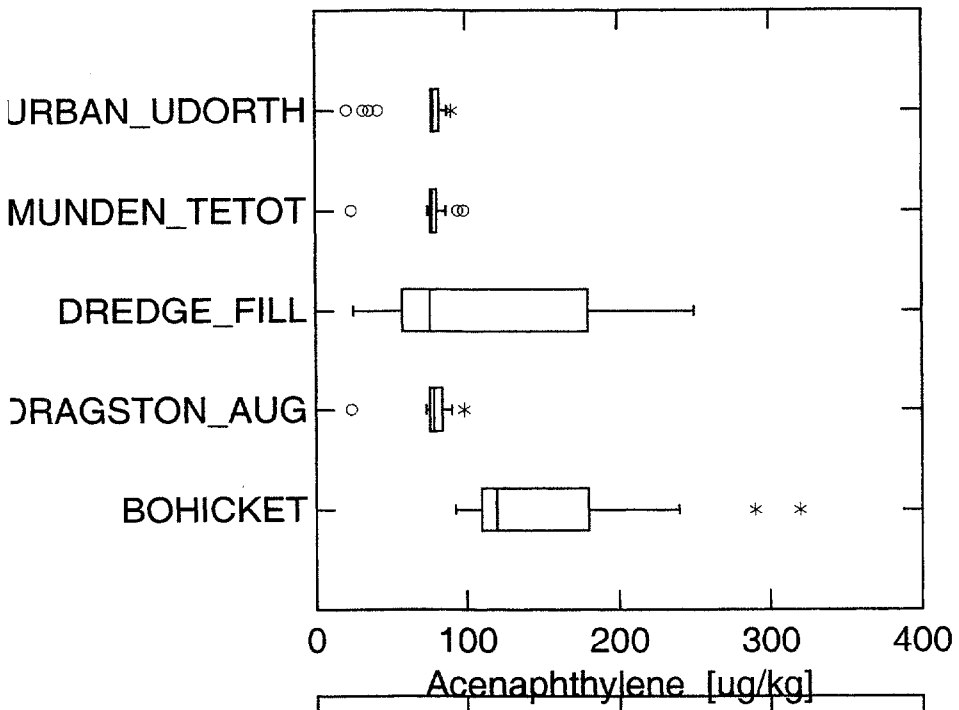

DEPTH
1 - 3
0 - 0.5
1 2 3 4 5 6 7 8 9
Endosulfan I [ug/kg]

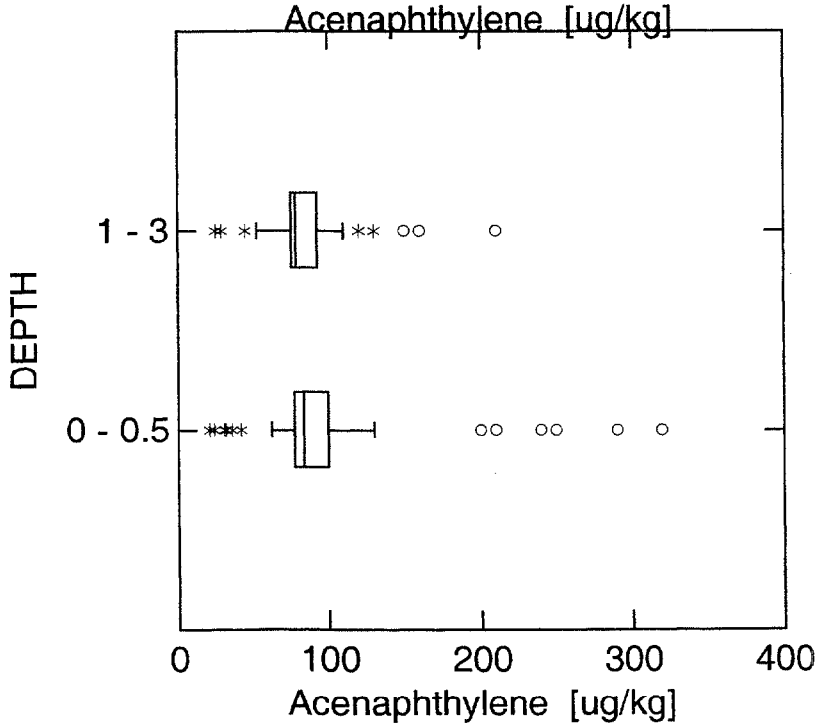

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
10
20
30
40
Endosulfan II [ug/kg]

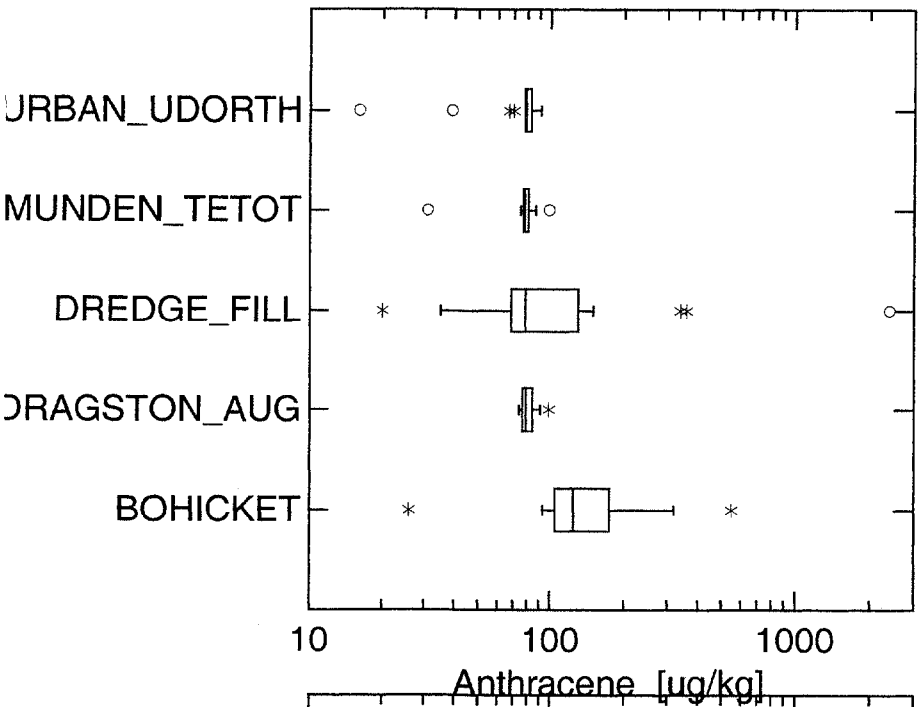

DEPTH
1 - 3
0 - 0.5
0
10
20
30
40
Endosulfan II [ug/kg]

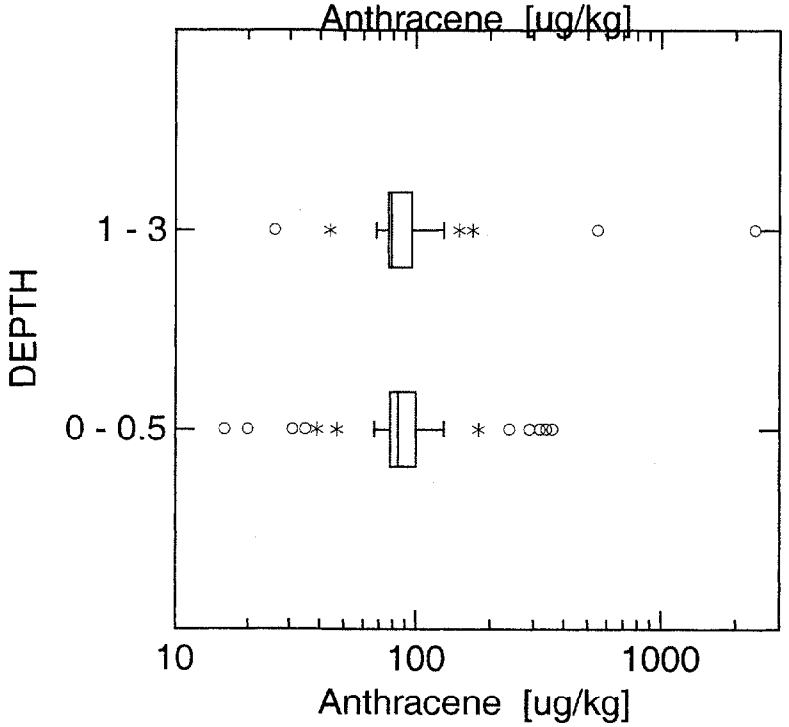

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
200
400
600
800
1000
1200
1400
Acenaphthene [ug/kg]

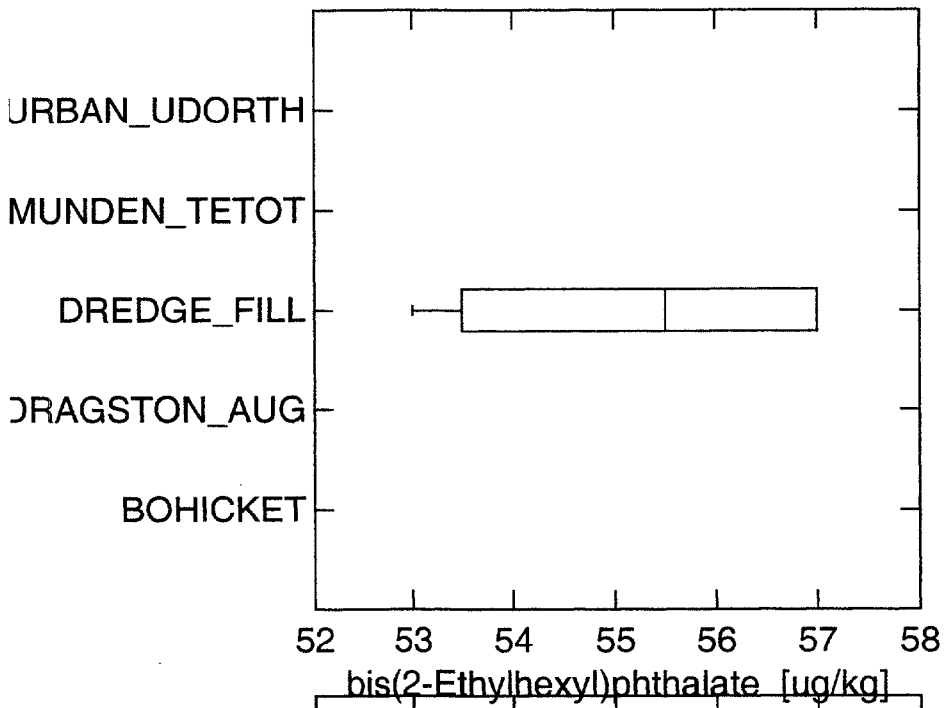

DEPTH
1 - 3
0 - 0.5
200
400
600
800
1000
1200
1400
Acenaphthene [ug/kg]

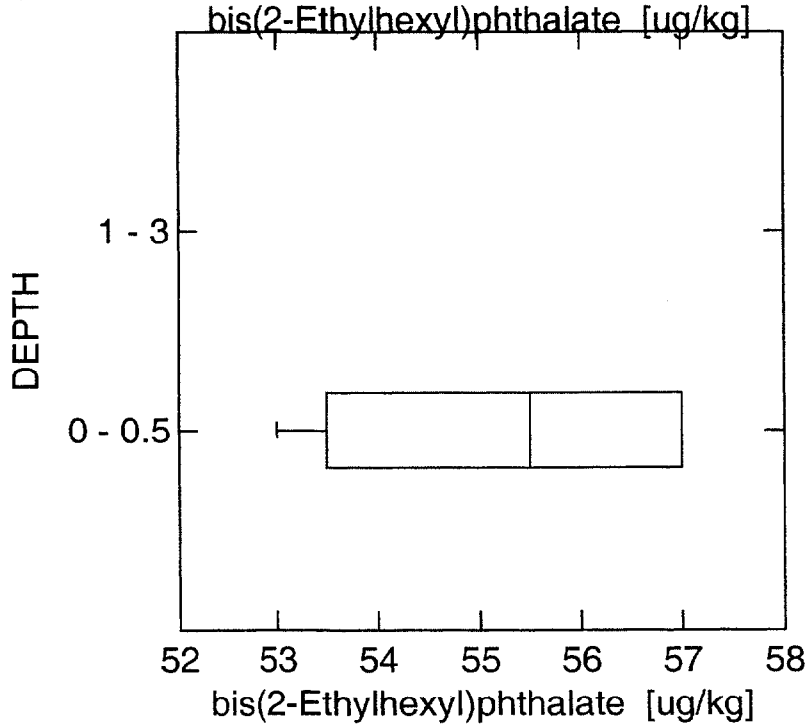

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
100
200
300
400
Acenaphthylene [ug/kg]

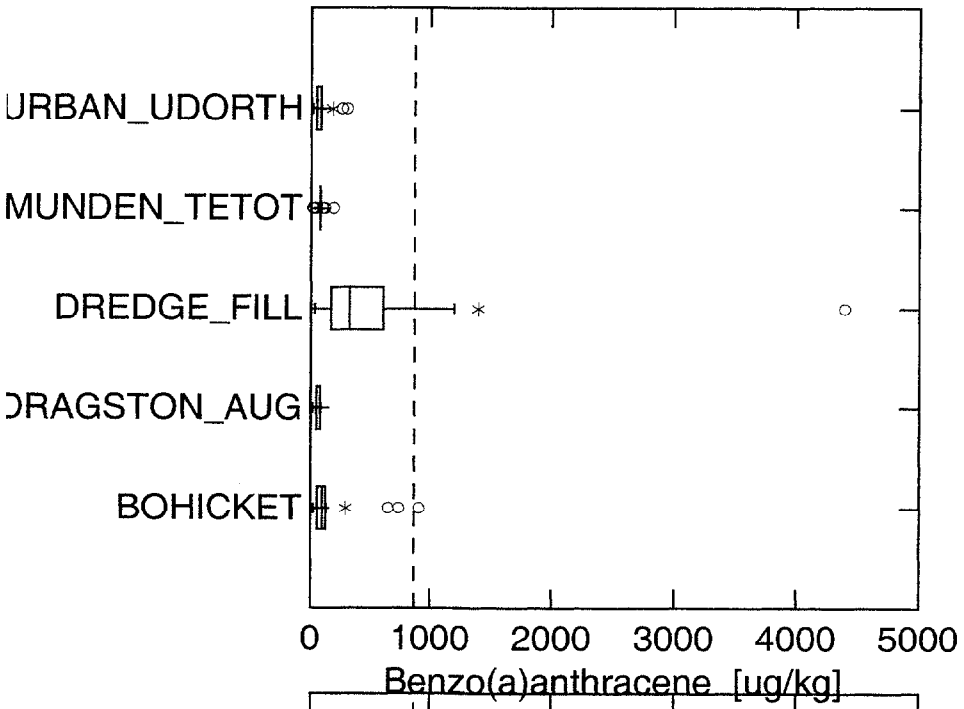

DEPTH
1 - 3
0 - 0.5
0
100
200
300
400
Acenaphthylene [ug/kg]

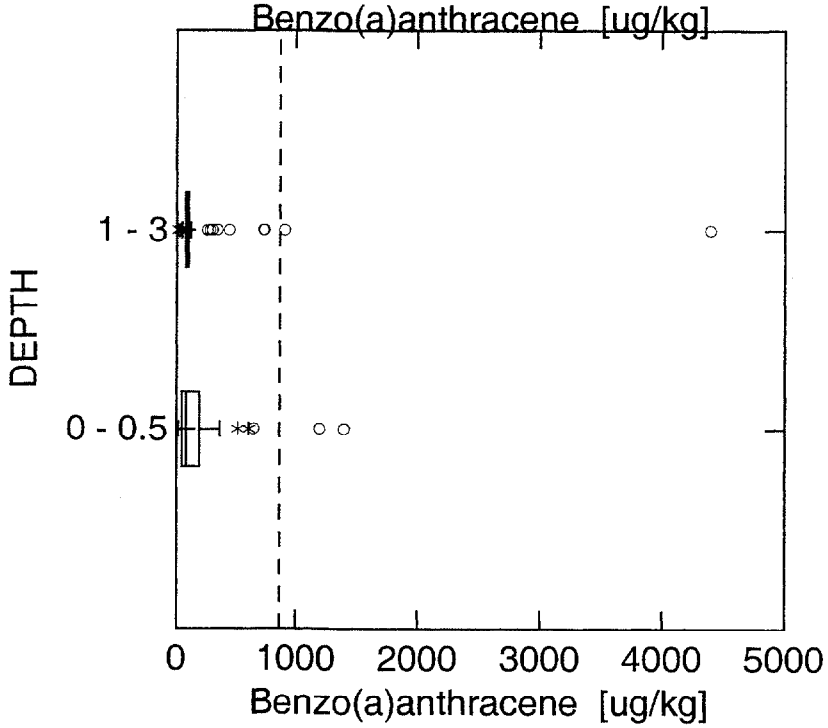

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
10
100
1000
Anthracene [ug/kg]

