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Sample Holding Time Reevaluation

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Sample Holding Time Reevaluation

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Executive Summary

The project's overall objective was to investigate the stability of selected contaminants in soil/sediment samples as a function of holding time prior to extraction. Contaminants of interest centered on SVOCs; particularly polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and pesticides, Cr(VI), and several heavy metals. Contaminant specific objectives were:

1. Determine if selected SVOC contaminant concentrations in soil/sediment changed with time when held in storage beyond their established extraction maximum holding times (MHTs) under current preservation techniques and at -20°C;
2. Determine if Cr(VI) concentrations change when held in storage beyond their established MHTs under current preservation techniques and at -20°C;
3. Determine if extracted Cr(VI) concentrations change when held beyond the analysis MHT (24-h) when held in the dark at room temperature (~20°C) or 4°C;
4. Determine if air-drying soil samples will adversely impact hot acid extractable heavy metal concentrations.

Test soils/sediments from contaminated sites were identified, collected and homogenized prior to extraction by SW-846 methods. After homogenization, soil/sediment samples were stored under designated conditions and extracted at multiples of the current MHT (depending on the contaminant, multiples of MHT were between 0.5 and 12). Analyses of contaminant concentrations were performed in accordance with SW-846 methodologies. Results of these extractions were evaluated by a progression of four distinct analyses to elucidate possible decreases in concentration of an analyte (lines of evidence). First, the magnitude and variability of the concentration was used to suggest a level of the signal to noise ratio; second, a t-test of the H_0:overall mean equal to or greater than the Day 0 mean was used to provide a level of relevance to observed change; third, a regression against time was used to estimate a rate of change; and fourth, a nonparametric upper and lower bound based on the Day 0 quartiles was used to provide an alternative measure of relevance to the potential change through time. Ultimately; however, linear regression analysis was utilized to estimate the time required to observe a specific percent change in the extractable concentration.

The estimated number of days until a 5% decrease in Cr(VI) concentration from the estimated intercept would be observed was greater than 140 days for all sediments/soils tested. The results of this study suggest that the recoveries of matrix spike and control extracts are key to determining stability of Cr(VI) in the solid materials to be extracted and the extracts themselves. In all cases, when the recovery of the matrix spike and control samples was good (within acceptable parameters), the stability of Cr(VI) in the sediment/soil and extract solutions (stored under proper conditions) appear to be longer than the current MHT specified in SW-486.

For the 17 PAH compounds that were quantified in three different soils/sediments, a holding time of 100 days at either 4^{o}C or -20^{o}C would result in no more than a 20% decrease in concentration. Importantly, there is considerable variability in the estimated holding times for different compounds and in different soils/sediments. The major consideration in sediment holding time appears, from these studies, to be the number of aromatic rings (or molecular weight) of the PAH of interest. Only the Eagle Harbor soil appeared to have significant loss to PAHs for samples stored at 4°C as compared to samples stored at -20°C. The loss of up to 50% occurred for compounds with relatively low molecular weights, including acenaphthene, fluorene, dibenzothiophene, phenanthrene and anthracene. These results confirmed a previous study that demonstrated freezing sediment/soil reduced the loss of low molecular weight (low number of rings) PAHs.

For the three PCB Aroclor mixtures and the seven congeners that were quantified in three different soils/sediments, a holding time of 260 days at 4°C and 281 days at -20°C would result in not more than a 20% decrease in concentration. An indication of the stability of the PCBs in the three soil/sediments that were studied is the very small difference in the mean concentration for all data across time at two storage temperatures. In almost every case, the concentrations for the -20°C samples are slightly greater, about 10% or less, than for the 4°C mean. This could be interpreted that about 10% more PCBs are lost during the 5.6 month storage time at 4°C than at -20°C. Given the 25% coefficient of variation (CV) metric for replicate precision; however, it is unlikely that this 10% difference could be accurately quantified.

For the 10 pesticides that were quantified in four different soils/sediments, a holding time of 217 days at 4°C and 299 days at -20°C would result in not more than a 20% decrease in concentration. These holding times are far greater than the current MHT specified in SW-846. In almost every case, the mean concentrations for the -20°C samples are within a few percent of the 4°C mean. This could be interpreted as less than 5% of the pesticides studied are lost during the 5.6 month storage time of samples at 4°C compared to storage at -20°C.

Extractable metal concentrations were not effected significantly by a holding time of up to 364 days or by the air drying treatment. All data sets exhibited fairly tight CVs across the holding times. The CV data suggests that no chemically significant change in concentration occurred during the 364 day holding time and the pooled data exhibited no significant difference between moist or dry sample handling. These results suggest that it would take a minimum of 709 days before the acid-extractable As, Cu, Pb, or Zn concentration would be reduced by 20%.

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Section 1

Introduction

Extraction and determination of a contaminant concentration (organic and metal) in soil, water, sediment, and other matrices is vital to estimating their impact on the environment. In an attempt to standardize the determination of contaminant levels in various matrices, the U.S. Environmental Protection Agency (USEPA) has established a set of procedures, protocols, and techniques for sampling, preservation, and analysis for various matrices and contaminants: the USEPA SW-846 Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods (USEPA, 2000). As part of sample handling protocols, maximum holding times (MHT) have been established to protect sample integrity and provide sufficient time for analyses. Holding times have been defined as the length of time an environmental media (e.g., water, soil, sediment, etc.) can be stored (under specific conditions) after collection and prior to analysis with reasonable assurance that the analyte of interest's concentration does not change significantly (Bayne et al., 1993).

Depending upon the matrix, analyte in question, and analytical methodology, soil/sediment sample MHTs vary (Table 1-1). Extraction and analysis of contaminants beyond MHTs may cause significant problems; for instance, analyses may be "flagged" or designated as estimates, often requiring expensive resampling and analysis.

Holding times and preservation requirements are set to assure that contaminant concentrations do not change significantly between sampling and extraction because of intrinsic biogeochemical reactions, such as biotic and abiotic degradation, volatilization, oxidation/reduction, or irreversible sorption. The fate of contaminants in soils and sediments have been extensively studied and reported in the literature. With the exception of hexavalent Cr (and other redox sensitive metals) and volatile organic compounds (VOCs); however, only a limited number of studies have looked at the impact of holding times and preservation techniques on the determination of contaminant concentration in soils and sediments.

1.1 Chromate [Cr(VI)]

Chromium has been utilized in various products and manufacturing processes throughout the world and chromium containing wastes have been discharged to the environment (Petura et al., 1998). The two common valance states of chromium [Cr(III) and Cr(VI)] exhibit vastly different physical/chemical behavior and toxicological properties. Hexavalent Cr is fairly soluble in aqueous environments compared to the insoluble and immobile trivalent Cr, and it is more toxic to exposed organisms (Petura et al., 1998). Hence, there has been considerable research focusing on development of a valance sensitive extraction technique for soils, sediments, and solid wastes (USEPA, 1983, 1986).

In 1986, SW-846 Method 3060 was removed as a regulatory approved method for extraction of Cr(VI) in solid samples primarily due to instability of the extract. Chromate determinations have been shown to be effected by oxidation/reduction reactions resulting from sample treatment: i.e., drying (Bartlett and James, 1996; James, 1994; James and Bartlett, 1983); base dissolution of Fe(II) bearing minerals and subsequent reduction of Cr(VI) (Qafoku et al., 2003); and induction of, or maintenance of anaerobic conditions (Vitale et al., 1997a). Fendorf (2000), in a recent

Table 1-1. Soil/sediment sample preservation, and holding times, and extract preservation, and holding times[1].

Analyte	Soil/Sediment		Extract	
	Preservation	Holding Time	Preservation	Holding Time
Total Metals (acid-extractable)	None	6 months	4°C	Within 6 months
Chromate [Cr(VI)]	4°C	30 days	4°C	Within 4 days[2]
Semi-volatile organics	4°C	14 days	4°C	Within 40 days

[1] From Tables 3-1 and 4-7 of the SW-846 manual (USEPA, 2000).

[2] From Table 4-7 of SW-846 manual, but values of 3 days, 24 hrs, and as soon as possible are also quoted in Cr(VI) extraction method (3060A) and Cr(VI) detection methods (e.g., Methods 7196A, and 7199).

review of Cr(VI) reduction, concluded that biological processes are the principal means by which Cr(VI) is converted to Cr(III) in aerobic systems. In addition, he surmised that the aeration status of a system is of primary dependence, while pH and concentrations of reduced phases appeared to be secondary. A modified Cr(VI) extraction method (Method 3060A; US EPA, 2000) was adopted after extensive study of a large set (>1500) of diverse field samples ranging from anoxic sediments to chromite ore processing residue (Table 1-2) (Vitale at al., 1994; 1997ab; 2000; James 1994; James et al., 1995).

Table 1-2. Changes made in Method 3060.[1]

Change in Extraction Protocol	Method 3060	Method 3060A
Wet sample wt. (g)	100	2.5
Alkaline digest solution volume (mL)	400	50
Solution to solid ratio	4	20
Digestion temperature (°C)	Near boiling	90 – 95
Digestion time (min)	30 – 45	60
Nitric acid acidification	pH 7 - 8	pH 7 – 8, but if <7, discard and start over

[1] After Vitale et al., 1994.

SW-846 Method 3060A delineates a MHT of 30-d prior to extraction. Vitale et al. (2000) performed one of the few studies designed to specifically investigate the effect of sample holding time on Cr(VI) extraction from contaminated solid matrices. They utilized soils contaminated with low, medium, and high levels of chromite ore processing residue (COPR) to follow Cr(VI) extraction (Method 3060A) concentration as a function of time (up to 30 days) from collection to extraction. The relative percent difference (RPD) between holding times of 1-d to 30-d for low, medium, and highly contaminated COPR soils were 7.4, 0.5, and 1.8%, respectively. Given that an RPD of >20% has been suggested as the maximum allowable variation between duplicates without mandated re-extraction, the results of Vitale et al. (2000) clearly demonstrated Cr(VI) stability in the COPR soils for at least 30 days when stored at 4°C.

Chromate analysis of solid matrix extracts may be analyzed by a number of methods (USEPA, 2000). Common methods of Cr(VI) detection are SW-846 Methods 7196A or 7199, which utilize the reaction of Cr(VI) with diphenylcarbizide (DPC) to produce a red-violet complex whose absorbance may be measured spectrophotometrically at 540 nm. The MHT for Cr(VI) extracts prior to analysis ranges from "as soon as possible" to 3 days (see footnote of Table 1-1) depending on the method of analysis. The 24-h MHT associated with Method 7196A probably arises from the prescribed (40 CFR, Part 136) holding time for aqueous Cr(VI) samples. Vitale et al. (2000); however, investigated the Cr(VI) extract (Method 3060A/7196A) stability over a 7-d period. They concluded that for the COPR soils investigated Cr(VI) extract stability over the 7-d period was acceptable when extracts were stored in the dark at 4^{o}C.

1.2 Semi-Volatile Organic Compounds

Reactions of pesticides and other semi-volatile organic compounds (SVOCs) in the soil environment have been reviewed in great detail (Sawhney and Brown, 1989; Cheng, 1990 for example). Of primary concern is that most organic compound concentrations will be reduced with time as a result of biotic and abiotic reactions. Even at 4°C, most of these degradation processes continue, albeit at a slower rate. For certain contaminants in a soil matrix; however, the abiotic and biotic reactions are of limited concern up to and well beyond the MHT. For instance, in a recent study of organochlorine pesticides in archived (air-dried) sludge-amended United Kingdom (UK) soils, half-lives of 8 pesticides ranged from 7 to 25 years (Meijer et al., 2001). The authors suggested that volatilization was the major process causing pesticide concentration depletion since microbial activity is typically minimal in air-dried soils. While these soils were air-dried and stored in sealed containers (unlike samples to be analyzed under SW-846), the reported half-lives are substantial and gives one pause regarding a 14 day until extraction, 4°C MHT for pesticides as specified in SW-846.