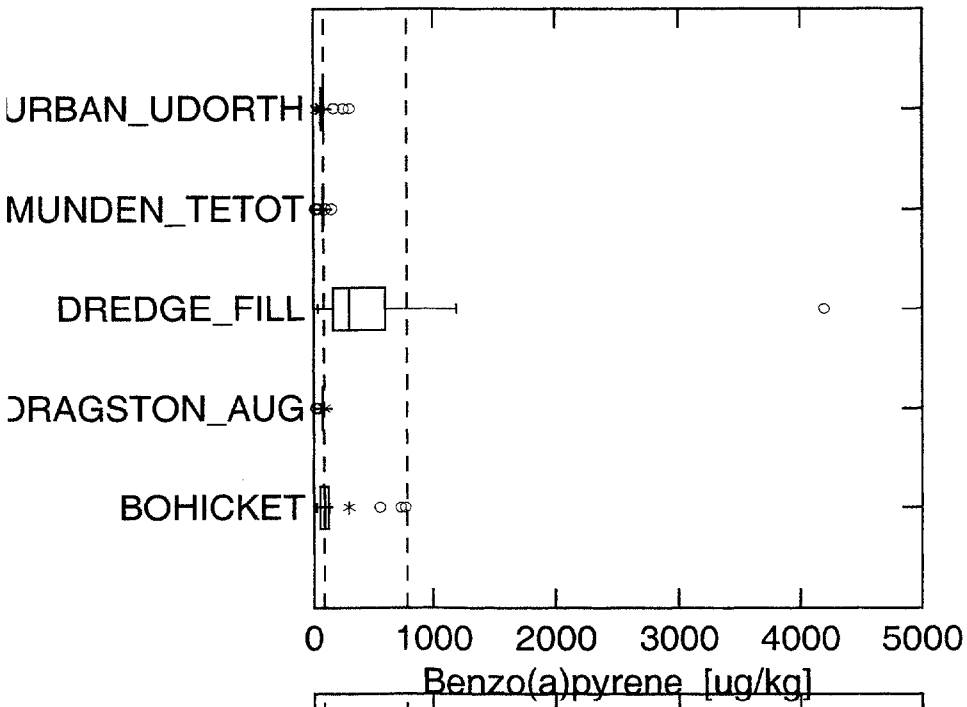

DEPTH
1 - 3
0 - 0.5
10
100
1000
Anthracene [ug/kg]

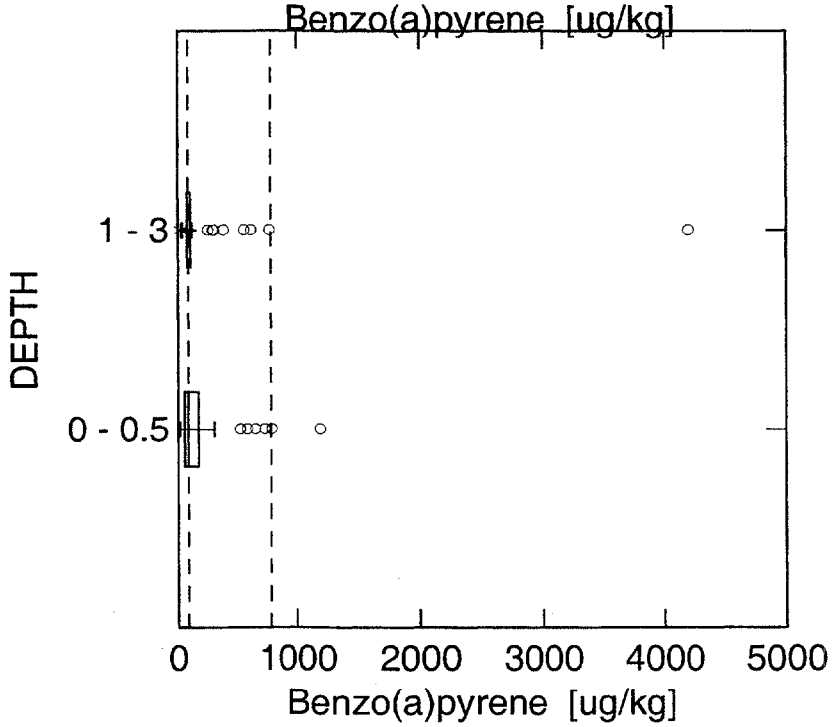

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
52
53
54
55
56
57
58
bis(2-Ethylhexyl)phthalate [ug/kg]

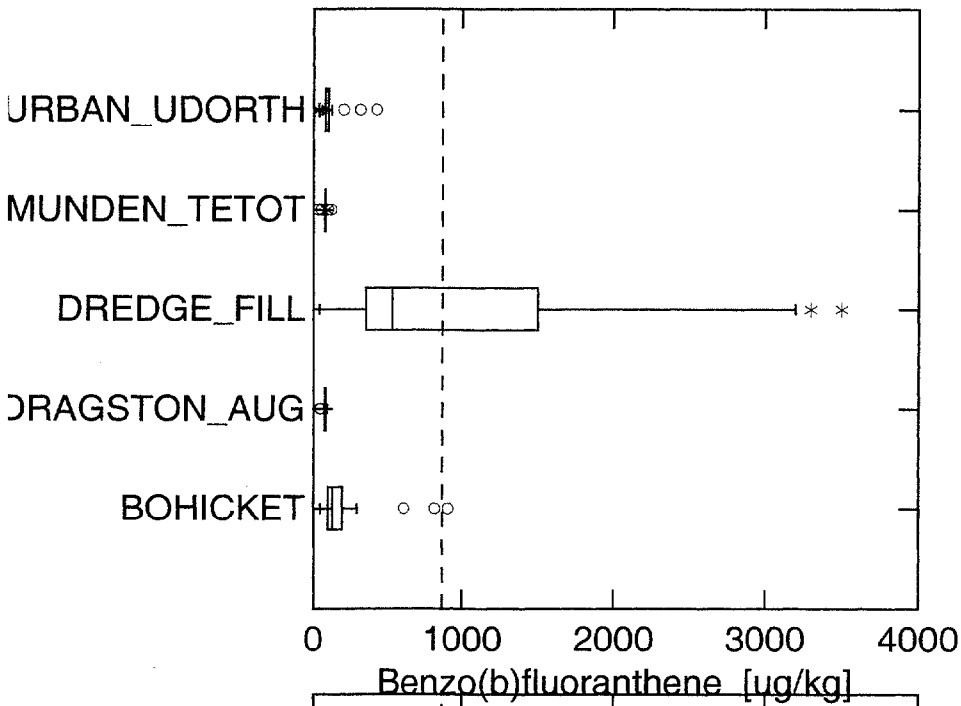

DEPTH
1 - 3
0 - 0.5
52
53
54
55
56
57
58
bis(2-Ethylhexyl)phthalate [ug/kg]

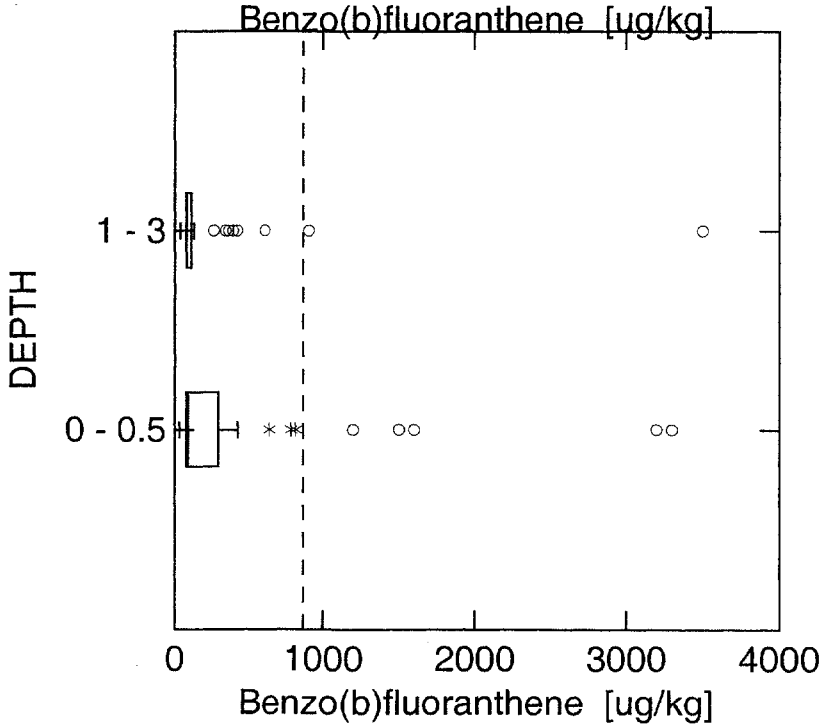

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
1000
2000
3000
4000
5000
Benzo(a)anthracene [ug/kg]

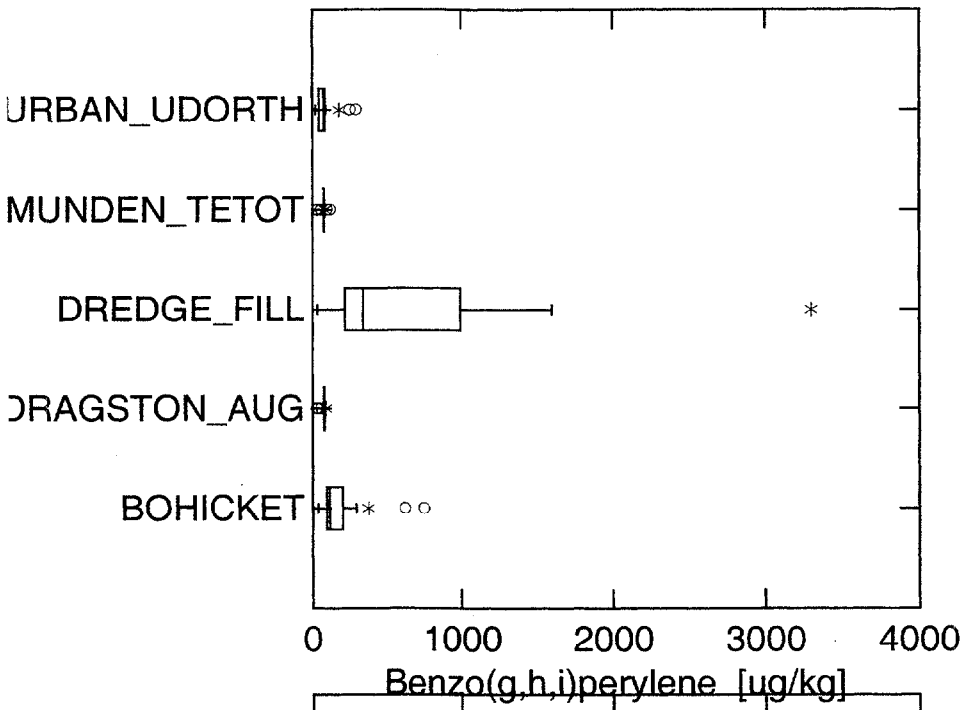

DEPTH
1 - 3
0 - 0.5
0
1000
2000
3000
4000
5000
Benzo(a)anthracene [ug/kg]

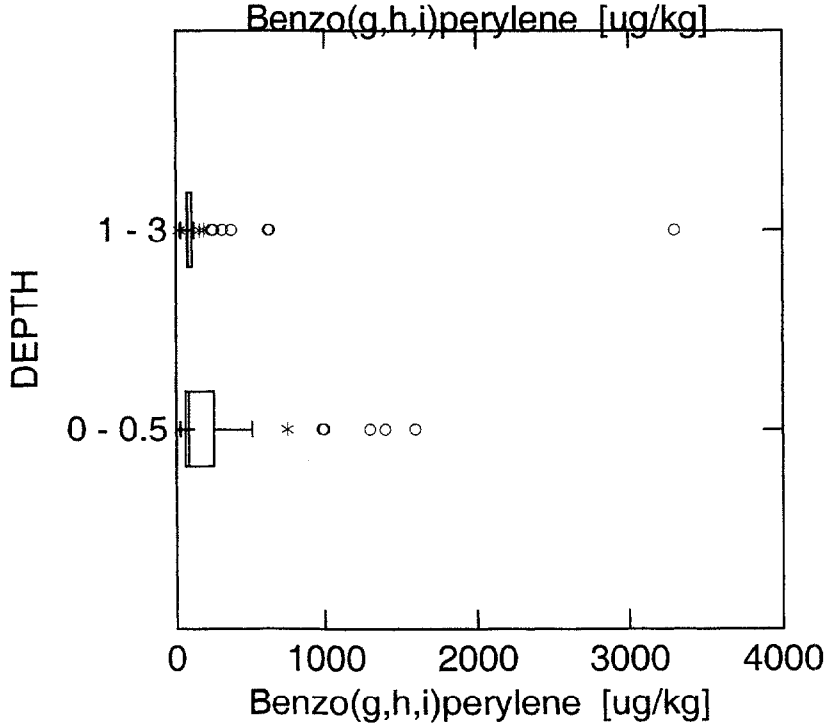

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
1000
2000
3000
4000
5000
Benzo(a)pyrene [ug/kg]

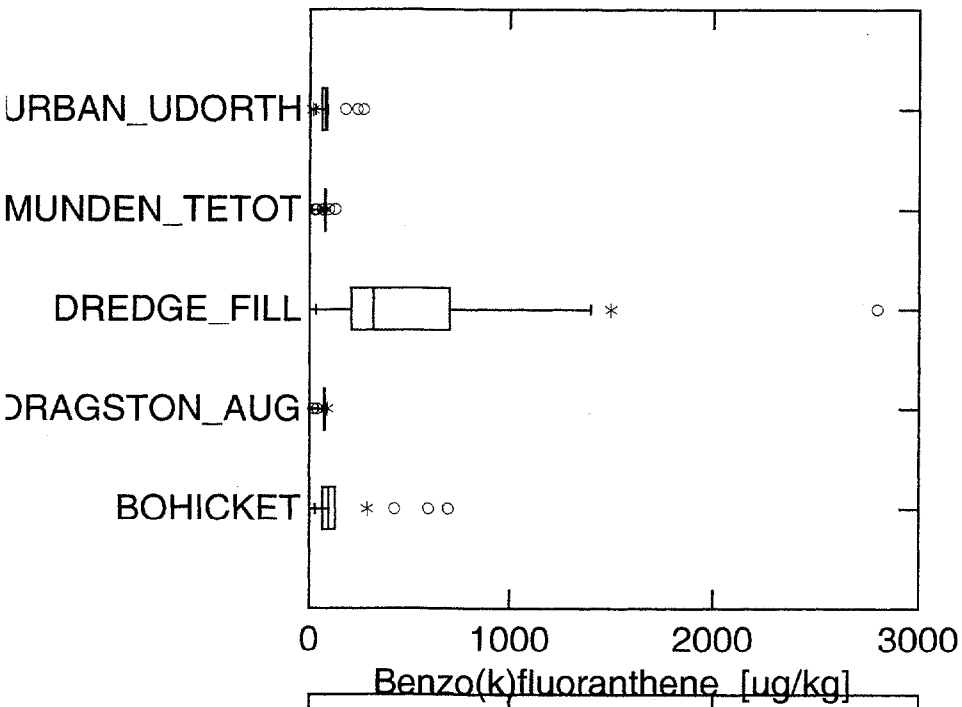

DEPTH
1 - 3
0 - 0.5
0
1000
2000
3000
4000
5000
Benzo(a)pyrene [ug/kg]