In a recent study of selected polychlorinated biphenyls (PCBs) and polyaromatic hydrocarbons (PAHs) in UK field soils (protected against leaching), slight increases in PCBs (congeners 28, 101, or 158) studied were observed (Cousins and Jones, 1998). The concentration increases were attributed to gas phase deposition. Smith et al. (1976) and Moein (1976) studied an Aroclor 1254 spill site over a two-year time frame and observed no significant reduction. For studied PAHs, the lighter molecular weight (MW) species (acenaphthene and phenanthrene) exhibited statistically significant losses, while heavier MW species [fluoranthrene, and benzo(ghi)perylene] showed no loss over a 281 day period. In sludge-amended soils, half-lives for naphthalene and benzo(ghi)perylene varied from 2.1 years to 9.1 years, respectively (Wild et al., 1990; 1991).

A more recent study of historically contaminated soils investigated the impact of cold storage on PAH extraction concentrations (Rost et al., 2002). Soil samples from two different sites exhibited very different results. Quantitative recovery of PAHs from soil stored at 4°C in the dark was observed throughout an 8 to 10 month holding time. Under identical storage conditions, a soil from a railroad sleeper preservation site exhibited significant losses of PAHs with low MW compounds being more affected than the higher MW compounds. After only a 2 week holding time, ≤ 3-ring PAH concentrations had decreased by 29% to 73%; lesser but still significant losses of up to 5-ring PAHs were also observed. Rost et al. (2002) demonstrated that PAH loss was due to aerobic microbial metabolism as PAH loss was not observed in soil treated with sodium azide prior to storage. In addition, stabilization against PAH loss was achieved by storing the soil at -20^{o}C.

1.3 Acid Extractable Heavy Metals

Acid digestion of solid matrices (e.g., soils, sediments) for the determination of heavy (trace) metals concentrations is not a total digestion technique. According to SW-846 Method 3050B, the extraction is designed to dissolve almost all elements that could become "environmentally available". For non-redox sensitive trace metals (Cd, Cu, Pb, Zn, etc.), a hot acid extract will probably be little affected in a time frame of years, which is reflective of the 6 month MHT prior to extraction. The aforementioned heavy metal contaminants are retained in soils by processes (e.g., ion exchange, specific adsorption, precipitation etc.) that are extractable to the same extent over long periods of time. The extraction method allows the sample to be dried, but drying is not required; however, sample homogeneity is typically more easily achieved with dried and sieved materials.

1.4 Objectives

The overall objective of this research effort was to investigate the stability of selected contaminants in soil/sediment samples as a function of holding time prior to extraction and analysis. Contaminants of interest centered on SVOCs, particularly PAHs, PCBs, and pesticides, Cr(VI), and several heavy metals. Contaminant specific objectives were:

1. Determine if selected SVOC contaminant concentrations in soil/sediment changed with time when held in storage beyond their established extraction MHTs under current preservation techniques and at -20^{o}C;
2. Determine if Cr(VI) concentrations change when held in storage beyond their established MHTs under current preservation techniques and at -20^{o}C;
3. Determine if extracted Cr(VI) concentrations change when held beyond the analysis MHT (24-h) when held in the dark at room temperature (~ 20^{o}C) or 4°C;
4. Determine if air-drying soil samples will adversely impact hot acid extractable metal concentrations;
5. Determine if hot acid extractable metal concentrations change when samples are held beyond their established MHT.

Section 2

Materials and Methods

2.1 Soils/Sediments Identification, Collection and Selection

A total of 19 soils/sediments were collected for this study (Table 2-1). Except for the Sinclair Inlet and SQ-1 sediment, samples of soils/sediments were obtained from contaminated sites throughout the United States. The Sinclair Inlet sample was obtained from an ongoing study at the Battelle Marine Sciences Laboratory and the SQ-1 sediment was obtained from J. Blazevich (retired), USEPA Region 10, Manchester, WA.

The SQ-1 sample was a sediment sample collected from Sequim Bay, WA in 1986, an area relatively free of contamination by PAH, PCBs, and chlorinated pesticides. The grain size and carbon content was similar to that of contaminated sediment in urban areas around the Puget Sound. Originally the sediment was placed in a cement mixer, spiked with a mixture of organic chemicals, mixed 7 hours, subsampled for chemical analysis, bottled in 2-oz glass jars with Teflon lined lids, and stored frozen at -20^{o}C. The results for the post-mixing chemical analyses indicated this reference material was homogenous (coefficient of variation, CVs, usually less than 20%) and the recovery of the analytes was usually greater than 50% of the expected concentration. Over a period of 10 years, between 1986 and 1996, several laboratories analyzed between 20 to 80 jars of SQ-1 and recovered about 50% of the expected concentrations of most of the analytes. The CVs for the mean of these results were about 50%.

Sediment samples were drained of excess water by vacuum filtration. Samples of each material were semi-quantitatively screened for contaminant type and concentration. From the 19 soil/sediment samples identified, 12 materials were utilized during the course of the project (Table 2-1; material in bold). Selection of materials for use was based on contaminants present, their concentration, and the amount of material. For instance, the CIC New Jersey sample was rejected for heavy metal study because only a single contaminant, arsenic, was present in significant quantity, and after screening the quantity of <2 mm material was insufficient for the study.

2.2 Experimental Design

The overall objective of this project is to provide scientific data on contaminant concentration changes through time. The expected contaminant concentration changes through time should be generally linear and potentially, curvilinear. Regression analysis allows the estimation of an equation relating contaminant concentration as a function of time. Regression analysis with replication provides greater power in testing for a particular response (e.g., a linear relationship) than does the equivalent design analyzed with an analysis of variance (ANOVA). The increased power for testing in the regression is directly related to the increased number of degrees of freedom for the error term. For example, for six analysis time points with two replicates at each time and a linear response, Table 2-2 shows that there are only six degrees of freedom for testing the linear (or curvilinear) response with an ANOVA compared to ten degrees of freedom (nine if a quadratic term is needed) in the regression analysis. Regression analysis, on the other hand, specifically tests for a consistent change through time (either linear or curvilinear).

Table 2-1. Available soils/sediments.

	Sample	Sample type	Suspected contaminants
1	Housatonic River	Freshwater sediment	PCBs/Pesticides
2	Tri-Cities NY2	Soil	PCBs/Pesticides
3	Eagle Harbor	Soil	PAHs
4	SQ-1	Marine sediment	PAHs/PCBs/Pesticides
5	Bedford-1	Soil	PAH
6	Bedford plot-6	Soil	Cr(VI)
7	Frontier Hard Chrome Site-2	Soil	Cr(VI)
8	Boomsnub site-0.5’	Soil	Cr(VI)
9	Boomsnub site-3.0’	Soil	Cr(VI)
10	Boomsnub site-5.5’	Soil	Cr(VI)
11	Stratford, CT Army engine plant	Soil	Cr(VI)
12	Sinclair Inlet, WA	Marine sediment	SVOCs/Metals
13	Wilmington, NC	Soil	PAHs/Metals
14	Eastland Woolen Mills, ME	Soil	DDT, DDE, Dieldrin
15	Richland site-1	Soil	Several Pesticides
16	Frontier Hard Chrome Site-1	Soil	Cr(VI)
17	EPA-Athens	Soil	Cr(VI)
18	EPA-Athens	Soil	Cl-Pesticides
19	CIC New Jersey	Soil	Metals

Table 2-2. Comparison of analysis of variance and regression assuming six time points for chemical analysis, two replicate analyses at each time, and a linear relationship.

Analysis of Variance		Regression Analysis	
Sources of Variation	**Degrees of Freedom**	**Sources of Variation**	**Degrees of Freedom**
Mean	1	Mean	1
Times (t)	(t-1) = 5	Slope = b_1	1
Linear[a]	1	Remainder[b]	t*r - 2 = 10
Remainder	4	Lack of Fit[c]	4
Within Times[b]	t*(r-1) = 6	True Error	t*(r-1) = 6
Total	t*r = 12	Total	t*r = 12

[a] The indented sources of variation represent the splitting of the main source of variation (not indented) listed above.

[b] Error for testing the null hypothesis that the slope equals zero.

[c] The sum of the degrees of freedom from the split sources of variation equal the degrees of freedom for the main source of variation listed above.

Regression analysis has the added advantage of being able to estimate a spline point where the relationship may change abruptly.

2.2.1 Soils/Sediments Homogenization, Analysis, Storage and Extraction Schedule

An experimental design based on regression analysis was constructed. The design consisted of initial (T = 0) extraction and analysis of multiple subsamples (4 SVOCs; 5 CrO_4, and metals), which were followed by extraction and analysis of four subsamples (two per storage technique; see below) at multiples of the analyte's MHT.

The selected soils/sediments were hand-screened (< 2mm) to remove rocks and twigs. The 12 sediment/soil samples were homogenized by hand through repeated cone and quartering and recompositing the sieved material. Materials were then subsampled (cone and quartered) for characterization of water content, total organic carbon content (by combustion; Nelson and Sommers 1996), particle size analysis (hydrometer method; Gee and Bauder 1986), and pH determined from a 1:1 soil:water mixture with a combination glass electrode (Thomas, 1996).

The selected soils/sediments were hand cone and quartered to obtain T = 0 samples. Initial (T = 0) sample extraction and analysis was performed on 4 (SVOCs) or 5 [Cr(VI) and metals] subsamples of a given sediment/soil. After subsampling for T = 0 samples, remaining materials were cone and quartered until a given subsample mass, at least 12 times the mass required for a given extraction, was obtained. This material was quartered and each quartered subsample placed in either a glass jar with Teflon-lined lid (SVOCs extraction) or polycarbonate centrifuge tubes (CrO_4 and metals) and stored under specific conditions (depending on contaminant type). This procedure was performed repeatedly until four subsamples for each holding time were obtained (the number of MHT elements depended on the contaminant(s) under study). The storage conditions and sampling times were as follows:

- The chromate holding time study utilized soil/sediment numbers 6-11 (Table 2-1). Twelve samples of each soil/sediment were stored at 4°C and 12 samples at -20°C. For each holding time, two containers (duplicates) were analyzed for each holding condition (4°C and -20°C). Specifically, the MHT multiples were 0, 0.5*MHT, MHT, 2*MHT, 4*MHT, and 8*MHT. These MHT multiples were equivalent to 0, 14, 28, 56, 112, and 224 days, respectively.

- In addition to following the stability of CrO_4 as a function holding time prior to extraction, the stability of the CrO_4 extract concentration was followed with time. At T = 0, the CrO_4 concentration was determined in the initial 5 extracts within 24 hrs of extraction. The remaining extract solutions, standards, laboratory blanks, and matrix spikes were placed in brown glass bottles and stored room temperature. Another 5 subsamples were extracted (with a new set of standards, laboratory blanks, and matrix spikes), and the T = 0 CrO_4 concentration in each extract determined. This second set of extract solutions, standards, laboratory blanks, and matrix spikes were placed in brown glass bottles and stored at 4°C. The Cr(VI) extracts were analyzed at 1, 3, 7, 14, 28, and 56 days. Extracts from sediment/soil numbers 7-10 were utilized for this study (Table 2-1).

  The SVOC holding time study utilized soil/sediment numbers 1-5 (Table 2-1). Twelve samples of each soil/sediment were stored at 4°C and 12 samples were stored at -20°C. For each holding time, two containers (duplicates) were analyzed for each holding condition (4°C and

-20°C). Specifically, the MHT multiples were 0, 0.5*MHT, MHT, 2*MHT, 3*MHT, 6*MHT, and 12*MHT. These MHT multiples were equivalent to 0, 7, 14, 28, 42, 84, and 168 days, respectively.

- The Sinclair Inlet sediment and the Wilmington, NC soil were used to study the stability of As, Cu, Pb, and Zn as a function of holding time and solid material drying treatment (soil/sediment numbers12 and 13 in Table 2-1). Eight samples were stored at 4°C and 8 samples were air-dried for 5 days, crushed, sieved (<2 mm) and stored at room temperature. Duplicate samples of the material stored at 4°C and air-dried samples were extracted and analyzed at multiples of the MHT (0, 0.5*MHT, MHT, 1.5*MHT, and 2*MHT); equivalent to 0, 90, 183, 284, and 392 days.

2.2.2 Cr(VI) Extraction and Analysis

Chromate extraction of all soils/sediments was performed strictly according to SW-846 Method 3060A-Alkaline Digestion for Hexavalent Chromium. Analysis of the sediment/soil extracts was conducted according SW-846 Method 7196A-Chromium, Hexavalent (colorimetric). The colorimetric procedure was performed as prescribed except that in the interests of waste minimization the colorimetric solutions (analyte solutions, standards, laboratory standards, and QA solutions) were produced in 10 mL volumes rather than the suggested 100 mL volume. Colorimetric determinations were performed using a Perkin-Elmer Lambda 19 dual beam spectrophotometer. QA reviewed data tables are provided in Appendix A.

2.2.3 SVOC Extraction

Housatonic River; Tri-Cities, NY; Eagle Harbor; SQ-1; and Bedford-1 soils/sediments were extracted using SW-846 Method 3540C-Soxhlet Extraction, a procedure for extracting nonvolatile and semivolatile organic compounds from solids. A deviation from this method was implemented for samples SQ-1 and Bedford-1 because the high moisture content of these samples caused incomplete extraction using the Method 3540C-Soxhlet Extraction. A thumbnail sketch of the procedure and the deviations are noted below for each of the soils/sediments.

Housatonic River, Eagle Harbor, and Tri Cities — Ten g of sample was mixed with 10 g anhydrous Na_2SO_4 in a 125 mL Qorpak jar, 100 mL of methylene chloride was added; and the jar rolled on a modified rock tumbler for 2 h. This mixture was transferred to a Soxhlet thimble and put into the Soxhlet extractor. The jar was rinsed three times with 50 mL methylene chloride and the rinsate added to the thimble. The soil/sediment was extracted overnight with 350 mL methylene chloride. The following day, the extract was evaporated using a Kuderna-Danish apparatus to <25 mL. The solvent exchanged to hexane, transferred to a 25 mL volumetric flask, and brought to volume using hexane. Activated copper was added to 1 mL (Housatonic River and Tri-Cities) or 2 mL (Eagle Harbor) of the resultant solution to remove the sulfur interference as described in SW-846 Method 3660B-Sulfur Cleanup Method. Deviations to SW-846 Method 3660B were:

- 0.2 mL of the copper treated Housatonic River extract or 0.05 mL Tri-Cities extract was placed on a conditioned Florisil column and eluted with 9 mL of 1:9 acetone:hexane mixture as described in SW-846 Method 3620-Florisil Cleanup. The eluate was evaporated to 1.0 mL and 100 μL of internal standard PP-1195 was added.

- 1.0 mL of the copper treated Eagle Harbor extract was placed on a silica column as described in SW-846 Method 3630C-Silica Gel Cleanup. The column was pre-eluted with 40 mL pentane and the pentane discarded. One mL of sample was added to the column and eluted with 25 mL pentane. This fraction was then discarded. 25 mL of 2:3 methylene chloride:pentane solution was added to the column and this fraction was collected in a Qorpak jar. The solution was then transferred to the Kuderna-Danish evaporator, solvent exchanged to cyclohexane, evaporated to 1.0 mL, and 100 μL of internal standard PP-1195 was added.

SQ-1 — Initially, a 15 g sample was mixed with 10 g anhydrous Na_2SO_4 and 10 g activated copper in a 125 mL Qorpak jar. One hundred mL of methylene chloride was added to the jar and the jar rolled on a modified rock tumbler for 2 h. With the exception of the initial step, the SQ-1 sediment followed the protocol used for Housatonic River, Eagle Harbor and Tri Cities soils/sediments.

Bedford-1 — Due to limited amount of soil, 5 to 6 g of soil was utilized for each subsample. The mass of soil was placed in 250 ml Qorpak jars. Prior to extraction, 0.5 g of sample was removed from the jars to determine percent dry weight. One hundred mL of methylene chloride, 10 g activated copper and 50 g anhydrous Na_2SO_4 were added. The vessel was shaken vigorously then put on a modified rock tumbler for two hours to homogenize the components. The suspension was transferred to a Soxhlet thimble and put into the Soxhlet extractor. The jar was rinsed three times with 50 mL methylene chloride and the rinsate added to the thimble. The soil was extracted overnight with 350 mL methylene chloride. The following day the sample was evaporated using a Kuderna-Danish apparatus to 25 mL, solvent exchanged to hexane, and again treated with activated copper as described in SW-846 Method 3660B-Sulfur Cleanup. 0.5 mL of the extract was placed on the Florisil column as described in SW-846 Method 3620-Florisil Cleanup and 0.5 mL was placed on the silica column as described in SW-846 Method 3630C-Silica Gel Cleanup. Both eluates were evaporated using a Kuderna-Danish apparatus to 1.0 mL, solvent exchanged to cyclohexane, and 0.1 mL of laboratory produced internal standard was added.

2.2.4 SVOC Analysis

All SVOC extracts were analyzed prior to the SVOC 40 day MHT. Polyaromatic hydrocarbon analysis of the SVOC extracts followed SW-846 Method 8270C-Gas Chromatography/Mass Spectrometry (GC/MS) with specifications and modifications as noted. PAHs were separated via high resolution capillary gas chromatography and identified and quantified using electron impact mass spectrometry. A data system interfaced to the GC/MS was used to control acquisition and to store, retrieve, and manipulate mass spectral data. The PAHs listed in Table 2-3 were identified and measured in selected ion monitoring mode (SIM). Tuning followed the parameters from the instrument manufacturer, which uses a compound PFTBA that is bled into the instrument. Inertness of the system was assessed using linearity and calibration check compounds (CCCs). The only deviation from SW-846 protocol was for sensitivity and compound degradation, which was addressed via other system checks, not specifically by a system performance check compound (SPCC). QA reviewed data tables and QA narratives are provided in the Appendix A.

Table 2-3. PAH Analyte List

Analyte	Quantitation Ion	Confirmation Ion
Naphthalene	128	127
Acenaphthylene	152	153
Acenaphthene	154	153
Fluorene	166	165
Dibenzothiophene	184	139
Phenanthrene	178	176
Anthracene	178	176
Fluoranthene	202	101
Pyrene	202	101
Benzo[a]anthracene	228	226
Chrysene	228	226
Benzo[b]fluoranthene	252	253
Benzo[k]fluoranthene	252	253
Benzo[e]pyrene	252	253
Benzo[a]pyrene	252	253
Perylene	252	253
Indeno[1,2,3-c,d]pyrene	276	277
Dibenzo[a,h]anthracene	278	279
Benzo[g,h,i]perylene	276	277
Surrogate Standards	**Quantitation Ion**	**Confirmation Ion**
Naphthalene-d_8	136	137
Acenaphthene-d_{10}	164	162
Phenanthrene-d_{10}	188	184
Chrysene-d_{12}	240	236
Perylene-d_{12}	264	265
Internal Standards	**Quantitation Ion**	**Confirmation Ion**
Acenaphthylene-d_8	160	161
Pyrene-d_{10}	212	106
Benzo[a]pyrene-d_{12}	264	265

Table 2-4. PCB (Aroclors and Congeners) and chlorinated pesticide analyte list.

<u>PCBs - Aroclors</u>

Aroclor 1242 (or 1016)
Aroclor 1248
Aroclor 1254
Aroclor 1260

<u>PCB - Congeners</u>

CB Number[a]	CAS Nomenclature[b]	CAS Registry Number[c]
8	2,4'-dichlorobiphenyl	34883-43-7
18	2,2',5-trichlorobiphenyl	37680-65-2
28	2,4,4'-trichlorobiphenyl	7012-37-5
29	2,4,5-trichlorobiphenyl	15862-07-4
44	2,3',3,5'-tetrachlorobiphenyl	41464-29-5
49	2,2',4,5'-tetrachlorobiphenyl	41464-40-8
50	2,2' 4,6'-tetrachlorobiphenyl	62796-65-8
52	2,2',5,5'-tetrachlorobiphenyl	35693-99-3
66	2,3'.4,4'-tetrachlorobiphenyl	32598-10-0
87	2,2' 3,4,5'-pentachlorobiphenyl	38380-02-8
101	2,2',4,5,5'-pentachlorobiphenyl	37680-73-2
104	2,2',4,6,6'-pentachlorobiphenyl	56558-16-8
105	2,3,3',4,4'-pentachlorobiphenyl	32598-14-4
118	2,3',4,4',5-pentachlorobiphenyl	31508-00-6
126	3,3',4,4',5-pentachlorobiphenyl	57465-28-8
128	2,2',3,3',4,4'-hexachlorobiphenyl	38380-07-3
138	2,2' 3,4,4',5'-hexachlorobiphenyl	35065-28-2
153	2,2',4,4',5,5'-hexachlorobiphenyl	35065-27-1
154	2,2',4,4',5,6'-hexachlorobiphenyl	60145-22-4
170	2,2',3,3',4,4',5-heptachlorobiphenyl	35065-30-6
180	2,2',3,4,4',5,5'-heptachlorobiphenyl	35065-29-3
183	2,2',3,4,4',5',6-heptachlorobiphenyl	52663-69-1
184	2,2',3,4,4, 6,6'-heptachlorobiphenyl	74472-48-3
187	2,2',3,4',5,5',6-heptachlorobiphenyl	52663-68-0
188	2,2' 3,4' 5,6,6'-heptachlorobiphenyl	74487-85-7
195	2,2',3,3',4,4',5,6-octachlorobiphenyl	52663-78-2
200[c]	2,2',3,3',4,5',6,6'-octachlorobiphenyl	40186-71-8
206	2,2'3,3',4,4',5,5',6-nonachlorobiphenyl	40186-72-9
209	2,2'3,3',4,4',5,5',6,6'-decachlorobiphenyl	2051-24-3

[a] Ballschmiter and Zell numbering scheme.

[b] Chemical Abstracts, Tenth Collective Index, Index Guide, American Chemical Society, Columbus, Ohio, 1982.

[c] CB 200 in the Ballschmiter and Zell numbering scheme.

Table 2-4, *Continued*

Chlorinated Pesticides
Aldrin
alpha-BHC
beta-BHC
gamma-BHC (Lindane)
delta-BHC
4,4'-DDE
4,4'-DDD
4,4'-DDT
(cis) alpha-Chlordane
(trans) gamma-Chlordane
Tech. Chlordane
Dieldrin
Endosulfan I
Endosulfan II
Endrin
Endrin Aldehyde
Endrin Ketone
Heptachlor
Heptachlor Epoxide
Toxaphene
Endosulfan Sulfate
Hexachlorobenzene
2,4'-DDD
2,4'-DDE
2,4'-DDT
Mirex
trans-Nonachlor
Surrogate Standards
PCB 103
PCB 198
Internal Standards
Tetrachloro-*m*-xylene (TCMX)
Octachloronaphthalene (OCN)
Hexabromobiphenyl (HBB)

Analysis of chlorinated pesticides followed SW-846 Method 8081A. Analysis of polychlorinated biphenyls (PCBs) as Aroclors or individual congeners followed SW-846 Method 8082. Both analyses utilized capillary gas chromatography with ^{63}Ni electron-capture detection. The internal standards were monitored closely indicating volume changes, system changes, injector changes, and linear condition but if outside data quality objectives (DQOs), the analytical run was allowed to complete and then assessed with surrogates and spike recoveries. QA Reviewed data tables and QA narratives are provided in the appendix. Table 2-4 lists the PCBs and pesticides targeted.