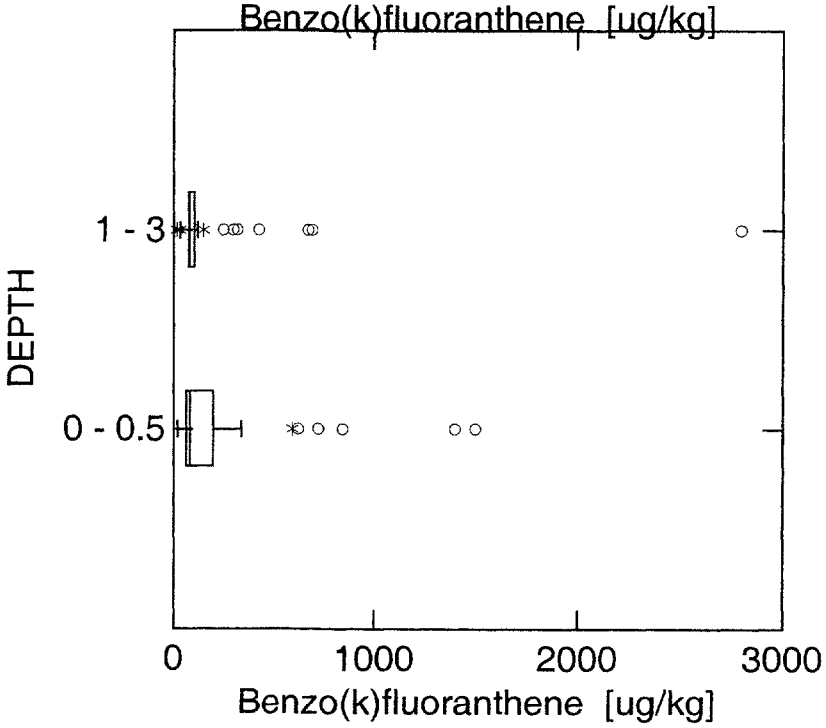

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
1000
2000
3000
4000
Benzo(b)fluoranthene [ug/kg]

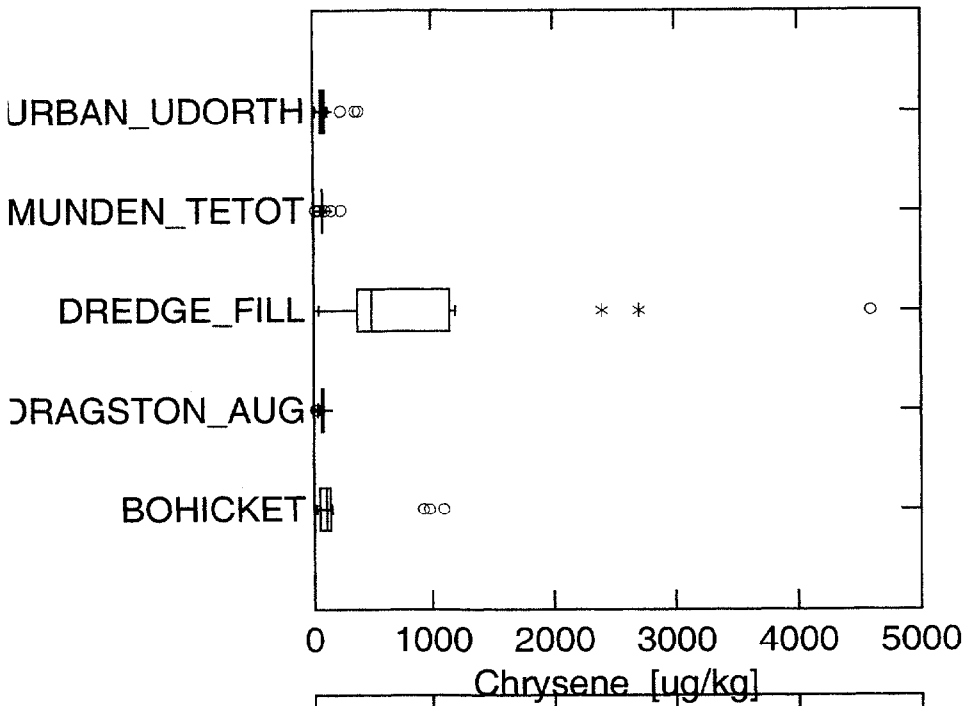

DEPTH
1 - 3
0 - 0.5
0
1000
2000
3000
4000
Benzo(b)fluoranthene [ug/kg]

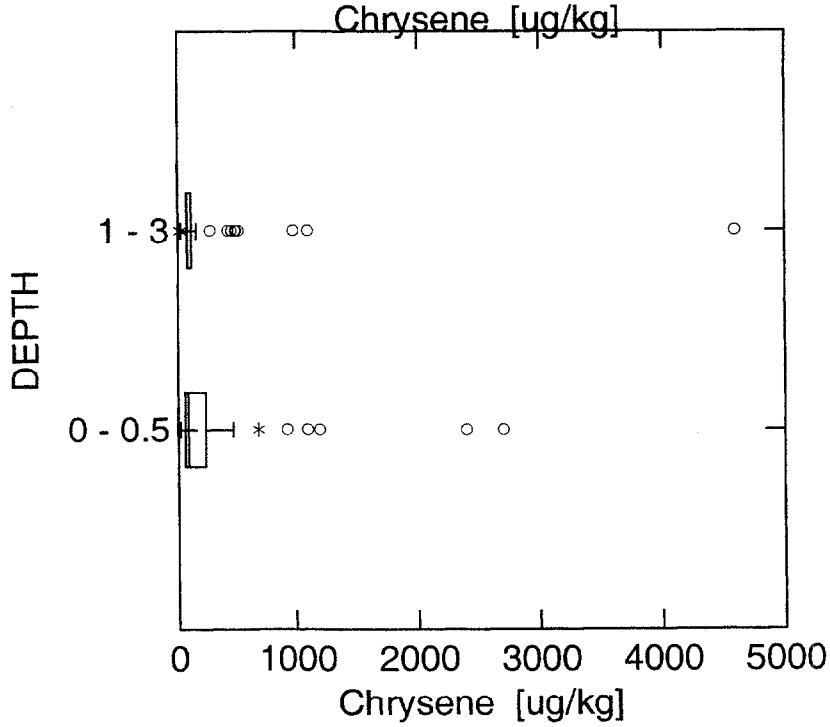

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
1000
2000
3000
4000
Benzo(g,h,i)perylene [ug/kg]

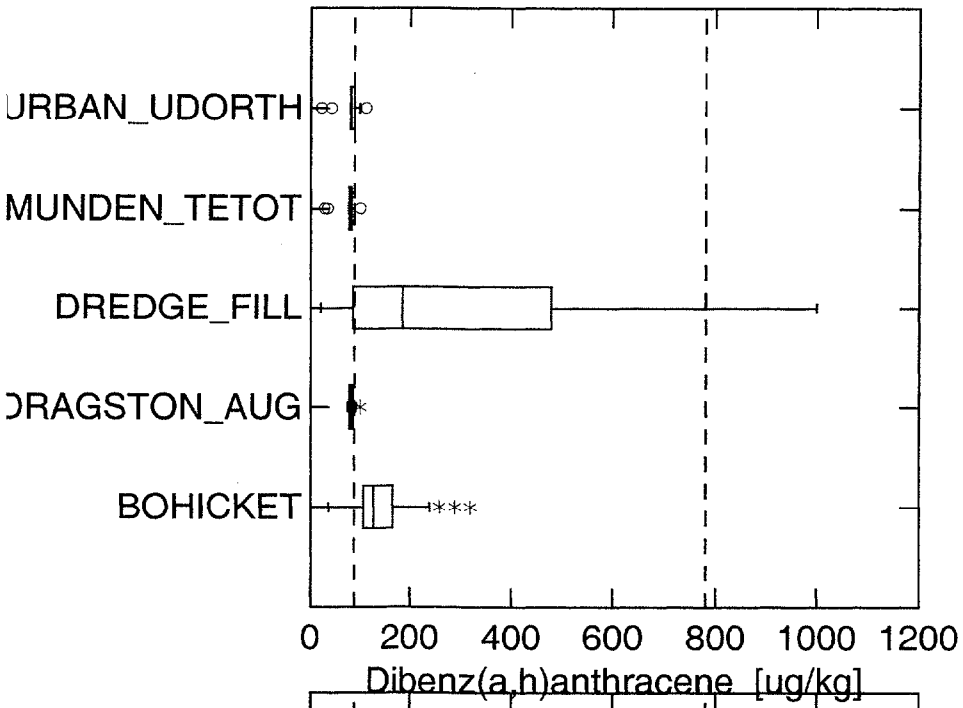

DEPTH
1 - 3
0 - 0.5
0
1000
2000
3000
4000
Benzo(g,h,i)perylene [ug/kg]

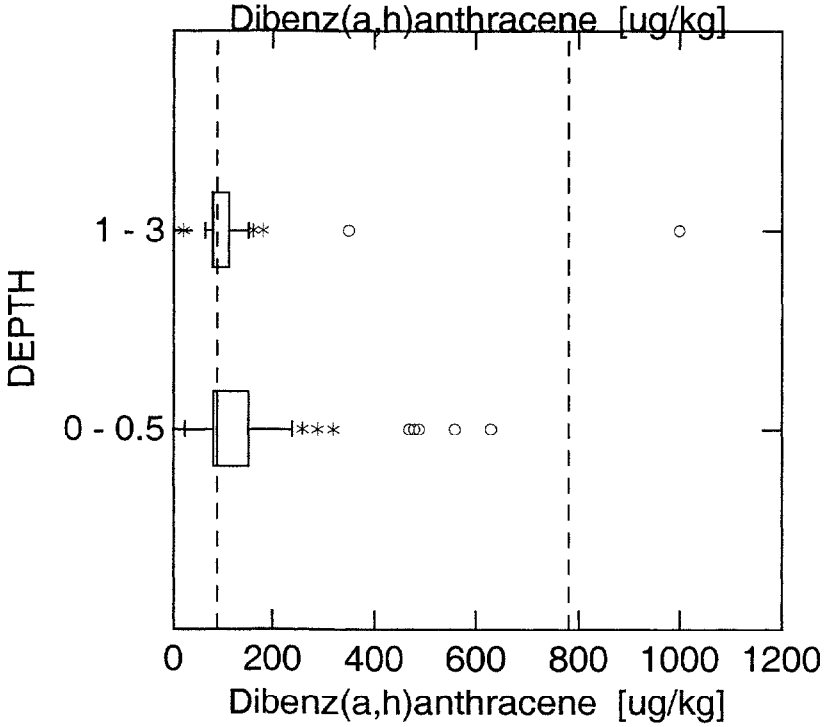

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
1000
2000
3000
Benzo(k)fluoranthene [ug/kg]

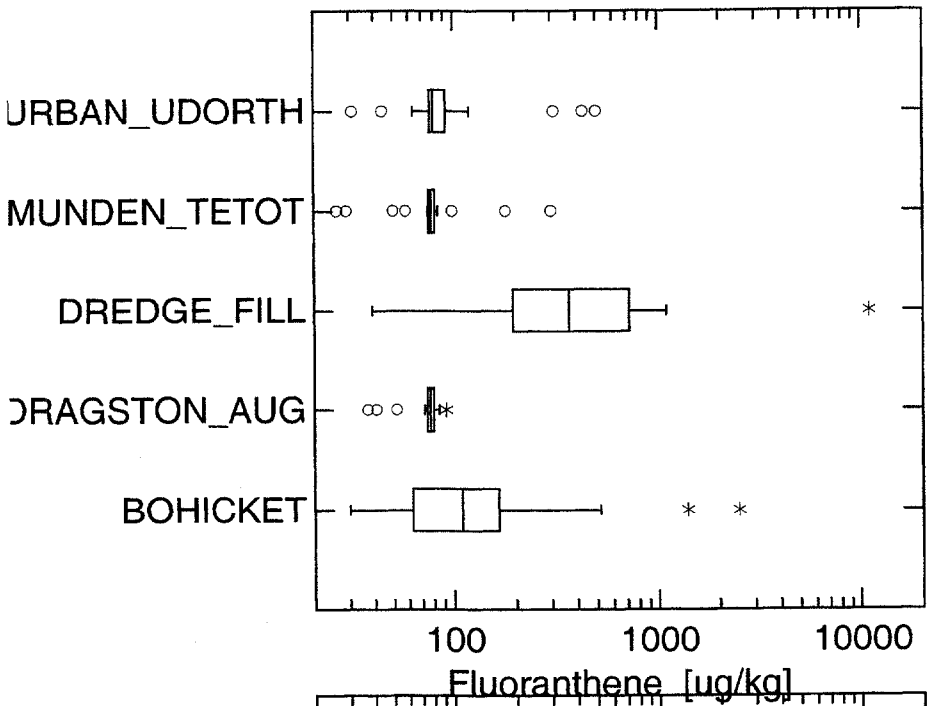

DEPTH
1 - 3
0 - 0.5
0
1000
2000
3000
Benzo(k)fluoranthene [ug/kg]

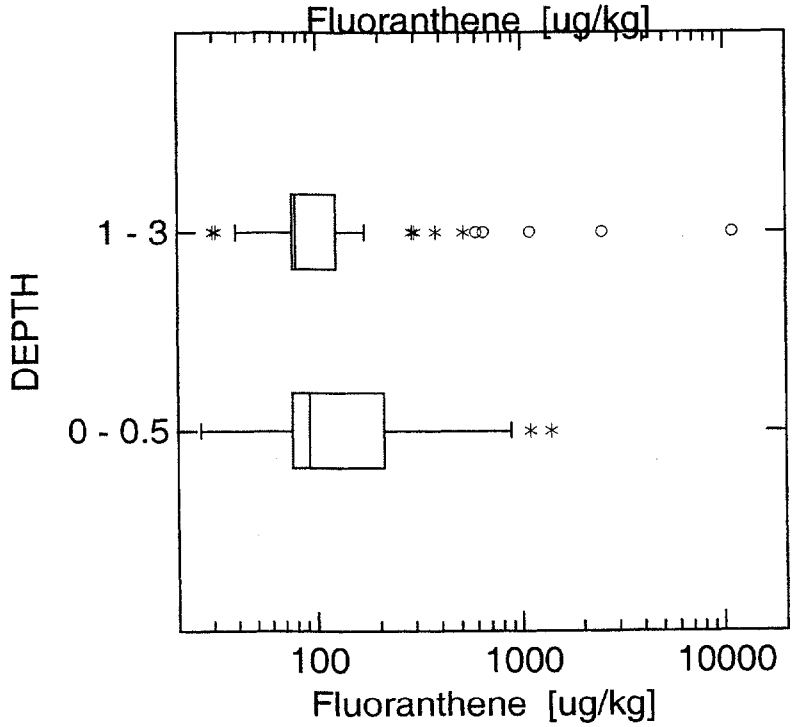

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
1000
2000
3000
4000
5000
Chrysene [ug/kg]

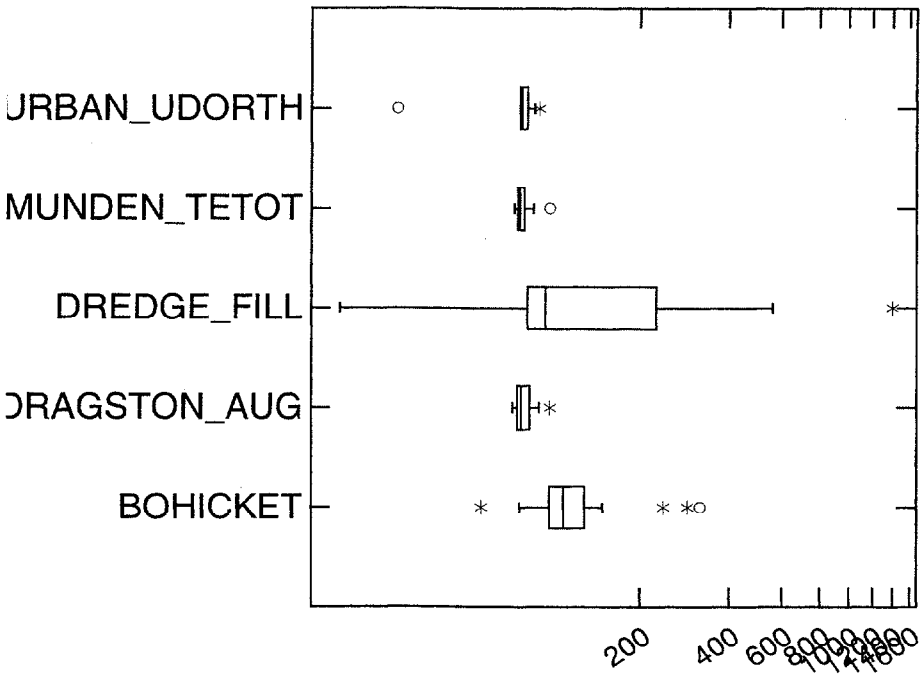

DEPTH
1 - 3
0 - 0.5
0
1000
2000
3000
4000
5000
Chrysene [ug/kg]