2.2.5 Metal Digestion (Acid-Leachable) and Analysis

The Wilmington soil and Sinclair Inlet sediment samples were digested using the acid-leachable digestion detailed in SW-846 Method 3051-Microwave Assisted Acid Digestion of Sediments, Sludges, Soils, and Oils. Digestates were analyzed via SW-846 Method 6020-Inductively Coupled Plasma-Mass Spectrometry. The method measures ions produced by a radio-frequency inductively coupled plasma. Analyte species originating in a liquid are nebulized and the resulting aerosol transported by argon gas into the plasma torch. The ions produced are entrained in the plasma gas and introduced, by means of an interface, into a mass spectrometer. The ions produced in the plasma are sorted according to their mass-to-charge ratios and quantified with a channel electron multiplier. There were no deviations from the aforementioned protocols. QA reviewed data tables and QA narratives are provided in the Appendix A.

2.3 Statistical Analysis

Descriptive statistics including the mean, standard deviation, minimum, maximum, median, and data quartiles (first quartile, Q1, equals the 25th percentile and the third quartile, Q3, equals the 75th percentile) were calculated for each sampling period and holding condition. The mean, standard deviation, and CV (equal to the standard deviation divided by the mean) were also calculated for all data collected for a given holding condition.

Overall CVs of less than 20% for CrO_4 and metals, and 25% for SVOCs suggest that data has remained within the data quality acceptance criteria for replicate precision (Table 2-5). Even though trends may be statistically detected in such data, it would be suspect due to the normal analytical error that can be observed in chemical analysis. For analytes measured within this level of noise, one would suggest that the concentration did not decrease more than would be allowed between replicate measurements over the entire time period tested. For these analytes, estimation of a holding time from this experiment could be considered impractical.

A one-sample, one sided, t-test of the null hypothesis Ho: the data are samples from a population with a mean equal to or greater than the mean of the Day 0 concentration versus the alternative H_1: the samples are from a population with a mean less than the mean of the Day 0 concentration, was conducted to provide a measure of relevance (chemical importance) of the potential change. Simple linear regression of concentration against time was used to test 1) the null hypothesis that the slope of the natural logarithm of the concentration of each contaminant was equal to zero and 2) the null hypothesis that slopes associated with curvature (the lack-of-fit to the simple linear model) were equal to zero. Plots were used to compare the observed concentration to the nonparametric upper and lower boundaries of the Day 0 concentration calculated as Q3+ 1.5(Q3-Q1) and Q1-1.5(Q3-Q1), respectively. The fitted regression line was included in data plots if the slope was negative and statistically different from zero.

The holding time (HT), defined as the number of days until a 5%, 10% and 20% decrease in the natural logarithm of the concentration from the intercept of the regression (C_0), was calculated based on the lower 95% confidence limit of the slope estimate (β_{LCL}). Thus, holding time for a given percentage change (Δ%) was defined as HT = $-\Delta\%*C_0/\beta_{LCL}$. Using the lower 95% confidence limit of the linear slope provides some conservatism to the holding time estimation because as the data increasingly deviate from a simple linear response, the confidence interval increases and the slope used for estimation becomes steeper. When the estimated β_{LCL} was greater than 0, the concentration was estimated to be increasing instead of decreasing and the number of days until a given percentage lost was not applicable (NA). All of the analytes tested were assumed to only decrease over time since none of the analytes measured were considered a degradation product.

Chemical concentrations tend to be log normally distributed. Thus, analysis was conducted on the natural logarithm of the concentration to satisfy assumptions of the statistical analyses. Further, the natural logarithm of the concentration was used instead of the raw data scale because sediments have varying amounts (i.e., 50 to 800 mg/kg) of a given analyte. The natural log transformation rescales the observations to minimize the magnitude of the difference between the Day 0 value and the value obtained at a given percentage change. A percentage change (i.e., 10%) from a large number (say 800) has a larger magnitude difference (800-720=80) than the same percentage change from a small number (50-45=5). Thus, on the raw data scale, analytes with the same slope associated with the decrease in concentration over time but different intercepts would produce quite different estimates of the holding time. The natural log transformation reduces this effect (i.e., ln[800]-.9*ln[800]=0.67 compared to ln[50]-.9*ln[50]=0.39). The resulting holding times would still be different; however, the magnitude of the difference would be much less than that achieved on the raw scale.

Observations were removed from data analysis including plots if they were potentially contaminated (flagged with a B) or rejected for QC/QA reasons (flagged with an r). Analysis was conducted with and without observations considered extreme outliers, defined as Q3 + 3*(Q3-Q1) where the quartiles are derived from the Day 0 data. Extremely high outliers have a large influence on the estimated slope and, thus, the resulting holding time. Outliers in the Day 0 data were removed from analysis and plots if the within replicate CV was greater than 25%. Observations were removed from the Day 0 data only if a single value was extreme and if that value was the furthest absolute distance from the median value. Extreme outliers observed during all other sampling times were removed from the analysis only if they made up less than 10% of the total number of observations.

Residual plots were used to assess the lack of homogeneity of variance, lack-of-fit to the linear model, potential outliers, and observations that could have exaggerated influence on the estimated slopes. Residuals, defined as the observed minus the fitted result, are assumed to have a mean of zero and a constant variance. Residuals plotted against time should display a random pattern about zero with a constant variance across the x-axis. A consistent U-shaped pattern of the residuals would indicate the need for curvature in the model if a significant ($p < 0.05$) lack-of-fit was detected. The need for a spline or nonlinear model could also be indicated by a significant lack-of-fit. However, if the concentration decreased and then increased over time, the lack-of-fit was considered analytical noise. In these cases, the simple linear model was used for the holding time estimation. A single observation that has a large amount of influence on the estimated slopes would be indicated by a residual close to zero and far away on the x-axis from all other observations. Observations with too great an influence on the estimation of the slope were removed from the analysis.

The intent of this analysis was to provide a progression of four distinct ways to evaluate a possible decrease in the concentration of an analyte (lines of evidence). First, the magnitude and variability of the concentration was used to suggest a level of the signal to noise ratio; second a t-test of the H_0:overall mean equal to or greater than the Day 0 mean was used to provide a level of relevance to observed change; third a regression against time was used to estimate a rate of change; and fourth a nonparametric upper and lower bound based on the Day 0 quartiles was used to provide an alternative measure of relevance to the potential change through time. When the t-test is not significant, the slope from the regression is not significant, and the data remain within the nonparametric bounds, all three methods suggest a lack of degradation over the period tested. However, when at least one of the methods differ in their results, the sensitivity and assumptions of each method must be evaluated to sort out the most likely outcome.

The t-test uses the variability observed in all of the data to determine significance and does not evaluate whether or not a trend over time is present. Thus, if the data is highly variable, the probability of rejecting the null hypothesis is low even though a significant trend of decreasing concentration may exist. The regression analysis is sensitive to detecting a linear degradation. Thus, if the pattern of degradation is not linear, the regression analysis may not detect it. A threshold point associated with different rates of degradation over time could cause a simple linear regression to be not significant. However, the lack-of-fit to a simple linear regression would be detected. Finally, the nonparametric bounds are based on the variability observed in the Day 0 data. When the Day 0 variability is high, the boundaries will be wider than when the Day 0 variability is low.

Statistical versus Chemical Significance: The determination of statistical significance in hypothesis testing means that a value greater than or equal to that observed of a specific statistic has a small probability of occurring by chance alone. The definition of small is used to define the level of significance and is usually set at $\alpha = 5\%$. The probability of occurrence of the achieved value or one greater of the statistic (p-value) is calculated based on specific assumptions about the distribution of the statistic assuming the null hypothesis is true. The decision to reject a null hypothesis (reject if the achieved p-value is less than α) for a defined alternative is based on the level of significance chosen before analysis. However, presenting the achieved p-value allows one to assess the potential biological or chemical significance of the result as well.

The chemical significance of a result is a function of the minimum detection limit (MDL) in comparison to the observed concentration and the analytical variability associated with the type of analyte being measured (metals versus organics, for example). Concentrations close to the MDL (defined as 2 times the MDL = 2*MDL) may exhibit a greater analytical variability than concentrations further away from the MDL. A chemically significant result requires that the observed variability is greater than the analytical variability alone. For metals and organic analytes replicate results must have a CV of less than 20% and 25%, respectively, to meet quality control criteria for extraction variability. If all observed concentrations for a given analyte across time display a CV of less than or equal to the analytical criteria of replicates, then any detected statistical significance is within the noise of analytical variability and could be spurious. If the achieved p-value for the test of a significant slope is close to 0.05, then the estimated slope may be considered a curious trend. However, if the achieved p-value is very small (< 0.01), then the observed trend should be considered chemically relevant even though all observations were within the allowable analytical noise.

2.4 General Data Quality Objectives

The data quality objectives are discussed in detail in the project's Quality Assurance Project Plan (QAPP). This plan was developed based on the QA/QC requirements associated with the different SW-846 methods utilized in this study. Of particular importance was the matrix spike recovery and replicate precision for the individual methods (Table 2-5).

Matrix spike recovery was essential in detecting potential problems during extraction and analysis. The concentration of the matrix spike was targeted at four times an analyte's estimated indigenous concentration; the initial estimate of the indigenous concentration was determined from preliminary semi-quantitative extraction and analysis. If the initial matrix spike was below a factor of four of the extracted analyte's concentration the matrix spike was increased for the next extraction time. As will be seen in the case of Cr(VI) extraction and analysis, the matrix spike recovery was essential to problem identification of Cr(VI) extraction and detection.

Replicate precision was measured as the percent coefficient of variation (CV; the standard deviation divided by the mean). Replicates are typically defined as extraction of multiple samples of the same soil/sediment during the course of an extraction process. As discussed in section 2.3; however, extractions data across the life of the study (e.g., 168 days for SVOCs) were pooled and an overall CV calculated as a method of comparison to the SW-846 prescribed replicate precision metric listed in Table 2-5. This comparison was utilized in this study as the initial measure of variability across time.

Table 2-5. Summary of general data quality objectives.

Method	Analytes	Spike Recovery	Replicate Precision
GC-MS (SIM) 8270C	SVOC (PAHs)	40-120%	<25%
8081/8082	Chlorinated Pesticides/PCBs	40-120%	<25%
9060[1]	Total Organic Carbon	NA	<20%[2]
6010/6020	Metals	75-125%	<20%
3060A/7196	Cr(VI)	85-115%	<20%

[1] EPA Method 9060 for TOC in water samples was adapted to soil and sediment TOC extract determination.

[2] Based on TOC by difference; RPD is the Σ of the RPD for TC and TIC; the RPD is typically much smaller than 20% but is dependent on homogeneous nature of sample and the amount of TOC.

Section 3

Results and Discussion

3.1 Chromate [Cr(VI)]

Based on preliminary qualitative extraction and analysis (no blanks, matrix spikes etc.), six soils were chosen for the Cr(VI) extraction holding time study. The general physical and chemical characteristics of the soils are presented in Table 3-1. The dissolved organic carbon (DOC) values were determined after filtration and pH adjustment to 7.5 ± 0.5 of the extract solutions. The soils exhibited circum neutral pH, fairly oxidized, and limited in clay content. The DOC extracted from the Bedford plot-6 soil was exceptionally high and proved to be a confounding factor in Cr(VI) extraction and analysis (discussed below). The Boomsnub site soils (125A, 125B, and 125C) and the Frontier Hard Chrome site (126D) T = 0 extracts were utilized in the extract stability study.

3.1.1 Spike Recovery Anomaly: Bedford Plot-6 Soil

Determination of the T = 0 Cr(VI) extract concentration and necessary blanks and matrix spikes for each of the extracted materials was acceptable (i.e., blanks and spikes fell within the prescribed range) except for the Bedford plot-6 soil. Recovery of the matrix soluble and insoluble spike for the Bedford plot-6 T = 0 extractions was very low (1 to 5%). According to the SW-846 Method 3060A QA/QC procedures, the soil was rehomogenized and the extraction repeated. Similar results were obtained. As per SW-846 Method 3060A, the soil's total organic carbon (TOC), Fe(II), and sulfide concentrations were determined. The TOC content was 16.24% and the extract DOC was 393 ± 16.8 mg/L. No evidence of sulfide was found. The soil's ferrous iron content was estimated to be 14.52 ± 0.29 mg Fe(II)/g sediment following ASTM Method D 3872-86, Standard Test Method for Ferrous Iron in Iron Oxides (ASTM, 1986).

The ASTM method uses an HCl acid extraction of the soil under a constant stream of $N_{2(g)}$ followed by a titration of the extract with a standard solution of $K_2Cr_2O_7$. The amount of Cr(VI) reductive power in the Bedford plot-6 sample estimated by the ASTM titration was more than enough to reduce the Cr(VI) added to the soil in the matrix spike. It did not; however, explain the apparent presence of Cr(VI) in the colorimetric extract determinations where, if all the Cr(VI) was reduced, no Cr(VI) should have been detected. The approximate 0.20 to 0.30 absorbance units (au), which translated to 15.9 ± 4.1 mg Cr(VI)/kg soil, appeared to be the result of the high DOC content of the extracts. This hypothesis was supported by the fact that measurement of absorbance at 540 nm yielded the same response (~0.25 au) whether the extract absorbance was measured directly without pH adjustment and addition of diphenylcarbazide, with pH adjustment only, or as prescribed in SW-846 Method 7169A (Fig. 3-1). Further, the UV/Vis spectrum of the extract exhibited the classic broad, slowly decreasing spectrum common to extracted organic carbon. The absorbance spectra of humic substances are seen as generally featureless, smooth curve whose absorbance decreases from about 400 nm to about 900 nm (Swift, 1996). At 540 nm; however, the DOC concentration of this extract was high enough that its absorbance was significantly above background (~0.02 au). As a result of these data, DOC was determined for each of other five extracts (Table 3-1).

Table 3-1. Chromate [Cr(VI)] extraction study soil/sediment properties.

Sediment	pH	Eh	OC[a]	Sand	Silt	Clay	DOC[a]
		mv	----------------%----------------				mg/L
Boomsnub site-0.5' (125A)	6.2	286	1.27	56.9	33.8	9.3	75.7
Boomsnub site-3.0' (125B)	6.4	284	1.49	55.8	35.4	8.8	76.3
Boomsnub site-5.5' (125C)	5.4	340	0.30	52.6	38.8	8.6	17.6
Frontier Hard Chrome Site-2 (126D)	5.3	442	0.13	94.6	4.56	0.84	10.7
Stratford CT, engine plant (123)	7.1	436	0.09	82.0	16.7	1.3	6.0
Bedford plot-6	6.8	570	16.2	ND[b]	ND	ND	393

[a] Reported values are extract dissolved organic carbon performed after filtration and are the mean of triplicate measurements.

[b] ND = no data.

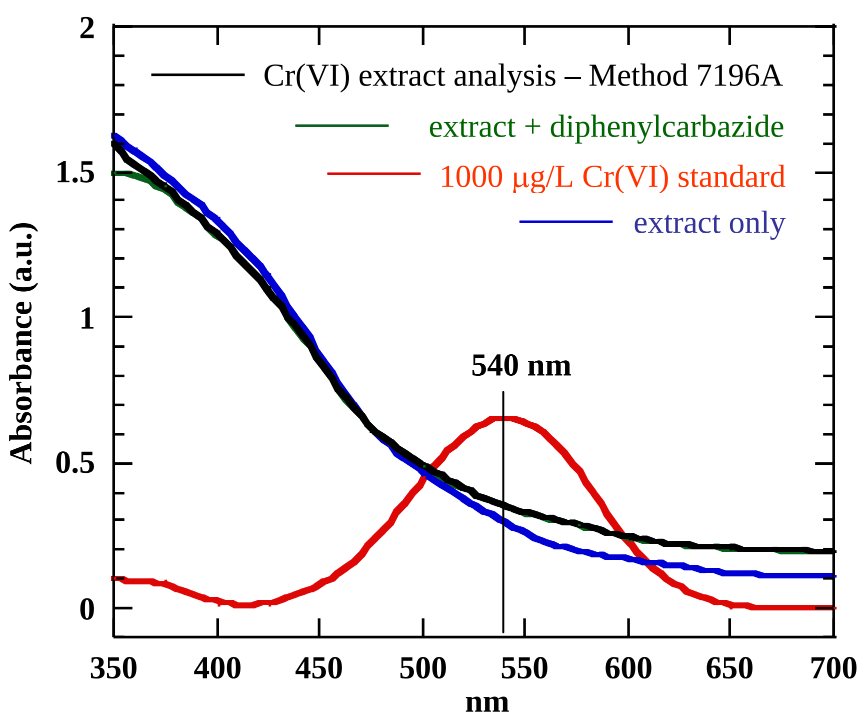

Figure 3-1. UV/Vis spectra of (a) Cr(VI) 1000 mg/L standard, (b) Bedford-6 Cr(VI) extract solution, (c) Bedford-6 Cr(VI) extract solution and diphenylcarbazide, and (d) Bedford-6 extract solution prepared as prescribed by SW-846 Method 7196A.

None of the other soils extracted in this study exhibited significant background absorbance.

To further investigate the Bedford plot-6 extract matrix spike anomalies, three Bedford plot-6 soil samples were extracted, filtered and pH adjusted (according to the extraction technique prescribed by SW-846 Method 3060A) and then four subsamples of each extract were spiked with increasing concentrations of Cr(VI); approximately 0, 2000, 6000, or 10,000 μg/L (Table 3-2). After approximately two hr, these solutions were analyzed according to SW-846 Method 7196A and SW-846 Method 6010B-Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The absorbance of the spiked samples through 6000 μg/L Cr(VI) exhibited no trend of increasing absorbance with increasing Cr(VI) addition. However, there was a consistent, albeit small increase in absorbance with the 10,000 μg/L spike (Table 3-2). Based on the standard additions, the absorbance of the extracts should have increased from approximately 0.33 au to well over 1.3 au. and required dilution at the higher two spiking concentrations. Comparison of the spiked Cr(VI) concentration (calculated, Table 3-2), the colorimetric concentration, and ICP-AES determined Cr_{total} showed that Cr(VI) was being reduced by the extracts. The slight increase in Cr(VI) concentration (absorbance) at the highest Cr(VI) spiking suggested that the extract solution's reductive potential was approaching exhaustion. The discrepancy between the calculated Cr(VI) additions and that determined by ICP-AES was probably related to formation and subsequent settling of $Cr(OH)_3$ as the Cr(VI) additions increased.

Hence, we concluded that the Cr(VI) reductive ability of this sediment was extractable. While the Cr(VI) reduction could have been the result of Fe^{2+} present in the mineral phases or complexed with the DOC, it could also have been present as reduced quinone moieties associated with the DOC (Scott et al. 1998). In addition, the positive initial semi-quantitative screening for Cr(VI) in the Bedford plot-6 soil was probably the result of extracted DOC. Any Cr in this soil was probably in the reduced Cr(III) state, and based on the ICP analysis of the zero spike addition the Cr(III) concentration was extremely low (Table 3-2). While a number of interesting questions remain (i,e, the nature of the Cr(VI) reducing agent(s), and the reducing capacity of the soil), addressing these issues was beyond the scope of this study.

3.1.2 Cr(VI) Extraction

Extractable concentrations of Cr(VI) were characterized through time for each of the remaining 5 soils and holding temperatures (Appendix A-Table A-1). Soil 125C had the lowest concentration of Cr(VI) averaging 64 mg/kg while soil 126D had the highest concentration averaging 830 mg/kg (dry weight) for all treatments and holding times. The CV for the day 0 replicates ranged from 2% to 13%, which were within the <20% CV for replicate precision (Table 3-3). In fact, only one soil (125A at 4°C) exhibited a CV greater than the 20% CV necessary for replicate precision for all data across time (Table 3-3). For the 125 A soil at 4°C, the overall CV of 34% was the result of two time period duplicates were widely variant at Days 28 and 224 (Fig. 3-2). Based solely on SW-846 Method 3060A requirement for replicate precision (CV<20%), the overall CV values suggest that all extraction results for a given soil had acceptable precision between replicates regardless of extraction time.

Table 3-2. Cr(VI) analyses of three Cr(VI) spiked Bedford-6 soil extracts.

Sample[1]	Calculated spiked Cr(VI) Conc.	Colorimetric analysis of Cr(VI) spiked solutions[2]		ICP-AES Cr analysis
	μg/L	Absorbance (au[3])	μg/L	μg/L
1A	0	0.360	446	75.9
1B	1965	0.331	426	1623
1C	5871	0.346	447	4732
1D	9914	0.399	521	7999
2A	0	0.326	418	178.1
2B	2016	0.320	410	1713
2C	5880	0.359	466	4675
2D	9593	0.369	479	7914
3A	0	0.357	461	79.6
3B	1957	0.357	462	1599
3C	6011	0.382	497	4764
3D	10065	0.426	560	8489

[1] Three separate Bedford plot-6 soil samples were extracted, four subsamples of each extract received either (A) 500 μL H_2O, (B) 400 μL H_2O and 100 μL of 100 μg/mL Cr(VI), (C) 200 μL H_2O and 300 μL of 100 μg/mL Cr(VI), or (D) 500 μL of 100 μg/mL Cr(VI).

[2] Colorimetric analyses followed SW-846 Method 7196A.

[3] Absorbance (au) = arbitrary units.

Table 3-3. Chromate [Cr(VI)] (mg/kg) one-sample t-test of the null hypothesis Ho: the sample is from a population with the mean equal to or greater than the Day 0 mean.

Sediment	Condition	Day 0 Mean and CV (N = 5)	Overall			95% Confidence Limits		P-value		N
			Mean	Standard Deviation	CV	Lower	Upper			
125A	4°C	91.6 (13%)	93.0	31.9	34%	75.3	111	0.55	NS	15
125A	-20°C	91.6 (13%)	96.5	17.7	18%	86.7	106	0.83	NS	15
125B	4°C	328 (12%)	339	34.5	10%	320	358	0.88	NS	15
125B	-20°C	329 (12%)	343	48.2	14%	317	370	0.88	NS	15
125C	4°C	62.5 (11%)	64.3	7.37	11%	60.2	68.4	0.75	NS	15
125C	-20°C	62.5 (11%)	63.5	5.83	9%	60.3	66.7	0.63	NS	15
126D	4°C	815 (4%)	828	46.2	6%	801	854	0.67	NS	14
126D	-20°C	816 (4%)	829	31.5	4%	812	847	0.95	NS	15
123	4°C	330 (2%)	325	42.0	13%	302	348	0.33	NS	15
123	-20°C	331 (2%)	350	18.4	5%	339	360	1.00	NS	15

NS = Not significant at $\alpha = 0.05$

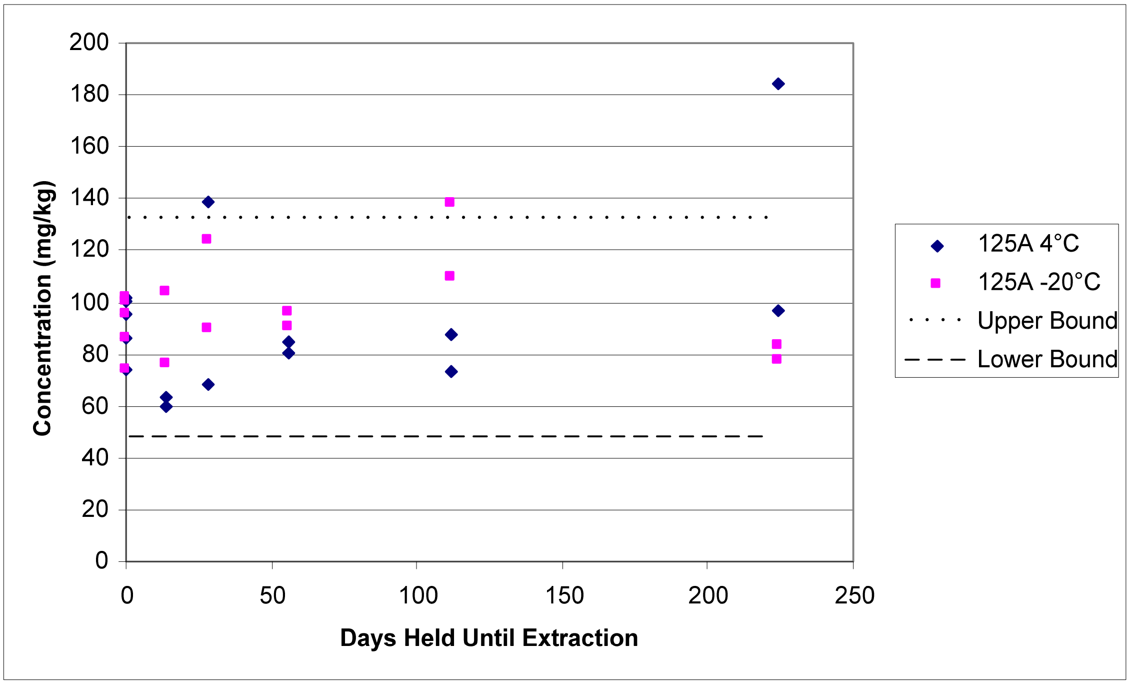

Figure 3-2. Observed Cr(VI) concentration for Soil 125A at both the 4°C and -20°C holding temperature over holding time and associated Day 0 nonparametric bounds; there was not a significant trend through time.