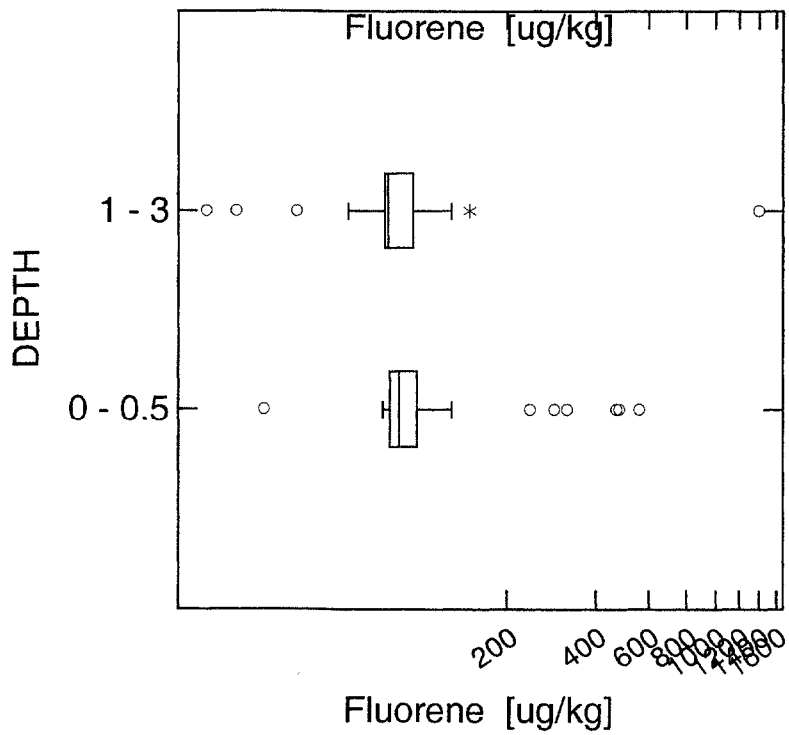

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
200
400
600
800
1000
1200
Dibenz(a,h)anthracene [ug/kg]

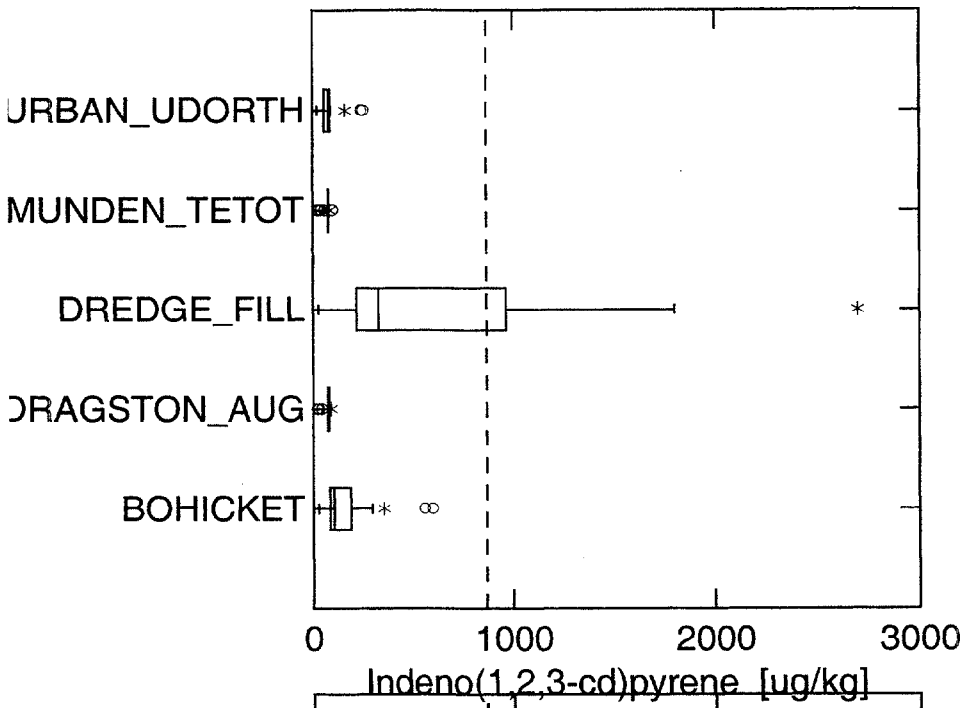

DEPTH
1 - 3
0 - 0.5
0
200
400
600
800
1000
1200
Dibenz(a,h)anthracene [ug/kg]

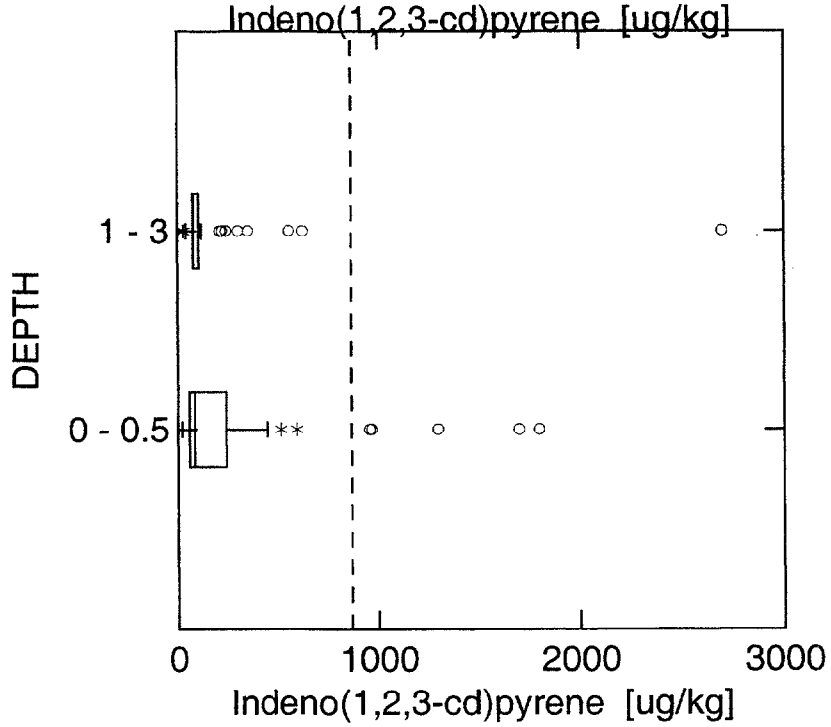

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
100
1000
10000
Fluoranthene [ug/kg]

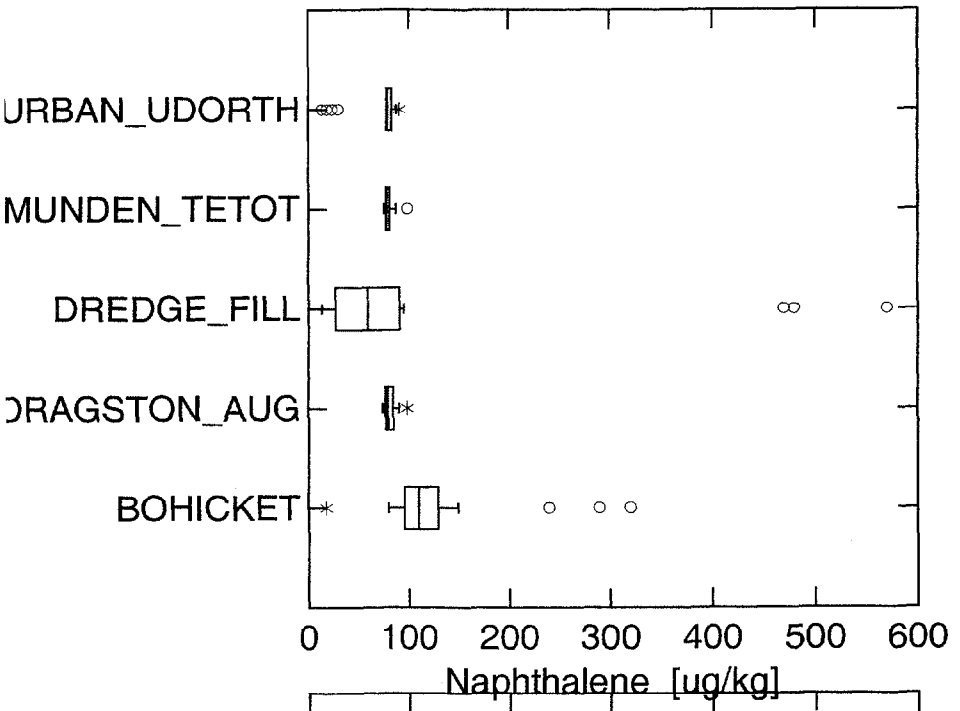

DEPTH
1 - 3
0 - 0.5
100
1000
10000
Fluoranthene [ug/kg]

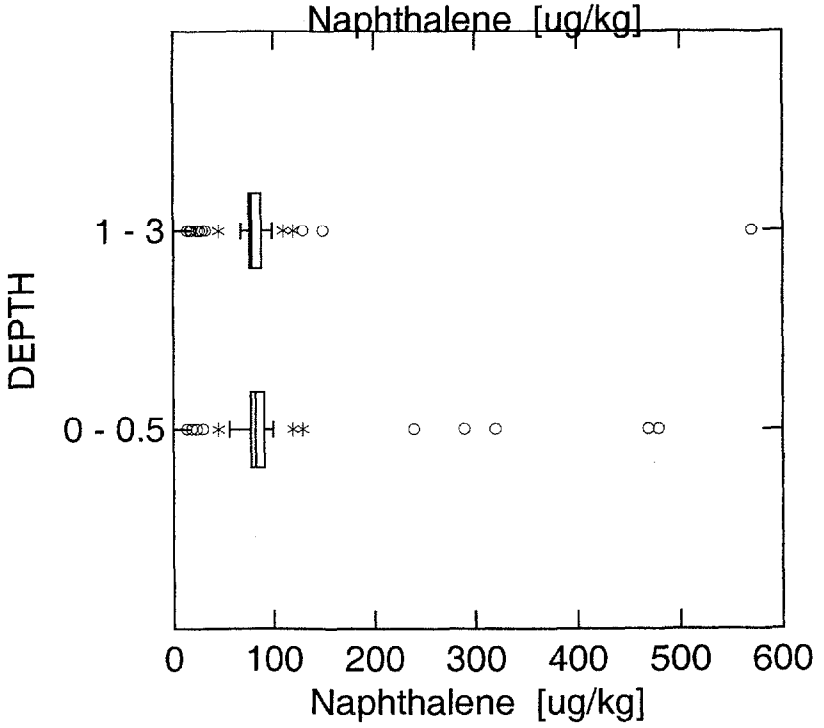

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
200
400
600
Fluorene [ug/kg]

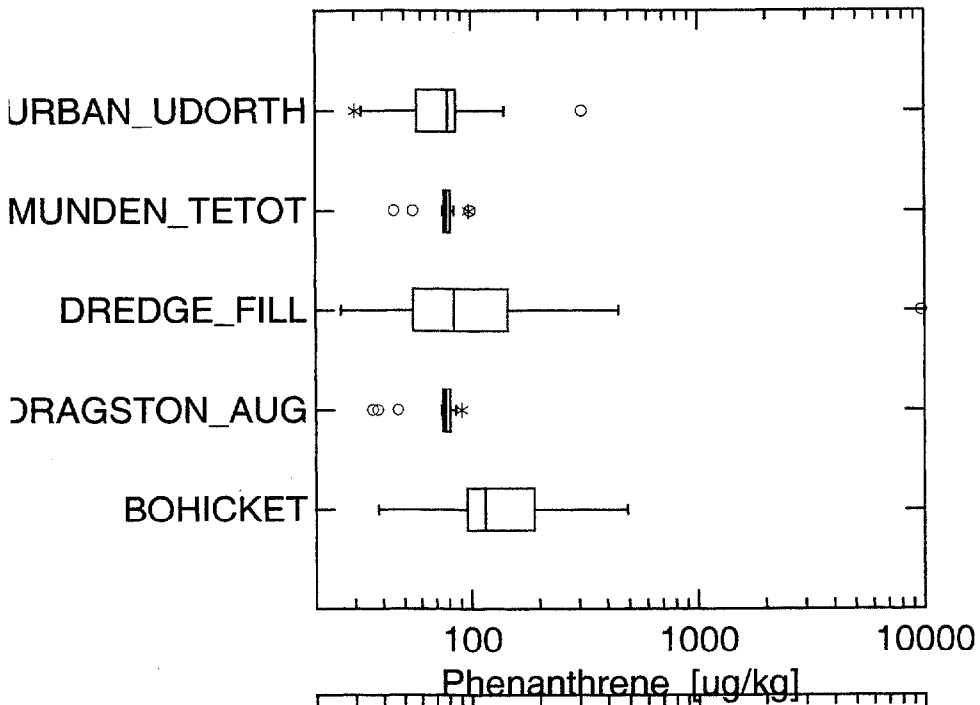

DEPTH
1 - 3
0 - 0.5
200
400
600
Fluorene [ug/kg]

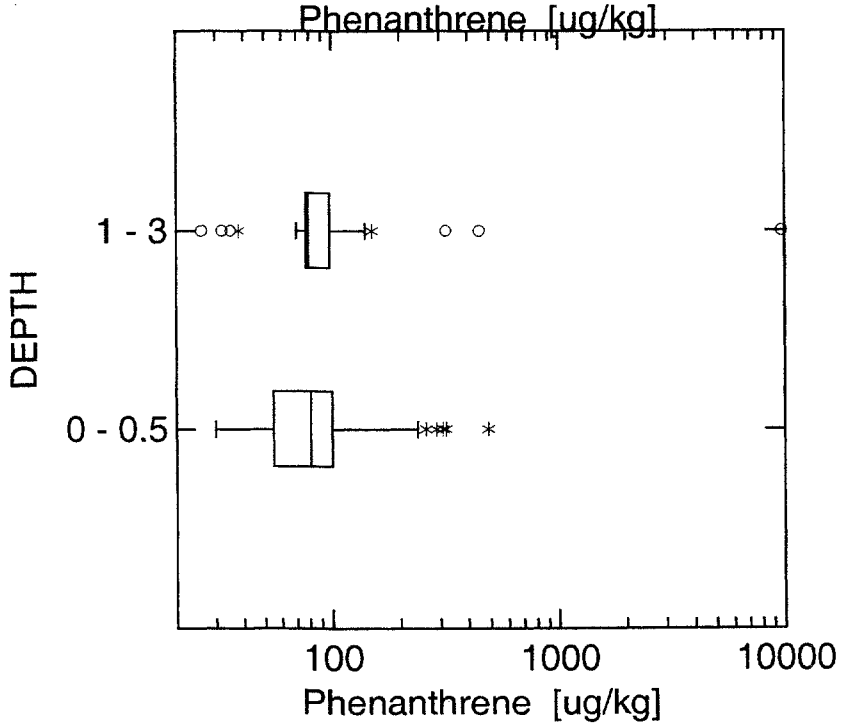

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
1000
2000
3000
Indeno(1,2,3-cd)pyrene [ug/kg]