The various holding time extract means were compared to the T = 0 mean by a one-tailed, t-test whose null hypothesis Ho: the sample is from a population with the mean equal to or greater than the Day 0 mean was not rejected for any of the soils at either holding temperature (Table 3-3). Importantly, soil 125A held at 4°C that exhibited an overall CV>20% was not rejected. That is, even though several of the timed extracts were widely variable (Fig. 3-2), their means were not statistically different from the T = 0 mean. One high observation taken during the 224 day sampling period from soil 126D held at 4°C was removed from the analysis because of its large influence on the estimation of the slope (Fig. 3-3). The 95% confidence limits about the mean concentration of Cr(VI) were widest for soil 125B held at -20°C and 126D held at 4°C. The results of the t-test and the overall CV determinations suggest that there was no significant change in Cr(VI) concentration during the 224 days of the study.

The lack-of-fit to the linear model was significant for soils 126D held at 4°C and soil 123 held at 4°C and -20°C (Table 3-4). In all cases, the residuals did not show a consistent U-shaped pattern through time suggesting that a parameter for curvature was not needed in the model. Therefore, the simple linear model was used for all sediments and holding temperatures. The slope associated with the holding time prior to extraction was not significantly different from zero ($p > 0.08$; Table 3-4) for any soil except 123 ($p < 0.05$; Table 3-4). The estimated slopes for the 123 soil at 4°C and -20°C were negative (-0.00119) and positive (0.000371), respectively. Figure 3-4 shows that the T = 0 data was very tightly centered on an average of 331 mg/kg with a CV=2% (Table 3-3). The positive slope for the 123 samples held at -20°C is probably the result of the tight t = 0 data and the variability of the remaining timed data; that is, the positive slope can be attributed to analytical noise. The 123 samples held at 4°C exhibited a significant but only slightly negative slope. However, given the previous statistical analyses (CV<20% and a non-significant t-test), the significant slope for soil 123 (4°C) is a trend rather than a verifiable decrease in Cr(VI) concentration with holding time.

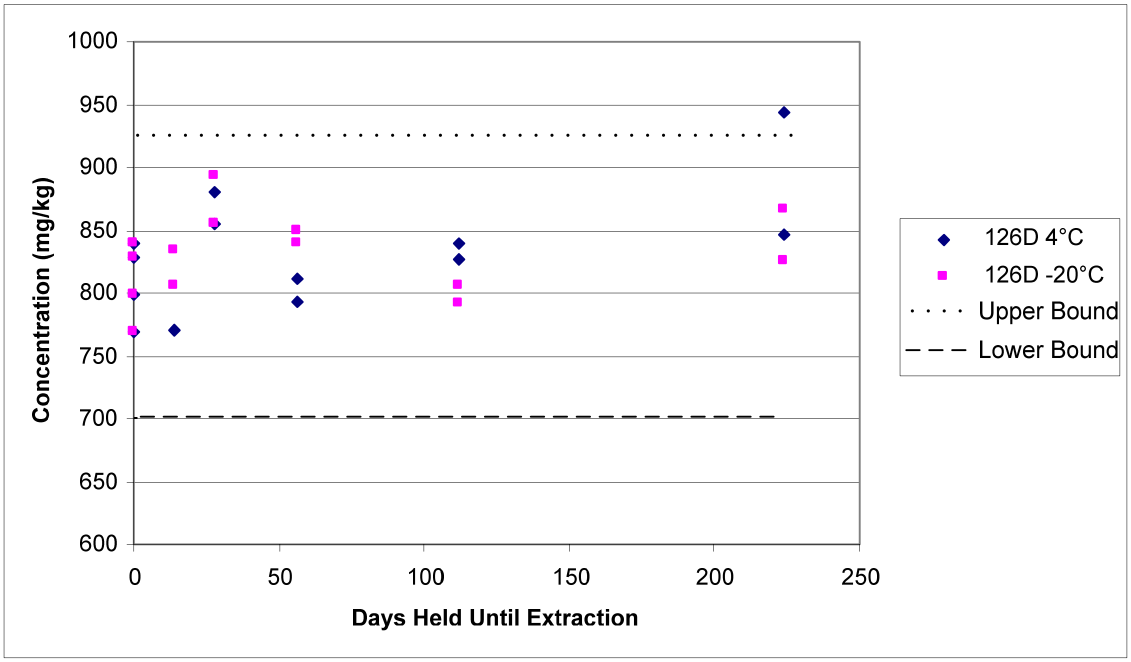

Figure 3-3. Observed Cr(VI) concentration for Soil 126D at both the 4°C and -20°C holding temperature over holding time and associated Day 0 nonparametric bounds; there was not a significant trend through time.

The statistical analyses discussed previously (CV, t-test, and linear regression) showed no significant change in Cr(VI) concentration over the life of the 224 day study (with the exception of the linear regression for soil 123 at 4°C). However, based on the estimated slopes from the linear regression analysis and the lower confidence limit of that slope (β_{LCL}), the estimated numbers of days until a 5%, 10%, and 20% decrease in natural log concentration was calculated. A 5% decrease in Cr(VI) was estimated to require at least 140 days regardless of soil or holding temperature (Table 3-5), which is 5 times longer than the SW-846 prescribed MHT of 28 days. Soil 123 held at -20°C had a positive estimated β_{LCL} and thus, the number of days until a given percentage decrease in concentration could not be calculated. Except for Soil 125C, it appears that the holding times for sediment held at 4°C were longer than the holding time for sediment held at -20°C. However, because these time estimates were based on slopes that were not significantly different from zero (and the other statistical analyses suggest that no change occurred during the life of the study) any differences noted as a function of holding temperature should not be considered definitive.

Table 3-4. P-values for the significance of the lack-of-fit and the slope from the linear regression and the best fit simple linear model parameters on the natural log scale for Cr(VI).

Sediment and Holding Temperature	P-value for Lack of Fit		Intercept	Slope	Standard Error	P-value for Slope		Df
125A 4°C	0.243	NS	4.388	0.00173	0.00094	0.089	NS	13
125A -20°C	0.118	NS	4.565	-0.00018	0.00063	0.775	NS	13
125B 4°C	0.469	NS	5.830	-0.00014	0.00038	0.706	NS	13
125B -20°C	0.46	NS	5.850	-0.00034	0.00047	0.481	NS	13
125C 4°C	0.223	NS	4.175	-0.0003	0.00037	0.439	NS	13
125C -20°C	0.138	NS	4.153	-0.0001	0.00032	0.759	NS	13
126D 4°C	0.036	*	6.698	0.000197	0.00018	0.297	NS	12
126D -20°C	0.085	NS	6.716	6.22E-05	0.00014	0.654	NS	13
123 4°C	0.013	*	5.845	-0.00119	0.00035	0.005	**	13
123 -20°C	< 0.001	**	5.834	0.000371	0.00016	0.036	*	13

df = degrees of freedom

NS = Not significant at $\alpha = 0.05$

* = Significant with $0.01 < p \leq 0.05$

** = Highly significant with $p \leq 0.01$

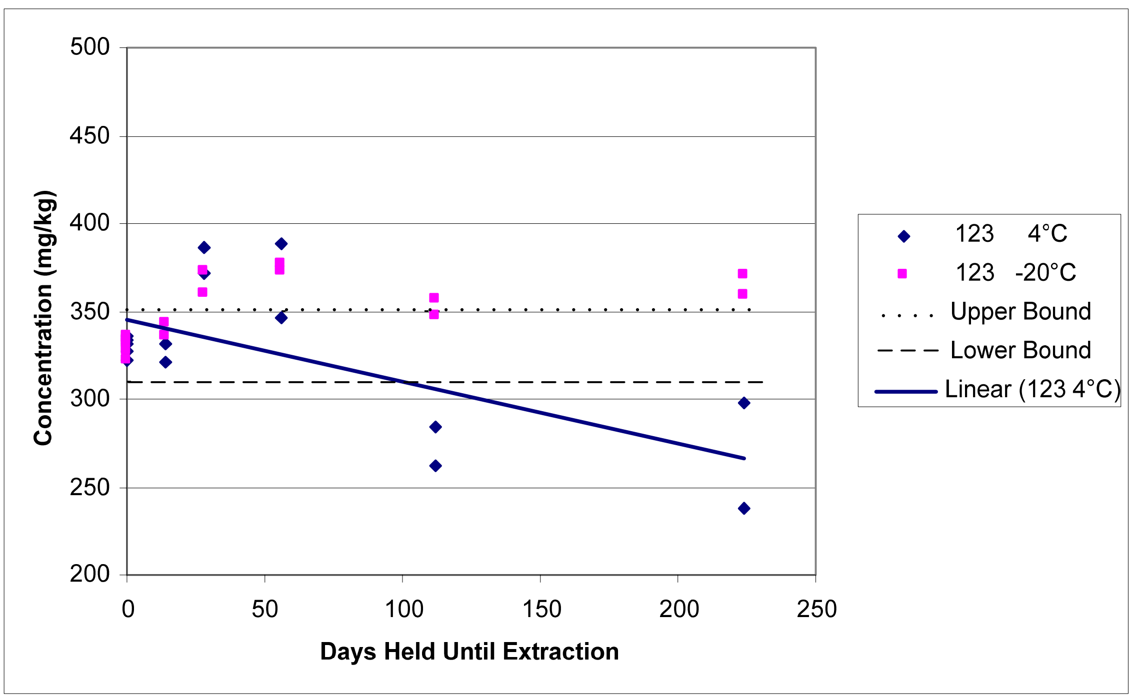

Figure 3-4. Observed Cr(VI) concentration for Soil 123 at both the 4°C and -20°C holding temperature over holding time, associated Day 0 nonparametric bounds, and the significant decreasing trend for sediment held at 4°C.

Table 3-5. The estimated number of days until a given percentage decrease from the intercept for Cr(VI) (MHT=28 days).

Sample	Holding Condition	5% Decrease	10% Decrease	20% Decrease
125A	4°C	729	1458	2916
125A	-20°C	148	296	592
125B	4°C	305	610	1220
125B	-20°C	213	427	855
125C	4°C	189	378	757
125C	-20°C	259	519	1038
126D	4°C	1700	3400	6801
126D	-20°C	1455	2910	5821
123	4°C	149	298	596
123	-20°C	NA	NA	NA

NA = not applicable because the slope and lower 95% confidence limit were positive.

Plots of the observed concentrations through time were compared to the nonparametric upper and lower boundaries of the Day 0 concentration (Figures 3-2 to 3-6). As with the CV, t-test, and linear regression (slope) analyses, the visual comparison showed that with except for Soil 123 held at 4°C (Fig. 3-4) the concentrations of Cr(VI) did not decline significantly over the 224 days tested. Soil 123 held at 4°C was seen to have a significant Cr(VI) decrease through time (with respect to the nonparametric lower boundary; Fig. 3-4) and exhibited a 5% decrease in the log concentration by 149 days; yet the 149 day estimate was still at least 5 times longer than the SW-846 mandated MHT. The data for soils 125B and 125C are plotted below (Figs. 3-5 and 3-6, respectively). Both of these soils exhibit stable extracted Cr(VI) concentrations.

3.1.3 Cr(VI) Extract Stability

Inspection of the Cr(VI) extract concentration data as a function of time revealed substantial variability between the five replicates of a given soil (Fig. 3-7 and 3-8). It was also noted that for those extracts held at room temperature over the 56 day study period, several soil extracts displayed a convex curve in the data (soils 125B and 125C; Fig. 3-8) or tended to appear more variable over time compared to those extracts stored at 4°C. Some of the noted variability resulted from indeterminate and determinate errors as well as analysis error. However, only the analyses performed at day 7 for soil 126D held at room temperature could definitively be associated with analysis error (i.e., distinctly higher Cr(VI) concentrations) because of its almost uniform increase across all replicates (Fig. 3-7).

The coefficient of variation (CV) between replicates was greatest for the 125A (Boomsnub, 0.5’) soil (Table 3-6). This variability probably arose from incomplete homogenization of the soil prior to subsampling and variations in analytical measurement over time. The Cr(VI) extraction procedure requires that the sample remain in its original moist condition, while this is important to the stability of Cr(VI), it makes it difficult to obtain a thoroughly mixed soil sample. Analytical variability for given replicates across time; however, was very low regardless of extract holding temperature (Table 3-6). The highest CV for within replicate determinations was 8% (extract from soil 125C stored at room temperature). The extracts stored at 4°C exhibiting a maximum CV of 3%. Simply put, these data demonstrate that for the soil extracts investigated there was no, or only very limited change in Cr(VI) extract concentrations over the 56-day time frame. When stored at 4°C, the CV across time for a given replicate was about what would be expected from analytical variability. Investigation of room temperature storage was solely for data comparison to the 4°C storage regime, not as a legitimate alternative. While we can not definitively demonstrate or delineate the cause of observed differences between the two storage regimes, it is well known that lower temperatures slow both microbial and chemical processes.

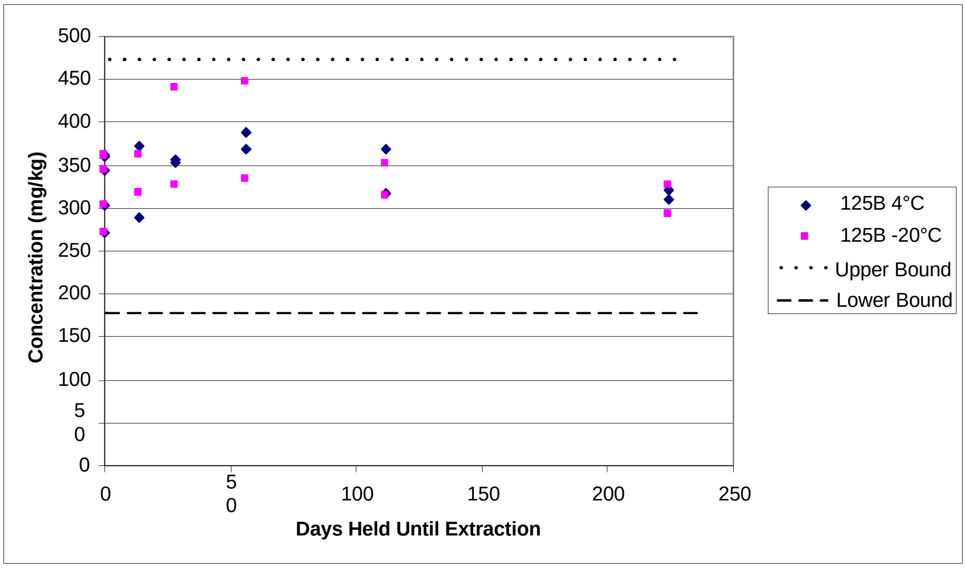

Figure 3-5. Observed Cr(VI) concentration for Soil 125B at both the 4°C and -20°C holding temperature over holding time and associated Day 0 nonparametric bounds; there was not a significant trend through time.

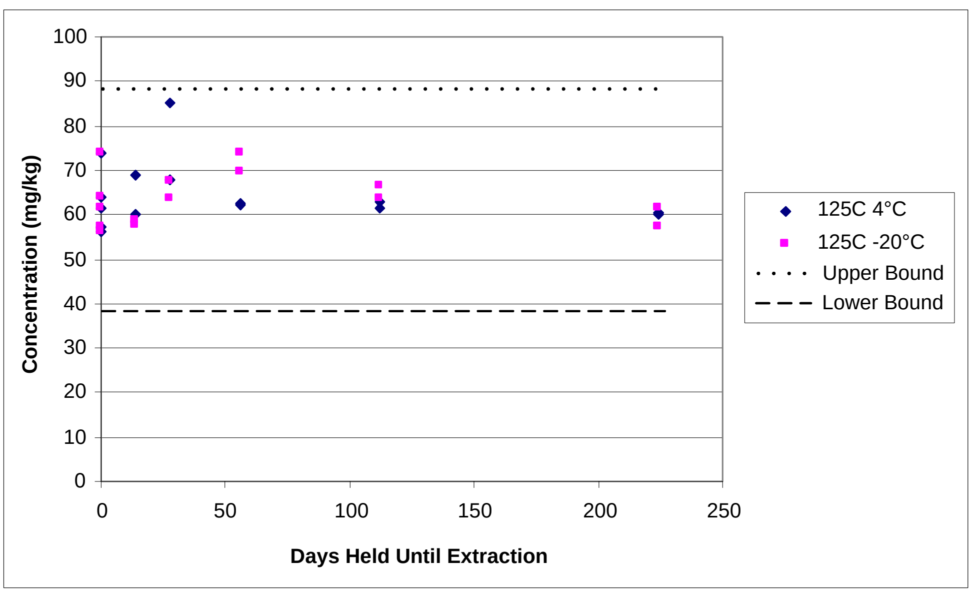

Figure 3-6. Observed Cr(VI) concentration for Soil 125C at both the 4°C and -20°C holding temperature over holding time and associated Day 0 nonparametric bounds; there was not a significant trend through time.

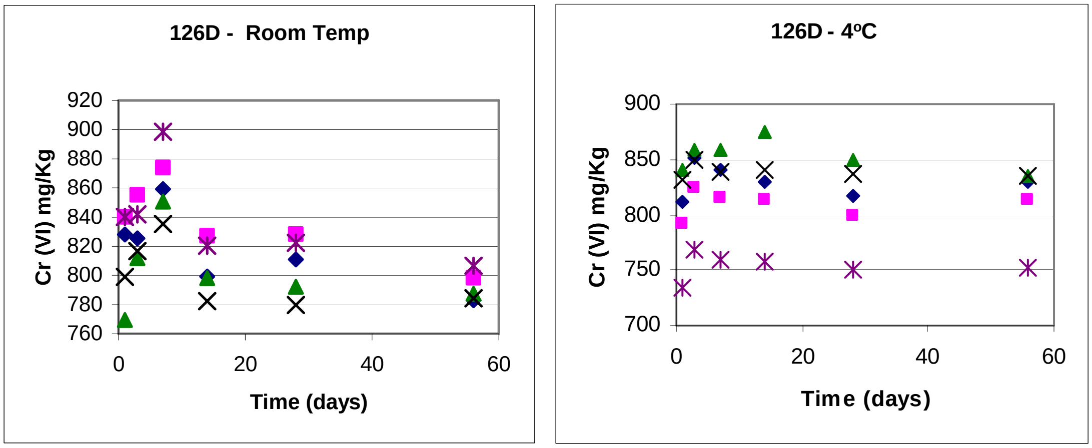

Figure 3-7. Chromate [Cr(VI)] extract concentration stored at room temperature or 4°C as a function of time for the Frontier Hard Chrome site sandy soil; the different symbols refer to the five replicates.

To examine the change in Cr(IV) concentration as a function of holding time of the extract for each sediment and storage condition, a regression analysis was conducted on the data corrected for baseline. The lack-of-fit of the simple linear regression was significant ($p > 0.05$; Table 3-7) for five of the eight sediment samples (125A, room temperature; 125B, 4°C; and 125C, room temperature and 4°C; and 126D, room temperature). In all cases; however, the residuals plotted against storage time did not display a consistent pattern that could be associated with holding time. Instead, the residuals appeared to show that for specific time points, either all residuals were high or the residuals were all low; hence, no spline analysis was necessary (see section 2.3). The behavior of the residuals was ultimately linked to the analytical requirement of producing a new calibrating dilution series and calibration curve for each batch of analyses. While a calibration curve was specific to a given extraction time period, small differences between time period curves would increase or decrease the determined extraction concentration for all soils extracted at that time period. Hence, comparison to other time periods (particularly those extracts that required substantial dilution) reflected those concentration differences as would the residual plots.

Despite the lack-of-fit to a simple regression equation noted above in the baseline corrected data, the slopes in all samples, except the 126D soil, were not significant ($p > 0.1$; Table 3-7); that is, not significantly different from zero. This result compared well with the low CV% discussed previously (particularly with the 4°C stored extracts). The variance between replicates remained fairly constant across time (i.e., slopes not significantly different from zero, $p > 0.1$; Table 3-7).

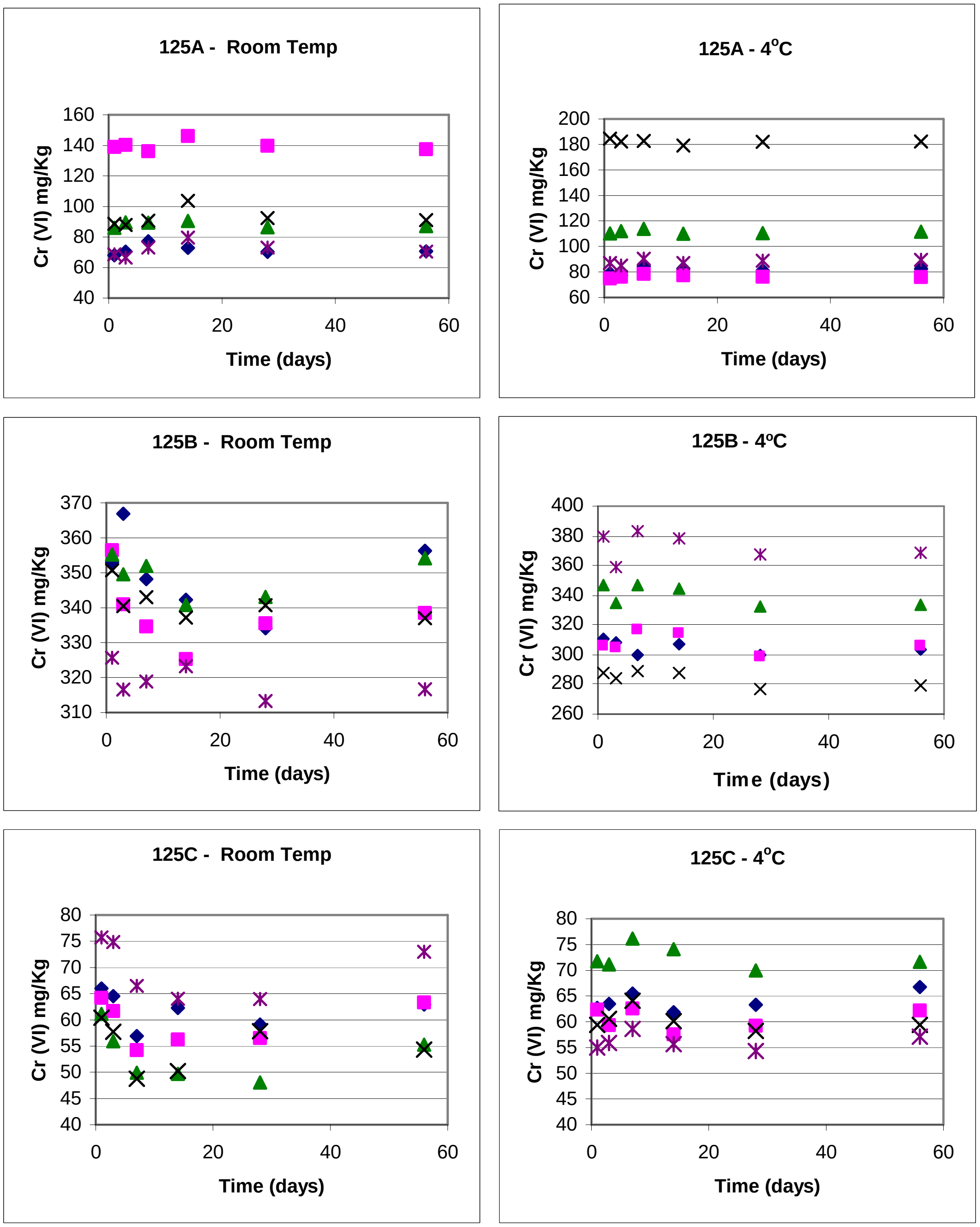

Figure 3-8. Chromate [Cr(VI)] extract concentration stored at room temperature or 4°C as a function of time for the Boomsnub soil at depths of 0.5, 3.0 or 5.5 feet; the different symbols refer to the five replicates.