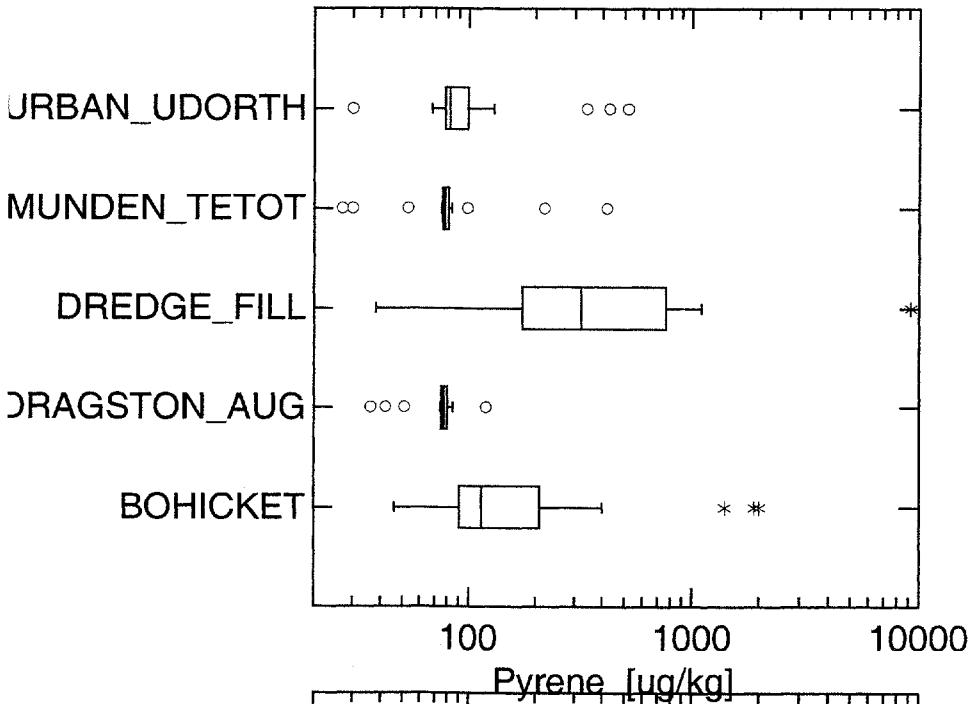

DEPTH
1 - 3
0 - 0.5
0
1000
2000
3000
Indeno(1,2,3-cd)pyrene [ug/kg]

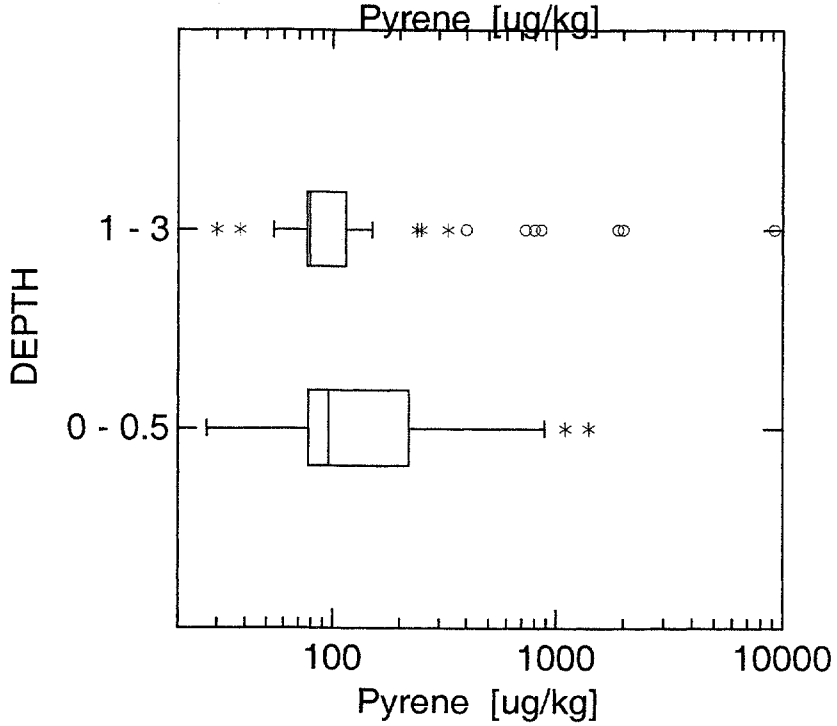

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
100
200
300
400
500
600
Naphthalene [ug/kg]

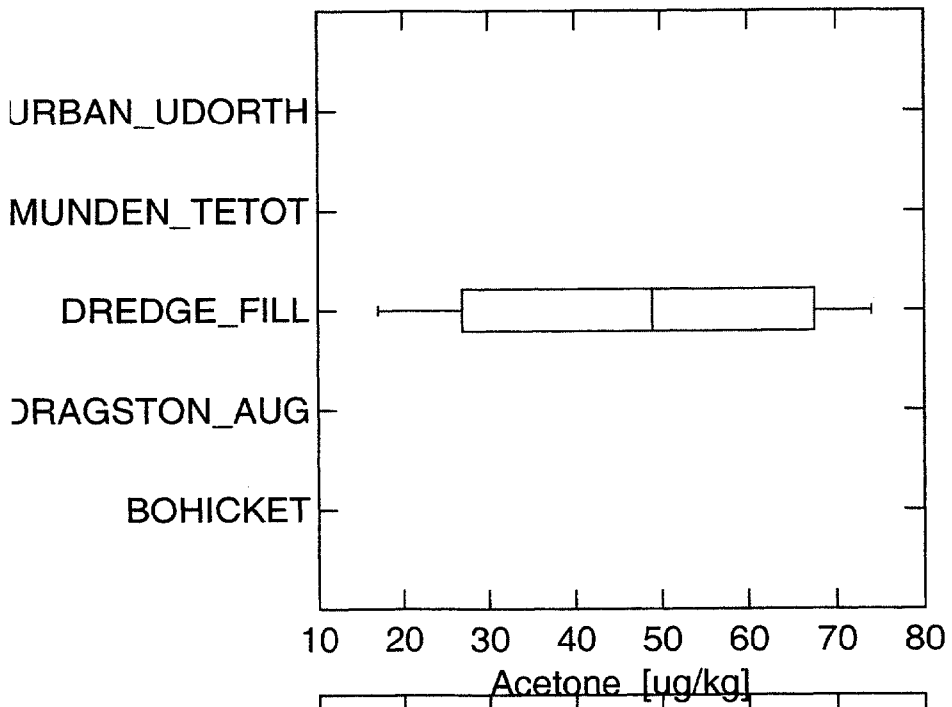

DEPTH
1 - 3
0 - 0.5
0
100
200
300
400
500
600
Naphthalene [ug/kg]

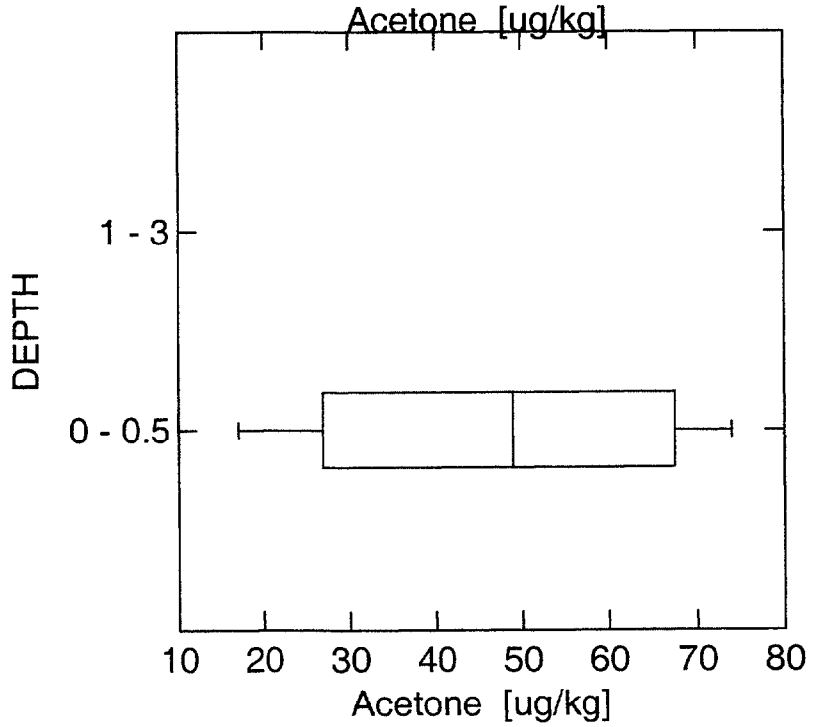

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
100
1000
10000
Phenanthrene [ug/kg]

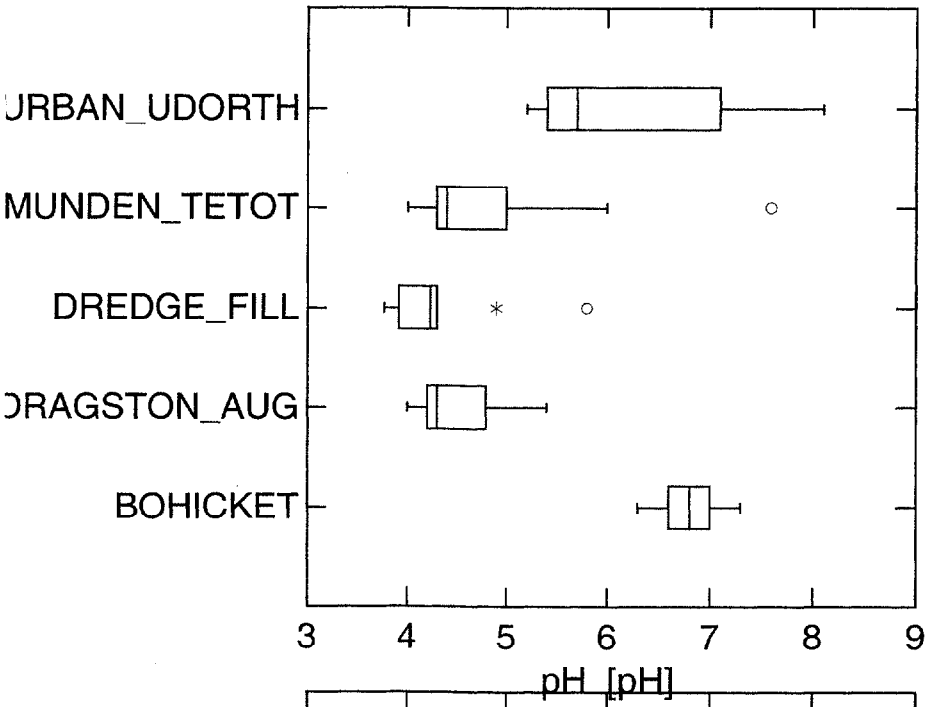

DEPTH
1 - 3
0 - 0.5
100
1000
10000
Phenanthrene [ug/kg]

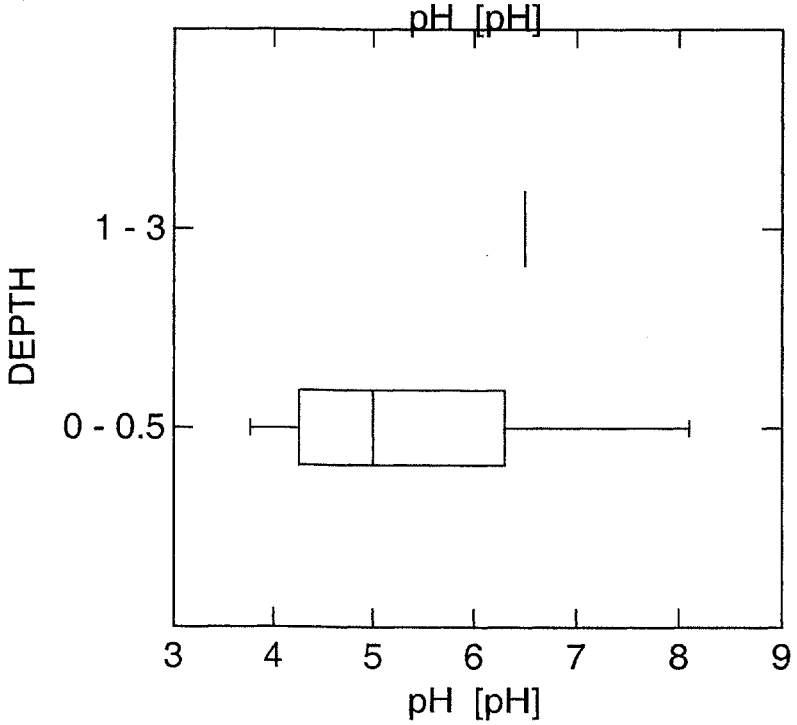

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
100
1000
10000
Pyrene [ug/kg]

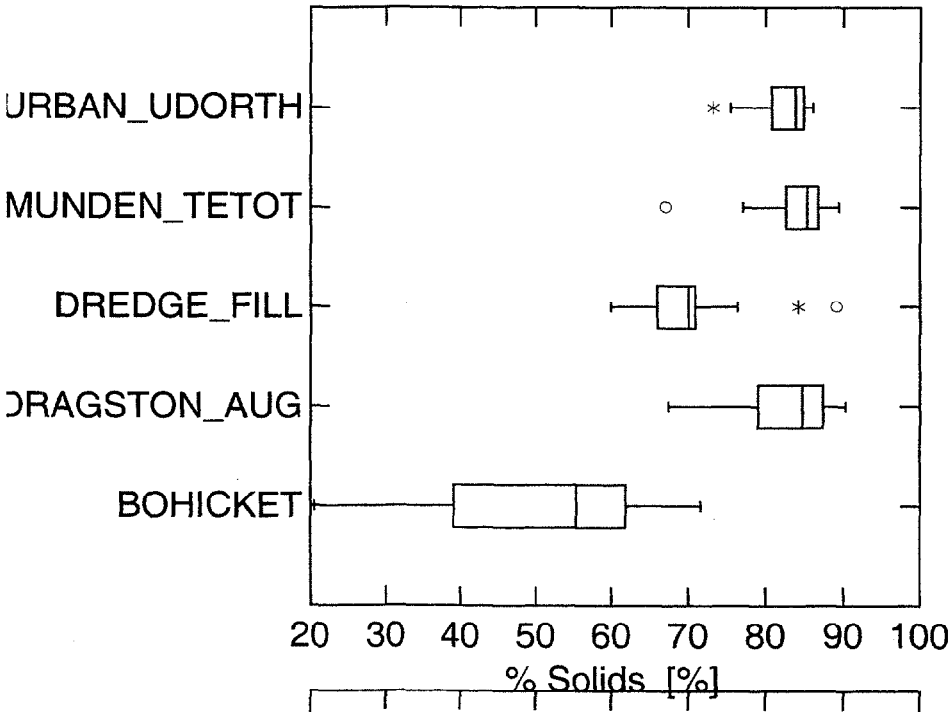

DEPTH
1 - 3
0 - 0.5
100
1000
10000
Pyrene [ug/kg]

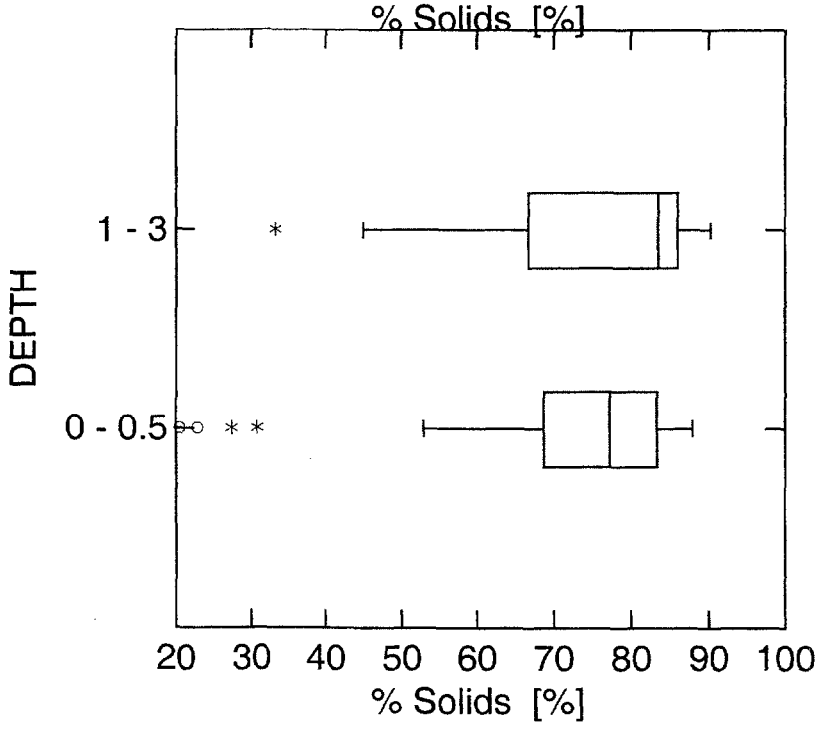

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
10 20 30 40 50 60 70 80
Acetone [ug/kg]

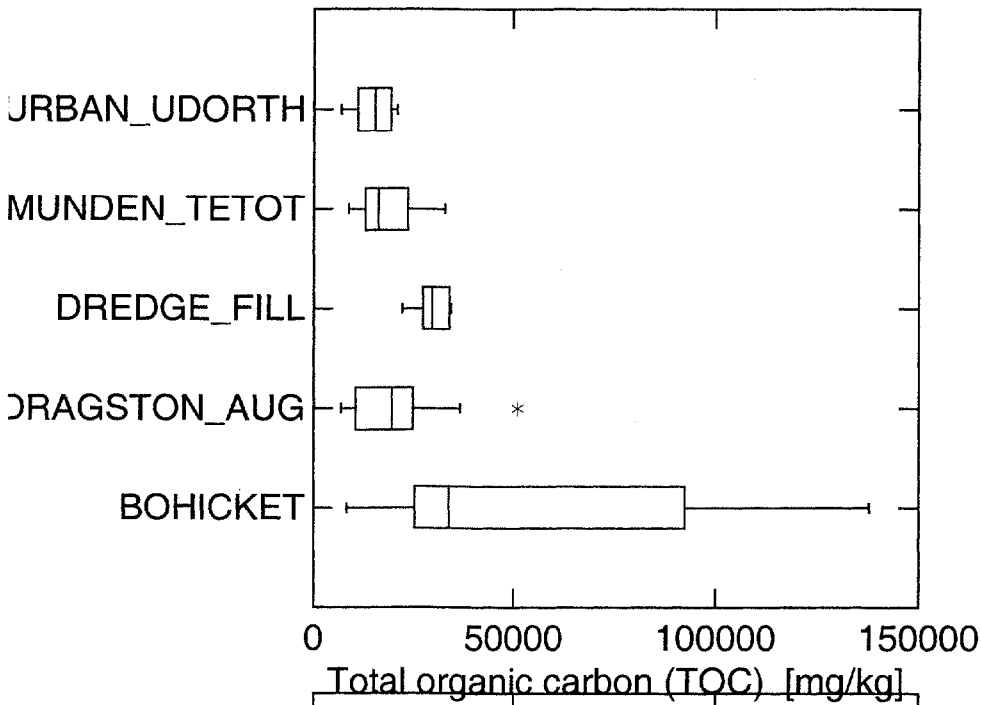

DEPTH
1 - 3
0 - 0.5
10 20 30 40 50 60 70 80
Acetone [ug/kg]

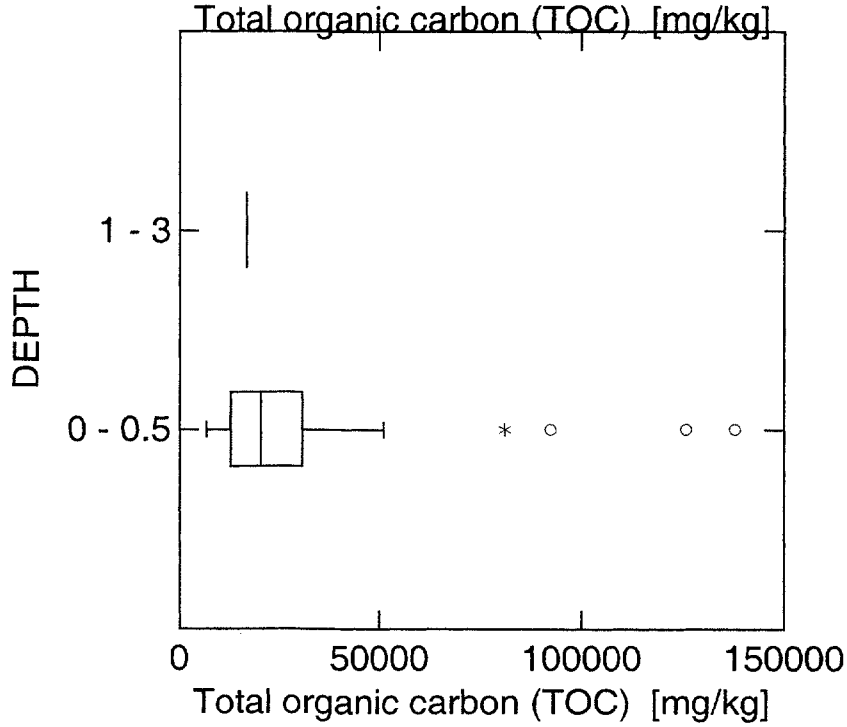

URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
3
4
5
6
7
8
9
pH [pH]


DEPTH
1 - 3
0 - 0.5
3
4
5
6
7
8
9
pH [pH]


URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
20 30 40 50 60 70 80 90 100
% Solids [%]


DEPTH
1 - 3
0 - 0.5
20 30 40 50 60 70 80 90 100
% Solids [%]


URBAN_UDORTH
MUNDEN_TETOT
DREDGE_FILL
DRAGSTON_AUG
BOHICKET
0
50000
100000
150000
Total organic carbon (TOC) [mg/kg]


DEPTH
1 - 3
0 - 0.5
0
50000
100000
150000
Total organic carbon (TOC) [mg/kg]

Appendix E

Soil Sample Data Summary

Appendix E
Soil Sample Data Summary
St. Juliens Creek Annex Background Investigation

File#	Chemical Name	Number of Detects	Number of Non Detects	Total Number of Samples	Frequency of Detection	~L = Log Normal	~N = Normal	Assumed Distribution	Mean (Conc.)	Lower Confidence Interval (Conc.)	Upper Confidence Interval (Conc.)	~ Conf = 95% Confidence Level	Upper Tolerance Level (UTL) (Conc.)	Lower Bound UTL (Conc.)	Upper Bound UTL (Conc.)	~Conf = Associated Confidence
F01	**Munden-Tetotum/Dragston-Augusta Surface and Subsurface**															
F01	Arsenic (mg/Kg)	31	9	40	77.5	0.18	E-6	L	2.6	2.2	3.3	95%	5.7	4.5	7.9	95%
F01	Benzo(a)anthracence (ug/Kg)	12	28	40	30.0	E-6	E-6	NP	2	1.8	2.6	94%	6.9	4.7	9.4	82%
F01	Benzo(a)pyrene (ug/Kg)	10	30	40	25.0	E-7	E-6	NP	77	76	79	94%	91	84	150	82%
F01	Benzo(b)fluoranthene (ug/Kg)	7	33	40	17.5	E-8	E-6	NP	78	77	80	94%	91	86	120	86%
F01	Benzo(g,h,I)perlyene (ug/Kg)	9	31	40	22.5	E-8	E-6	NP	77	76	79	94%	91	84	120	82%
F01	Benzo(k)fluoranthene (ug/Kg)	9	31	40	22.5	E-8	E-6	NP	77	76	79	94%	91	84	130	82%
F01	Beryllium (mg/Kg)	2	38	40	5.0	0.78	0.09	L	0.15	0.13	0.18	95%	0.28	0.24	0.36	95%
F01	Calcium (mg/Kg)	38	2	40	95.0	E-4	E-13	NP	194	146	282	94%	1225	504	9060	82%
F01	Chrysene (ug/Kg)	13	27	40	32.5	E-6	E-8	NP	77	76	78	94%	102	84	230	82%
F01	Fluoranthene (ug/Kg)	12	28	40	30.0	E-7	e-10	NP	77	76	79	94%	103	85	300	82%
F01	Indeno(1,2,3-cd)pyrene (ug/Kg)	9	31	40	22.5	E-8	E-7	NP	77	76	79	94%	91	84	99	82%
F01	Nickel (mg/Kg)	11	29	40	27.5	0.004	0.001	NP	4.2	3	5.1	94%	6.9	5.8	9.5	82%
F01	Phenanthrene (ug/Kg)	6	34	40	15.0	E-8	E-7	NP	78	77	80	94%	91	85	99	82%
F01	Potassium (mg/Kg)	10	30	40	25.0	0.002	E-5	NP	172	135	204	94%	368	308	409	82%
F01	Pyrene (ug/Kg)	12	28	40	30.0	E-7	E-11	NP	77	76	79	94%	125	85	420	82%
F01	Sodium (mg/Kg)	26	14	40	65.0	E-5	E-8	NP	44	40	51	94%	174	112	290	82%
F01	Vanadium (mg/Kg)	39	1	40	97.5	0.007	0.2	N	16.3	14.2	18.3	95%	26.6	24.1	30.3	95%
F02	**Munden-Tetotum/Dragston-Augusta Surface**															
F02	4,4'-DDT (ug/Kg)	17	2	19	89.5	0.002	E-9	NP	7.2	4	19	94%	237	28	1600	56%
F02	4,4'-DDT (ug/Kg)	5	14	19	26.3	E-4	E-6	NP	4.2	3.9	4.3	94%	10.6	7.8	16	56%
F02	4,4'-DDE (ug/Kg)	16	3	19	84.2	0.03	E-8	NP	11	5	41	94%	532	350	1900	56%
F02	Acenaphthene (ug/Kg)		20	20	0.0	0.06	0.02	L	82	80	85	95%	92	88	97	95%
F02	Acenaphthylene (ug/Kg)	3	17	20	15.0	E-7	E-6	NP	82	79	86	92%	95	91	99	57%
F02	Aldrin (ug/Kg)		19	19	0.0	E-7	E-8	NP	2.1	2	2.2	94%	2.7	2.2	5.9	56%
F02	alpha-Chlordane (ug/Kg)	3	16	19	15.8	E-7	E-8	NP	2.1	2	2.2	94%	9.8	2.3	45	56%
F02	Aluminum (mg/Kg)	20		20	100.0	0.02	0.28	N	4610	3739	5480	95%	7669	6647	9401	95%
F02	Anthracene (ug/Kg)	1	19	20	5.0	E-7	E-6	NP	81	79	85	92%	91	87	99	57%
F02	Antimony (mg/Kg)	1	19	20	5.0	0.002	E-4	NP	0.5	0.5	0.6	94%	0.7	0.7	0.7	57%
F02	Barium (mg/Kg)	20		20	100.0	0.11	0.69	N	25	21	30	95%	40	35	49	95%
F02	beta -BHC (ug/Kg)		19	19	0.0	E-7	E-8	NP	2.1	2	2.2	94%	2.7	2.2	5.9	56%
F02	Copper (mg/Kg)	20		20	100.0	0.99	0.02	L	8.4	6.7	11.3	95%	17.1	13	27.5	95%
F02	delta - BHC (ug/Kg)		19	19	0.0	E-7	E-8	NP	2.1	2	2.2	94%	2.7	2.2	5.9	56%
F02	Dibenz(a,h)anthracene (ug/Kg)	2	18	20	10.0	E-6	E-5	NP	81	79	85	92%	91	87	99	57%
F02	Dieldrin (ug/Kg)	1	18	19	5.3	E-7	E-7	NP	4.1	4	4.2	94%	11.5	4.5	16	56%
F02	Endosulfan I (ug/Kg)		19	19	0.0	E-7	E-8	NP	2.1	2	2.2	94%	2.7	2.2	5.9	56%
F02	Endosulfan II (ug/Kg)	1	18	19	5.3	E-7	E-8	NP	4.1	4	4.2	94%	13.5	4.5	36	56%
F02	Endrin (ug/Kg)	2	17	19	10.5	E-7	E-8	NP	4.1	3.9	4.2	94%	13.4	4.5	35	56%
F02	Endrin aldehyde (ug/Kg)	2	17	19	10.5	E-6	E-7	NP	4	3.9	4.2	94$	11.6	4.5	17	56%
F02	Fluorene (ug/Kg)		20	20	0.0	0.06	0.02	L	82	80	85	95%	92	88	97	95%
F02	gamma-Chlordane (ug/Kg)	1	18	19	5.3	E-7	E-7	NP	2.1	2	2.2	94%	6.1	2.3	8.1	56%
F02	Lead (mg/Kg)	20		20	100.0	0.29	0.17	L	31	25	41	95%	61	47	95	95%
F02	Manganese (mg/Kg)	20		20	100.0	0.74	E-5	L	16	12	27	95%	42	28	84	95%
F02	Mercury (mg/Kg)	9	11	20	45.0	0.26	0.08	L	0.14	0.11	0.19	95%	0.3	0.23	0.5	95%
F02	Magnesium (mg/Kg)	20		20	100.0	0.47	0.06	L	251	200	344	95%	527	393	865	95%
F02	Naphthalene (ug/Kg)		20	20	0.0	0.06	0.02	L	82	80	85	95%	92	88	97	95%
F02	Selenium (mg/Kg)	3	17	20	15.0	E-4	E-4	NP	0.7	0.7	0.7	92%	1	1	1.2	57%
F02	Silver (mg/Kg)		20	20	0.0	0.02	0.007	NP	0.52	0.5	0.54	92%	0.62	0.58	0.63	57%
F02	Zinc (mg/Kg)	20		20	100.0	0.83	0.17	L	19	15	25	95%	38	29	62	95%

Appendix E
Soil Sample Data Summary
St. Juliens Creek Annex Background Investigation

File#	Chemical Name	Number of Detects	Number of Non Detects	Total Number of Samples	Frequency of Detection	~L = Log Normal	~N = Normal	Assumed Distribution	Mean (Conc.)	Lower Confidence Interval (Conc.)	Upper Confidence Interval (Conc.)	~ Conf = 95% Confidence Level	Upper Tolerance Level (UTL) (Conc.)	Lower Bound UTL (Conc.)	Upper Bound UTL (Conc.)	~Conf = Associated Confidence
F03	**Munden-Tetotum/Dragston-Augusta Subsurface**															
F03	4,4'-DDT (ug/Kg)	2	18	20	10.0	E-8	E-8	NP	3.8	3.8	3.9	92%	7.8	4.9	19	57%
F03	4,4'-DDT (ug/Kg)		20	20	0.0	E-6	E-6	NP	3.8	3.8	3.9	92%	4	4	4.9	57%
F03	4,4'-DDE (ug/Kg)	5	15	20	25.0	E-6	E-7	NP	3.9	3.8	.4	92%	18	12	18	57%
F03	Acenaphthene (ug/Kg)		20	20	0.0	E-6	E-6	NP	77	76	78	92%	81	80	99	57%
F03	Acenaphthylene (ug/Kg)		20	20	0.0	E-6	E-6	NP	77	76	78	92%	81	80	99	57%
F03	Aldrin (ug/Kg)		20	20	0.0	E-7	E-7	NP	2	1.9	2	92%	2	2	2.5	57%
F03	alpha-Chlordane (ug/Kg)	1	19	20	5.0	E-8	E-9	NP	2	1.9	2	92%	2.8	2	8.4	57%
F03	Aluminum (mg/Kg)	20		20	100.0	E-4	0.97	N	9361	7586	11136	95%	15599	13516	19131	95%
F03	Anthracene (ug/Kg)		20	20	0.0	E-6	E-6	NP	77	76	78	92%	81	80	99	57%
F03	Antimony (mg/Kg)		20	20	0.0	E-7	E-8	NP	0.5	0.5	0.5	92%	0.6	0.5	1.2	57%
F03	Barium (mg/Kg)	20		20	100.0	E-5	0.33	N	39	33	45	95%	61	54	74	95%
F03	beta -BHC (ug/Kg)	1	19	20	5.0	E-6	E-6	NP	2	1.9	2	92%	2	2	2.5	57%
F03	Copper (mg/Kg)	17	3	20	85.0	0.009	0.81	N	3	2.4	3.6	95%	5.1	4.4	6.3	95%
F03	delta - BHC (ug/Kg)		20	20	0.0	E-7	E-7	NP	2	1.9	2	92%	2	2	2.5	57%
F03	Dibenz(a,h)anthracene (ug/Kg)		20	20	0.0	E-6	E-6	NP	77	76	78	92%	81	80	99	57%
F03	Dieldrin (ug/Kg)	1	19	20	5.0	E-6	E-6	NP	3.8	3.8	3.9	92%	4	4	4.9	57%
F03	Endosulfan I (ug/Kg)		20	20	0.0	E-7	E-7	NP	2	1.9	2	92%	2	2	2.5	57%
F03	Endosulfan II (ug/Kg)	1	19	20	5.0	E-7	E-8	NP	3.8	3.8	3.9	92%	5	4	7.4	57%
F03	Endrin (ug/Kg)	2	18	20	10.0	E-6	E-7	NP	3.8	3.8	3.9	92%	5.1	4	8.9	57%
F03	Endrin aldehyde (ug/Kg)	1	19	20	5.0	E-5	E-6	NP	3.8	3.8	3.9	92%	4.2	4	4.9	57%
F03	Fluorene (ug/Kg)		20	20	0.0	E-6	E-6	NP	77	76	78	92%	81	80	99	57%
F03	gamma-Chlordane (ug/Kg)	1	19	20	5.0	E-5	E-6	NP	2	1.9	2	92%	2	2	2.5	57%
F03	Lead (mg/Kg)	20		20	100.0	0.97	0.13	L	7.3	6.4	8.6	95%	12	10	15	95%
F03	Manganese (mg/Kg)	20		20	100.0	0.68	0.1	L	8.9	7.7	10.5	95%	14	12	19	95%
F03	Mercury (mg/Kg)	6	14	20	30.0	0.02	0.047	NP	0.08	0.06	0.09	92%	0.1	0.1	0.13	57%
F03	Magnesium (mg/Kg)	20		20	100.0	0.52	0.63	N	372	311	433	95%	587	515	709	95%
F03	Naphthalene (ug/Kg)		20	20	0.0	E-6	E-6	NP	77	76	78	92%	81	80	99	57%
F03	Selenium (mg/Kg)		20	20	0.0	E-6	E-7	NP	0.6	0.6	0.6	92%	0.7	0.7	0.8	57%
F03	Silver (mg/Kg)		20	20	0.0	E-6	E-7	NP	0.49	0.48	0.49	92%	0.52	0.5	0.63	57%
F03	Zinc (mg/Kg)	20		20	100.0	0.03	E-6	NP	7.9	6.2	8.6	92%	13	10	30	57%
F04	**Munden-Tetotum Surface and Subsurface**															
F04	Cobalt (mg/Kg)	11	10	21	52.4	0.03	0.002	NP	1.2	1	1.5	95%	2.2	2	2.6	57%
F05	**Munden-Tetotum Surface**															
F05	Chromium (mg/Kg)	9	1	10	90.0	--	0.43	N	4.8	3.8	5.8	95%	7	6	9	95%
F05	Iron (mg/Kg)	10		10	100.0	--	0.79	N	2501	1993	3009	95%	3669	3151	4815	95%
F06	**Munden-Tetotum Subsurface**															
F06	Chromium (mg/Kg)	10	1	11	90.9	--	0.63	N	9.5	6.1	12.8	95%	18	14	25	95%
F06	Iron (mg/Kg)	11		11	100.0	--	0.71	N	4614	3062	6165	95%	8412	6791	11838	95%
F07	**Dragston-Augusta Surface and Subsurface**															
F07	Cobalt (mg/Kg)	14	5	19	73.7	--	0.16	N	1.8	1.5	2	95%	2.7	2.4	3.2	95%
F08	**Dragston-Augusta Surface**															
F08	Chromium (mg/Kg)	9	1	10	90.0	0.31	0.63	N	6.7	5.4	7.9	95%	9.6	8.3	12.4	95%
F08	Iron (mg/Kg)	10		10	100.0	0.11	0.81	N	3366	2547	4185	95%	5249	4414	7097	95%
F09	**Dragston-Augusta Subsurface**															
F09	Chromium (mg/Kg)	9	0	9	100.0	--	0.03	NP	14	12	14	89%	15	14	15	30%
F09	Iron (mg/Kg)	9	0	9	100.0	--	E-4	NP	6550	5120	7310	89%	13664	7310	17900	30%

Appendix E
Soil Sample Data Summary
St. Juliens Creek Annex Background Investigation

File#	Chemical Name	Number of Detects	Number of Non Detects	Total Number of Samples	Frequency of Detection	~L = Log Normal	~N = Normal	Assumed Distribution	Mean (Conc.)	Lower Confidence Interval (Conc.)	Upper Confidence Interval (Conc.)	~ Conf = 95% Confidence Level	Upper Tolerance Level (UTL) (Conc.)	Lower Bound UTL (Conc.)	Upper Bound UTL (Conc.)	~Conf = Associated Confidence
F10	Bohicket Surface and Subsurface															
F10	4,4'-DDT (ug/Kg)	7	13	20	35	E-4	E-7	NP	6	5.4	13	92%	34	26	81	57%
F10	4,4'-DDE (ug/Kg)	10	10	20	50	E-5	E-8	NP	6.3	5.5	11	92%	308	36	840	57%
F10	Acenaphthene (ug/Kg)	2	18	20	10	0.02	E-4	NP	110	110	130	92%	292	240	320	57%
F10	Acenaphthylene (ug/Kg)	3	17	20	15	0.002	E-4	NP	120	110	150	92%	292	240	320	57%
F10	Aldrin (ug/Kg)	1	19	20	5	0.001	E-6	NP	3.1	2.8	5.1	92%	8.7	7.4	17	57%
F10	alpha-Chlordane (ug/Kg)	2	18	20	10	E-5	E-7	NP	3.1	2.8	3.8	92%	9.1	7.4	25	57%
F10	Aluminum (mg/Kg)	20		20	100	0.77	E-4	L	10777	7617	18937	95%	30002	19241	63698	95%
F10	Anthracene (ug/Kg)	4	16	20	20	0.03	E-4	NP	125	110	170	92%	332	290	550	57%
F10	Antimony (mg/Kg)	20		20	100	0.11	E-5	L	7.4	5.1	13.4	95%	21	13	46	95%
F10	Barium (mg/Kg)	20		20	100	0.22	0.03	L	30	21	53	95%	83	53	179	95%
F10	Benzo(a)anthracence (ug/Kg)	12	8	20	60	0.047	E-6	NP	96	68	120	92%	749	650	910	57%
F10	Benzo(a)pyrene (ug/Kg)	13	7	20	65	0.047	E-6	NP	96	79	120	92%	732	550	770	57%
F10	Benzo(b)fluoranthene (ug/Kg)	9	11	20	45	0.001	E-6	NP	125	110	140	92%	825	610	910	57%
F10	Benzo(g,h,I)perlyene (ug/Kg)	10	10	20	50	0.11	E-5	L	181	128	316	95%	501	322	1060	95%
F10	Benzo(k)fluoranthene (ug/Kg)	11	9	20	55	0.05	E-5	L	160	111	297	95%	467	291	1039	95%
F10	Beryllium (mg/Kg)	2	18	20	10	0.85	E-5	L	0.74	0.48	1.6	95%	2.3	1.4	5.8	95%
F10	beta -BHC (ug/Kg)		20	20	0	0.002	E-4	NP	3.1	2.8	3.8	92%	7.5	6.2	8.3	57%
F10	Calcium (mg/Kg)	20		20	100	0.59	0.13	L	1395	1031	2218	95%	3530	2394	6818	95%
F10	Chromium (mg/Kg)	20		20	100	0.12	0.002	L	19	13	33	95%	53	34	111	95%
F10	Chrysene (ug/Kg)	16	4	20	80	0.009	E-7	NP	103	83	130	92%	986	930	1100	57%
F10	Cobalt (mg/Kg)	11	9	20	55	0.06	E-5	L	8.5	5.2	22	95%	30	16	85	95%
F10	delta - BHC (ug/Kg)	1	19	20	5	0.005	E-4	NP	3.1	2.8	5.1	92%	7.5	6.2	8.3	57%
F10	Dibenz(a,h)anthracene (ug/Kg)	4	16	20	20	0.047	0.004	NP	125	110	150	92%	292	260	320	57%
F10	Dieldrin (ug/Kg)	1	19	20	5	0.005	E-4	NP	5.8	5.4	7.3	92%	14	12	16	57%
F10	Endosulfan I (ug/Kg)	1	19	20	5	E-4	E-5	NP	3.1	2.8	3.8	92%	8.3	7.4	8.4	57%
F10	Endosulfan II (ug/Kg)		20	20	0	0.004	E-4	NP	6	5.5	7.3	92%	14	12	16	57%
F10	Endrin (ug/Kg)	1	19	20	5	0.008	E-4	NP	6	5.5	9	92%	14	12	16	57%
F10	Endrin aldehyde (ug/Kg)	2	18	20	10	0.004	E-4	NP	6	5.5	9.1	92%	15	14	16	57%
F10	Fluoranthene (ug/Kg)	16	4	20	80	0.003	E-7	NP	110	93	160	92%	2500	1400	2400	57%
F10	Fluorene (ug/Kg)	2	18	20	10	0.01	E-5	NP	110	110	130	92%	292	240	320	57%
F10	gamma-Chlordane (ug/Kg)	2	18	20	10	E-4	E-7	NP	3.1	2.8	3.8	92%	9.7	8.3	24	57%
F10	Indeno(1,2,3-cd)pyrene (ug/Kg)	10	10	20	50	0.18	E-5	L	164	114	300	95%	472	297	1035	95%
F10	Iron (mg/Kg)	20		20	100	0.16	0.003	L	15220	9795	34042	95%	50142	28682	129228	95%
F10	Manganese (mg/Kg)	20		20	100	0.055	E-4	L	93	55	270	95%	345	178	1059	95%
F10	Mercury (mg/Kg)	16	4	20	80	0.18	E-4	L	0.21	0.15	0.38	95%	0.6	0.4	1.3	95%
F10	Magnesium (mg/Kg)	20		20	100	0.35	0.005	L	3191	2110	6630	95%	10058	5944	24534	95%
F10	Naphthalene (ug/Kg)	3	17	20	15	0.001	E-4	NP	110	100	130	92%	292	240	320	57%
F10	Nickel (mg/Kg)	18	2	20	90	0.06	0.004	L	15	10	29	95%	44	27	102	95%
F10	Phenanthrene (ug/Kg)	5	15	20	25	0.25	E-4	L	158	120	238	95%	376	264	687	95%
F10	Potassium (mg/Kg)	13	7	20	65	0.26	0.003	L	1702	1039	4428	95%	6046	3252	17299	95%
F10	Pyrene (ug/Kg)	13	7	20	65	E-4	E-7	NP	115	95	150	92%	1905	1400	2000	57%
F10	Selenium (mg/Kg)	7	13	20	35	0.004	E-4	NP	1	0.9	1.7	92%	2.6	2.4	3	57%
F10	Silver (mg/Kg)	3	17	20	15	0.002	E-4	NP	0.76	0.7	1.3	92%	1.8	1.5	2.1	57%
F10	Sodium (mg/Kg)	19	1	20	95	0.84	E-4	L	6199	4024	13584	95%	20145	11643	51017	95%
F10	Vanadium (mg/Kg)	20		20	100	0.053	E-4	L	28	20	45	95%	72	48	143	95%
F10	Zinc (mg/Kg)	20		20	100	0.12	0.002	L	108	67	264	95%	372	205	1024	95%
F11	Bohicket Surface															
F11	4,4'-DDE (ug/Kg)	8	1	9	88.9	--	E-6	NP	20	16	28	89%	269	28	430	30%

Appendix E
Soil Sample Data Summary
St. Juliens Creek Annex Background Investigation

File#	Chemical Name	Number of Detects	Number of Non Detects	Total Number of Samples	Frequency of Detection	~L = Log Normal	~N = Normal	Assumed Distribution	Mean (Conc.)	Lower Confidence Interval (Conc.)	Upper Confidence Interval (Conc.)	~ Conf = 95% Confidence Level	Upper Tolerance Level (UTL) (Conc.)	Lower Bound UTL (Conc.)	Upper Bound UTL (Conc.)	~Conf = Associated Confidence
F11	Antimony (mg/Kg)		9	9	0.0	--	0.47	N	1.4	0.9	1.8	95%	2.4	1.9	3.4	95%
F11	Copper (mg/Kg)	9		9	100.0	--	0.06	N	36	15	57	95%	81	60	129	95%
F11	Lead (mg/Kg)	9		9	100.0	--	0.05	N	82	29	136	95%	198	144	322	95%
F12	**Bohicket Subsurface**															
F12	4,4'-DDE (ug/Kg)	6	5	11	54.5	--	E-6	NP	6.4	5	17	93%	99	58	140	33%
F12	Antimony (mg/Kg)		11	11	0.0	--	0.01	NP	0.7	0.6	1.1	93%	1.2	1.2	1.2	33%
F12	Copper (mg/Kg)	11		11	100.0	--	E-5	NP	11	7	21	93%	64	64	64	33%
F12	Lead (mg/Kg)	11		11	100.0	--	E-4	NP	23	14	37	93%	145	116	174	33%
F13	**Urban-Udorthent Surface and Subsurface**															
F13	4,4'-DDT (ug/Kg)	6	13	19	31.6	E-5	E-7	NP	3.9	3.9	4.1	94%	22.1	6	32	56%
F13	Acenaphthene (ug/Kg)	2	18	20	10.0	E-7	E-6	NP	79	79	82	92%	88	88	91	57%
F13	Acenaphthylene (ug/Kg)	4	16	20	20.0	E-6	E-5	NP	79	78	82	92%	88	88	91	57%
F13	Aldrin (ug/Kg)		19	19	0.0	E-8	E-8	NP	2	2	2.1	94%	2.9	2.2	8.1	56%
F13	alpha-Chlordane (ug/Kg)	1	18	19	5.3	E-8	E-8	NP	2.1	2	2.1	94%	9.6	2.3	23	56%
F13	Aluminum (mg/Kg)	20		20	100.0	0.49	0.07	L	8389	6206	13297	95%	21155	14371	40741	95%
F13	Anthracene (ug/Kg)	4	16	20	20.0	E-7	E-6	NP	79	78	82	92%	88	88	91	57%
F13	Antimony (mg/Kg)	1	19	20	5.0	E-4	E-4	NP	0.52	0.49	0.65	92%	0.91	0.86	1	57%
F13	Arsenic (mg/Kg)	20		20	100.0	0.08	0.67	N	3	2.3	3.7	95%	5.5	4.6	6.9	95%
F13	Barium (mg/Kg)	20		20	100.0	0.11	0.79	N	33	25	41	95%	61	51	77	95%
F13	Benzo(a)anthracence (ug/Kg)	9	11	20	45.0	0.13	E-5	L	88	65	139	95%	221	151	423	95%
F13	Benzo(a)pyrene (ug/Kg)	10	10	20	50.0	0.03	E-5	NP	79	78	84	92%	253	170	300	57%
F13	Benzo(b)fluoranthene (ug/Kg)	9	11	20	45.0	0.009	E-6	NP	80	78	91	92%	316	200	420	57%
F13	Benzo(g,h,l)perlyene (ug/Kg)	11	9	20	55.0	0.1	E-4	L	88	65	138	95%	219	150	418	95%
F13	Benzo(k)fluoranthene (ug/Kg)	10	10	20	50.0	0.04	E-4	NP	79	78	84	92%	241	180	270	57%
F13	Beryllium (mg/Kg)		20	20	0.0	E-8	0.001	NP	0.2	0.2	0.3	92%	0.6	0.3	0.7	57%
F13	beta -BHC (ug/Kg)		19	19	0.0	E-8	E-8	NP	78	63	84	92%	252	180	290	57%
F13	Calcium (mg/Kg)	20		20	100.0	E-4	E-8	NP	741	585	1100	92%	57405	9490	105000	57%
F13	Chromium (mg/Kg)	19	1	20	95.0	0.86	0.005	L	12.5	9.7	17.9	95%	28	20	48	95%
F13	Chrysene (ug/Kg)	12	8	20	60.0	0.08	E-5	L	106	77	174	95%	277	184	553	95%
F13	Cobalt (mg/Kg)	14	6	20	70.0	0.25	0.002	L	2.7	2.1	4	95%	6.3	4.5	11.3	95%
F13	delta - BHC (ug/Kg)		19	19	0.0	E-8	E-8	NP	2	2	2.1	94%	2.9	2.2	8.1	56%
F13	Dibenz(a,h)anthracene (ug/Kg)	4	16	20	20.0	E-6	E-4	NP	81	79	84	92%	98	91	110	57%
F13	Dieldrin (ug/Kg)		19	19	0.0	E-8	E-8	NP	3.9	3.9	4	94%	5.7	4.3	16	56%
F13	Endosulfan I (ug/Kg)		19	19	0.0	E-8	E-8	NP	2	2	2.1	94%	2.9	2.2	8.1	56%
F13	Endosulfan II (ug/Kg)		19	19	0.0	E-8	E-8	NP	3.9	3.9	4	94%	5.7	4.3	16	56%
F13	Endrin (ug/Kg)		19	19	0.0	E-8	E-8	NP	3.9	3.9	4	94%	5.7	4.3	16	56%
F13	Endrin aldehyde (ug/Kg)		19	19	0.0	E-8	E-8	NP	3.9	3.9	4	94%	5.7	4.3	16	56%
F13	Fluorene (ug/Kg)	1	19	20	5.0	E-8	E-7	NP	80	79	82	92%	88	88	91	57%
F13	gamma-Chlordane (ug/Kg)	1	18	19	5.3	E-7	E-8	NP	2.1	2	2.1	94%	5.6	2.3	8.1	56%
F13	Indeno(1,2,3-cd)pyrene (ug/Kg)	9	11	20	45.0	0.05	E-4	L	89	68	129	95%	202	145	356	95%
F13	Iron (mg/Kg)	20		20	100.0	0.3	0.01	L	8023	6295	11288	95%	17494	12822	29624	95%
F13	Magnesium (mg/Kg)	20		20	100.0	0.74	E-4	L	777	588	1172	95%	1853	1297	3392	95%
F13	Manganese (mg/Kg)	20		20	100.0	0.02	E-6	L	44	30	86	95%	133	81	312	95%
F13	Naphthalene (ug/Kg)	4	16	20	20.0	E-6	E-5	NP	79	78	82	92%	88	88	91	57%
F13	Nickel (mg/Kg)	19	1	20	95.0	0.05	E-6	L	5.3	4.3	7.1	95%	11	8	17	95%
F13	Phenanthrene (ug/Kg)	9	11	20	45.0	0.03	E-5	NP	79	78	84	92%	149	140	310	57%
F13	Potassium (mg/Kg)	5	15	20	25.0	0.34	E-4	L	415	304	670	95%	1067	717	2094	95%
F13	Selenium (mg/Kg)		20	20	0.0	E-6	E-7	NP	0.66	0.64	0.72	92%	0.82	0.79	1.3	57%
F13	[illegible]er (mg/Kg)		20	20	0.0	0.001	[illegible]	NP	0.5	0.5	0.51	92%	0.56	0.55	0.57	57%

Appendix E
Soil Sample Data Summary
St. Juliens Creek Annex Background Investigation

File#	Chemical Name	Number of Detects	Number of Non Detects	Total Number of Samples	Frequency of Detection	~L = Log Normal	~N = Normal	Assumed Distribution	Mean (Conc.)	Lower Confidence Interval (Conc.)	Upper Confidence Interval (Conc.)	~ Conf = 95% Confidence Level	Upper Tolerance Level (UTL) (Conc.)	Lower Bound UTL (Conc.)	Upper Bound UTL (Conc.)	~Conf = Associated Confidence
F13	Sodium (mg/Kg)	15	5	20	75.0	E-5	E-7	NP	47	39	64	92%	574	308	1260	57%
F13	Vanadium (mg/Kg)	20		20	100.0	0.08	0.08	N	21	16	26	95%	39	33	49	95%
F14	**Urban-Udorthent Surface**															
F14	4,4'-DDE (ug/Kg)	6	3	9	66.7	--	E-6	NP	15	4	240	89%	1116	240	1700	30%
F14	4,4'-DDT (ug/Kg)	7	2	9	77.8	--	E-7	NP	13	4	36	89%	566	36	920	30%
F14	Copper (mg/Kg)	10		10	100.0	--	E-4	NP	9	8	27	93%	38	27	47	32%
F14	Fluoranthene (ug/Kg)	8	2	10	80.0	--	0.002	NP	93	78	430	93%	469	430	500	32%
F14	Lead (mg/Kg)	10		10	100.0	--	0.08	N	46	26	66	95%	92	72	138	95%
F14	Mercury (mg/Kg)	1	9	10	10.0	--	0.002	NP	0.14	0.13	0.25	93%	0.34	0.25	0.42	32%
F14	Pyrene (ug/Kg)	8	2	10	80.0	--	0.002	NP	100	88	430	93%	480	430	520	32%
F14	Zinc (mg/Kg)	10		10	100.0	--	0.004	NP	48	32	91	93%	131	91	164	32%
F15	**Urban-Udorthent Subsurface**															
F15	4,4'-DDE (ug/Kg)	1	9	10	10.0	--	E-7	NP	4	4	4.5	93%	41	4.5	79	32%
F15	4,4'-DDT (ug/Kg)	1	9	10	10.0	--	E-7	NP	4	4	4.5	93%	9	4.5	12	32%
F15	Copper (mg/Kg)	8	2	10	80.0	--	0.59	N	4.3	2.2	6.4	95%	9.1	7	14	95%
F15	Fluoranthene (ug/Kg)	3	7	10	30.0	--	0.002	NP	79	64	81	93%	83	81	84	32%
F15	Lead (mg/Kg)	10		10	100.0	--	0.006	NP	7.3	5.5	21	93%	27	21	31	32%
F15	Mercury (mg/Kg)		10	10	0.0	--	0.51	N	0.1	0.08	0.11	95%	0.12	0.11	0.15	95%
F15	Pyrene (ug/Kg)	3	7	10	30.0	--	E-4	NP	79	69	81	93%	83	81	84	32%
F15	Zinc (mg/Kg)	9	1	10	90.0	--	0.001	NP	12	10	31	93%	46	31	59	32%
F16	**Dredge Fill Surface and Subsurface**															
F16	4,4'-DDT (ug/Kg)	1	19	20	5.0	E-4	0.002	NP	4.7	4.7	5	92%	5.3	5.2	5.5	57%
F16	4,4'-DDE (ug/Kg)	7	13	20	35.0	0.08	0.002	L	5.2	4.5	6.4	95%	9	7.3	13	95%
F16	Acenaphthene (ug/Kg)	5	15	20	25.0	0.04	E-6	NP	96	87	110	92%	592	480	1200	57%
F16	Aldrin (ug/Kg)		20	20	0.0	0.1	0.23	N	2.4	2.3	2.5	95%	2.8	2.7	3	95%
F16	alpha-Chlordane (ug/Kg)		20	20	0.0	0.1	0.23	N	2.4	2.3	2.5	95%	2.8	2.7	3	95%
F16	Anthracene (ug/Kg)	18	2	20	90.0	0.007	E-8	NP	78	69	130	92%	462	340	2400	57%
F16	Antimony (mg/Kg)	11	9	20	55.0	0.38	0.003	L	0.86	0.73	1.05	95%	1.47	1.2	2.06	95%
F16	Benzo(a)anthracene (ug/Kg)	20		20	100.0	0.99	E-7	L	578	356	1462	95%	2027	1102	5692	95%
F16	Benzo(a)pyrene (ug/Kg)	20		20	100.0	0.91	E-7	L	525	331	1244	95%	1785	997	4792	95%
F16	Benzo(k)fluoranthene (ug/Kg)	20		20	100.0	0.76	E-5	L	594	372	1434	95%	2038	1130	5542	95%
F16	beta -BHC (ug/Kg)		20	20	0.0	0.1	0.23	N	2.4	2.3	2.5	95%	2.8	2.7	3	95%
F16	Calcium (mg/Kg)	20		20	100.0	0.16	E-4	L	1217	877	2043	95%	3251	2137	6617	95%
F16	Chrysene (ug/Kg)	20		20	100.0	0.66	E-5	L	992	610	2521	95%	3487	1893	9823	95%
F16	Cobalt (mg/Kg)	17	3	20	85.0	0.15	0.82	N	7	5.4	8.6	95%	13	11	16	95%
F16	delta - BHC (ug/Kg)		20	20	0.0	0.1	0.23	N	2.4	2.3	2.5	95%	2.8	2.7	3	95%
F16	Dieldrin (ug/Kg)	2	18	20	10.0	E-4	0.005	NP	4.7	4.7	5	92%	5.3	5.2	5.5	57%
F16	Endosulfan I (ug/Kg)		20	20	0.0	0.1	0.23	N	2.4	2.3	2.5	95%	2.8	2.7	3	95%
F16	Endosulfan II (ug/Kg)		20	20	0.0	0.02	0.06	N	4.7	4.5	4.9	95%	5.4	5.2	5.8	95%
F16	Endrin (ug/Kg)		20	20	0.0	0.02	0.06	N	4.7	4.5	4.9	95%	5.4	5.2	5.8	95%
F16	Endrin aldehyde (ug/Kg)		20	20	0.0	0.02	0.06	N	4.7	4.5	4.9	95%	5.4	5.2	5.8	95%
F16	Fluoranthene (ug/Kg)	20		20	100.0	0.22	E-8	L	758	453	2101	95%	2766	1453	8242	95%
F16	Fluorene (ug/Kg)	4	16	20	20.0	0.02	E-6	NP	96	94	110	92%	602	480	1400	57%
F16	gamma-Chlordane (ug/Kg)		20	20	0.0	0.1	0.23	N	2.4	2.3	2.5	95%	2.8	2.7	3	95%
F16	Naphthalene (ug/Kg)	14	6	20	70.0	0.02	E-6	NP	59	32	87	92%	485	480	570	57%
F16	Phenanthrene (ug/Kg)	19	1	20	95.0	E-4	E-9	NP	84	68	140	92%	913	260	9700	57%
F16	Pyrene (ug/Kg)	20		20	100.0	0.4	E-8	L	696	410	2026	95%	2590	1336	7953	95%
F16	Silver (mg/Kg)	2	18	20	10.0	E-4	E-4	NP	0.6	0.55	0.61	92%	0.67	0.64	0.67	57%

Appendix E
Soil Sample Data Summary
St. Juliens Creek Annex Background Investigation

File#	Chemical Name	Number of Detects	Number of Non Detects	Total Number of Samples	Frequency of Detection	~L = Log Normal	~N = Normal	Assumed Distribution	Mean (Conc.)	Lower Confidence Interval (Conc.)	Upper Confidence Interval (Conc.)	~ Conf = 95% Confidence Level	Upper Tolerance Level (UTL) (Conc.)	Lower Bound UTL (Conc.)	Upper Bound UTL (Conc.)	~Conf = Associated Confidence
F17	**Dredge Fill Surface**															
F17	4,4'-DDT (ug/Kg)	9	1	10	90.0	0.87	0.73	N	11	6.2	15	95%	21	16	31	95%
F17	Acenaphthylene (ug/Kg)	10		10	100.0	0.08	0.04	NP	144	64	240	93%	246	240	250	32%
F17	Aluminum (mg/Kg)	10		10	100.0	0.01	0.15	N	17083	14603	19563	95%	22786	20256	28382	95%
F17	Arsenic (mg/Kg)	10		10	100.0	0.69	0.99	N	17	14	20	95%	24	21	32	95%
F17	Barium (mg/Kg)	10		10	100.0	0.24	0.05	N	77	68	86	95%	98	88	118	95%
F17	Benzo(b)fluoranthene (ug/Kg)	10		10	100.0	0.59	0.12	N	1431	663	2199	95%	3197	2413	4931	95%
F17	Benzo(g,h,I)perlyene (ug/Kg)	10		10	100.0	0.4	0.38	N	811	444	1178	95%	1655	1280	2483	95%
F17	Beryllium (mg/Kg)	4	6	10	40.0	0.02	E-4	NP	0.62	0.53	0.71	93%	1	0.7	1.3	32%
F17	Chromium (mg/Kg)	10		10	100.0	0.004	0.04	NP	39	35	45	93%	45	45	45	32%
F17	Copper (mg/Kg)	10		10	100.0	0.45	0.95	N	43	36	49	95%	58	51	72	95%
F17	Dibenz(a,h)anthracene (ug/Kg)	6	4	10	60.0	0.004	0.05	N	401	264	537	95%	714	575	1022	95%
F17	Indeno(1,2,3-cd)pyrene (ug/Kg)	10		10	100.0	0.53	0.27	N	847	420	1274	95%	1829	1393	2792	95%
F17	Iron (mg/Kg)	10		10	100.0	0.02	0.11	N	35570	31119	40021	95%	45805	41265	55850	95%
F17	Lead (mg/Kg)	10		10	100.0	0.22	0.69	N	105	87	123	95%	147	128	188	95%
F17	Magnesium (mg/Kg)	10		10	100.0	0.39	0.77	N	3446	2984	3908	95%	4507	4037	5549	95%
F17	Manganese (mg/Kg)	10		10	100.0	0.06	0.01	NP	131	124	166	93%	198	166	224	32%
F17	Mercury (mg/Kg)	10		10	100.0	0.42	0.35	N	0.8	0.6	1	95%	1.3	1.1	1.7	95%
F17	Nickel (mg/Kg)	10		10	100.0	0.01	E-4	NP	13	12	14	93%	19	14	24	32%
F17	Potassium (mg/Kg)	10		10	100.0	0.59	0.79	N	3276	2710	3842	95%	4577	4000	5854	95%
F17	Selenium (mg/Kg)	8	2	10	80.0	0.37	0.57	N	1.5	1.2	1.8	95%	2.2	1.9	2.9	95%
F17	Sodium (mg/Kg)	10		10	100.0	0.05	E-4	NP	187	151	392	93%	620	392	806	32%
F17	Vanadium (mg/Kg)	10		10	100.0	0.01	0.08	N	55	49	62	95%	70	64	85	95%
F17	Zinc (mg/Kg)	10		10	100.0	0.01	E-4	NP	91	83	107	93%	137	107	162	32%
F18	**Dredge Fill Subsurface**															
F18	4,4'-DDT (ug/Kg)	1	9	10	10.0	E-4	E-5	NP	4.7	4.5	5.3	93%	9	5.3	12	32%
F18	Acenaphthene (ug/Kg)	9	1	10	90.0	0.63	0.06	N	69	41	96	95%	131	103	192	95%
F18	Aluminum (mg/Kg)	10		10	100.0	0.08	0.27	N	9150	4936	13364	95%	18839	14541	28347	95%
F18	Arsenic (mg/Kg)	10		10	100.0	0.11	0.1	N	7.8	5.2	10	95%	14	11	20	95%
F18	Barium (mg/Kg)	10		10	100.0	0.41	0.43	N	27	17	37	95%	50	40	72	95%
F18	Benzo(b)fluoranthene (ug/Kg)	10		10	100.0	0.36	E-5	NP	375	260	910	93%	2335	910	3500	32%
F18	Benzo(g,h,I)perlyene (ug/Kg)	10		10	100.0	0.59	E-6	NP	245	100	630	93%	2099	630	3300	32%
F18	Beryllium (mg/Kg)		10	10	0.0	0.99	0.42	N	0.42	0.25	0.59	95%	0.81	0.64	1.18	95%
F18	Chromium (mg/Kg)	10		10	100.0	0.03	0.09	N	20	12	28	95%	39	30	57	95%
F18	Copper (mg/Kg)	10		10	100.0	0.94	0.55	N	22	14	30	95%	40	32	57	95%
F18	Dibenz(a,h)anthracene (ug/Kg)	9	1	10	90.0	0.71	E-5	NP	111	67	350	93%	708	350	1000	32%
F18	Indeno(1,2,3-cd)pyrene (ug/Kg)	10		10	100.0	0.67	E-5	NP	230	120	630	93%	1769	630	2700	32%
F18	Iron (mg/Kg)	10		10	100.0	0.05	0.08	N	18829	11107	26551	95%	36585	28709	54009	95%
F18	Lead (mg/Kg)	10		10	100.0	0.52	0.11	N	46	28	63	95%	86	68	125	95%
F18	Magnesium (mg/Kg)	10		10	100.0	0.08	0.47	N	1923	1086	2760	95%	3847	2994	5736	95%
F18	Manganese (mg/Kg)	10		10	100.0	0.83	0.15	N	79	47	110	95%	151	119	223	95%
F18	Mercury (mg/Kg)	10		10	100.0	0.46	0.6	N	0.37	0.26	0.48	95%	0.62	0.51	0.86	95%
F18	Nickel (mg/Kg)	9	1	10	90.0	0.05	0.14	N	8.2	5.1	11	95%	15	12	23	95%
F18	Potassium (mg/Kg)	10		10	100.0	0.09	0.33	N	1626	827	2426	95%	3465	2649	5269	95%
F18	Selenium (mg/Kg)	5	5	10	50.0	0.48	0.24	N	1	0.8	1.2	95%	1.5	1.3	1.9	95%
F18	Sodium (mg/Kg)	9	1	10	90.0	0.01	0.05	N	92	43	140	95%	203	153	312	95%
F18	Vanadium (mg/Kg)	10		10	100.0	0.08	0.08	N	22	13	31	95%	42	33	62	95%
F18	Zinc (mg/Kg)	10		10	100.0	0.46	0.39	N	47	29	65	95%	87	70	127	95%