Table 3-6. Average CV% over time and within replicates for the Cr(VI) extracts.

Soil type	Storage	Across Time CV%[(a)] Averaged over Replicates	Between Replicate CV% Averaged Over Time
125A	room temp	4%	30%
	4°C	2%	40%
125B	room temp	2%	4%
	4°C	2%	11%
125C	room temp	8%	11%
	4°C	3%	10%
126D	room temp	3%	4%
	4°C	1%	5%

[a] CV = Coefficient of variation.

Table 3-7. Simple linear regression analysis corrected for baseline only.

Soil	Storage	Slope Coefficient	DF[a] for Error	P-value for Slope	DF for Lack-of-fit	P-value for Lack-of-fit	95% CI[b] Regression Equation
125A	room temp	-0.03675	23	0.395	3	0.005	Y= -0.0132x + 1.6422
	4°C	0.00785	23	0.778	3	0.203	Y= -0.0002x + 0.4089
125B	room temp	-0.01108	23	0.908	3	0.239	Y= 7E-05x + 0.0384
	4°C	-0.11826	23	0.12	3	0.019	Y= 5E-05x + 0.1075
125C	room temp	0.04526	23	0.286	3	p < 0.001	Y= 0.0001x + 0.1111
	4°C	-0.00389	23	0.878	3	0.009	Y= -0.0001x + 0.1019
126D	room temp	-0.9601	23	0.002	3	0.007	Y= -0.0003x + 0.03
	4°C	-0.3043	23	0.007	3	0.131	Y= -9E-05x + 0.0496

[a] DF - degrees of freedom.
[b] CI - confidence interval.

Based on the estimated lower 95% confidence limit of the slope (β_{LCL}), the estimated number of days until a 5%, 10%, and 20% change in extract Cr(VI) concentration was calculated (Table 3-8). A decrease of 5% in the extract Cr(VI) concentration was estimated to occur between 20 and 81 days after extraction, which is substantially longer than the 24 h SW-846 prescribed MHT. With the exception of soil 125B, the extract solution holding condition of 4°C yielded a slightly greater stability (i.e., longer time to a 5% change). Regardless of holding condition or soil, the estimated time for an observed 20% change in the Cr(VI) concentration was approximately 3 months. The 5% change increment, while somewhat arbitrary, was seen as a reasonable metric because determination of Cr(VI) in an extract is an analytical procedure, as opposed to the extraction of Cr(VI) from a soil. From the statistical analyses of these extract solution data, it was clear that the extract Cr(VI) concentrations were fairly stable across the time frame of this study.

3.1.4 Cr(VI) Holding Time for Extraction and Extract Stability – Conclusions

The purpose of this study was to investigate if the extractable Cr(VI) concentration in soils/sediments was effected by the holding time prior to extraction according to SW-846 Method 3060A procedures. Of the six soils studied, five exhibited no or limited influence of holding time prior to extraction for the 224 days of this study regardless of the holding condition (4°C or -20°). The time required for the Cr(VI) concentration extracted from the five soils to change by 20% was estimated to be ≥ 592 days; the 20% value was based on the SW-846 prescribed replicate precision for Cr(VI) extraction from soils. The estimate of 592 days is about 21 times greater than the currently prescribed SW-846 MHT; even a 5% decrease in extractable Cr(VI) from these five soils was estimated to be about 5 times greater than the MHT. While the sixth soil, Bedford plot-6, exhibited a significant under recovery of the sample spike (only 1-5%), the method protocols (SW-846 Method 3060A) clearly indicated a problem. Further investigation showed that the high level of extracted organic carbon yielded a false measure of Cr(VI) and the DOC may have acted as the reductant of the Cr(VI) spike. Hence, if the method QA/QC protocols are followed, laboratory control samples and spikes (standard additions) would have identified the erroneous results regardless of holding time prior to extraction.

The Cr(VI) extract solutions from this study exhibited a chemical stability far beyond the prescribed SW-846 Method 7169A MHT (24 h), when extracts were stored in the dark at 4°C. No one would argue that Cr(VI) extract solutions be held longer than necessary or for the length of time required by this study to estimate a 5% decrease (20 d), but if the standards, spikes, and laboratory control samples exhibit appropriate stability and recovery then holding times beyond 24 h seem reasonable.

3.2 Semi-Volatile Organic Compounds (SVOCs)

Five soils/sediments were utilized for the SVOC extraction study (Table 3-9). Samples were selected to yield at least 3 PAH extractable, 3 PCB extractable, and 3 pesticide extractable soils/sediments. The three soils (Bedford-1, Eagle Harbor, and Tri Cities) and two sediments (Housatonic River and SQ-1) exhibited wide ranges in TOC and particle size distributions. All soils/sediments exhibited circum-neutral pH levels, and the Eh-pH values suggested that the redox status of the samples were oxic. Soils/sediments were sampled and semi-quantitative SVOC screening performed to identify the likely samples and contaminants that would be utilized in this part of the study. Until the screening was completed the samples were stored at 4°C. The samples were homogenized, split, and stored as described in section 2.2.1 once the extraction study was initiated.

Table 3-8. Estimated number of days to achieve a given percentage change in concentration using the regression model of the background corrected data.

		Estimated Number of Days		
Sample	**Holding condition**	**5% Change**	**10% Change**	**20% Change**
125A	Room temp	36	73	147
	4°C	81	162	325
125B	Room temp	81	163	327
	4°C	59	119	238
125C	Room temp	20	41	83
	4°C	54	109	219
126D	room temp	26	52	104
	4°C	78	157	315

Table 3-9. SVOC extraction study soil/sediment properties.

Sample	**SVOC Analysis**	**pH**	**Eh**	**OC**[a]	**Sand**	**Silt**	**Clay**
			mv	--------------------%--------------------			
Housatonic River	PCB/Pesticides	7.7	510	3.57	5.8	75.4	18.8
Tri-Cities	PCB/Pesticides	ND[b]	ND	5.60	54.4	34.6	11.0
Eagle Harbor	PAHs	9.1	386	0.55	10.2	67.3	22.5
SQ-1	PAHs/PCB/Pesticides	7.1	446	0.97	13.5	68.8	17.7
Bedford-1	PAH/Pesticides	8.5	509	5.80	13.7	47.0	39.3

[a] Reported values are the mean of duplicate measurements. OC = organic carbon.
[b] ND = no data.

3.2.1 Polyaromatic Hydrocarbons (PAHs)

Concentrations of PAHs were characterized through time for each of the three sediments/soils (Eagle Harbor, SQ-1 and Bedford-1) and holding temperatures of 4°C and -20°C (Appendix A, Descriptive Statistics Tables A-2 to A-7). Seventeen PAHs were analyzed for in each of the soils/sediments (Table 3-10). The Eagle Harbor soil was analyzed for three additional PAHs, 1-methyl naphthalene, 2-methyl naphthalene, and 1-methyl phenanthrene. For the Eagle Harbor soil, all of the observed concentrations were above 2*MDL (see section 2.3) except for 2-methyl naphthalene and acenaphthylene. For the Bedford-1 soil, all of the observed concentrations were above 2*MDL except for acenaphthene, fluorene, and dibenzothiophene. For the SQ-1 sediment, benzo[k]fluoranthene was below detection limits for all observations and dibenzothiophene had observations less than 2*MDL.

Table 3-10. Mean concentration (ng/g) and coefficient of variation (CV) for all data across time accepted for analysis (including statistical outliers)[a].

	Eagle Harbor			SQ-1			Bedford-1		
Analyte	**Day 0**	**4°C**	**-20°C**	**Day 0**	**4°C**	**-20°C**	**Day 0**	**4°C**	**-20°C**
Naphthalene	489 19.9%	435 36.0%	545 52.9%	81.2 8.6%	72.0 15.9%	73.2 21.7%	283 25.5%	366 37.6%	427 21.5%
1 Methyl naphthalene	490 18.5%	275 31.2%	439 52.8%						
2 Methyl naphthalene	144 36.3%	**74** **33.5%**	124 34.2%						
Acenaphthylene	133 53.9%	**66** **26.3%**	**71** **36.0%**	8.14 13.0%	8.76 12.7%	10.4 18.5%	346 14.0%	402 24.7%	444 18.1%
Acenaphthene	1,501 64.8%	754 40.5%	1,034 23.5%	97.0 4.6%	92.5 9.8%	91.6 12.4%	**74.6** **7.6%**	**85.2** **12.6%**	**91.3** **14.2%**
Fluorene	1,846 63.4%	818 44.7%	1,302 19.2%	90.0 8.9%	92.0 12.2%	92.6 12.2%	**78.6** **23.4%**	**72.7** **28.4%**	**91.8** **30.6%**
Dibenzothiophene	728 87.8%	214 53.7%	396 20.7%				108 16.0%	**118** **51.0%**	142 24.4%
Phenanthrene	8,199 89.8%	2,418 52.9%	4,623 18.0%	162 6.6%	147 10.4%	149 10.7%	1,435 24.1%	1,782 28.5%	1,912 22.2%
Anthracene	1,962 42.7%	1,265 32.9%	1,708 58.7%	71.6 16.9%	87.3 12.2%	91.1 13.9%	343 18.2%	401 29.0%	446 26.5%
1 Methyl phenanthrene	645 70.2%	385 16.1%	399 16.0%						
Fluoranthene	9,277 60.2%	5,849 27.4%	6,207 11.2%	156 6.1%	187 10.7%	185 10.7%	6,639 20.7%	7,371 20.9%	7,771 17.7%
Pyrene	6,723 57.4%	4,672 8.0%	4,457 11.9%	139 2.7%	159 10.3%	158 10.1%	6,851 19.8%	7,732 19.9%	8,194 16.6%
Benzo[a] anthracene	1,901 31.6%	1,409 10.8%	1,353 10.4%	93.9 13.0%	135 14.4%	138 13.5%	4,837 16.4%	5,603 20.7%	6,002 19.3%
Chrysene	2,350 28.4%	1,841 11.8%	1,746 9.0%	111 10.7%	139 13.1%	142 13.8%	5,278 16.4%	6,173 21.0%	6,515 19.3%
Benzo [b] fluoranthene	2,469 14.1%	1,888 16.7%	1,781 14.6%	91.2 8.1%	125 26.5%	122 24.1%	6,903 16.7%	7,236 18.7%	7,623 16.2%
Benzo [k] fluoranthene	2,433 14.1%	1,579 39.0%	1,443 39.7%				2,762 16.7%	4,733 58.7%	4,964 59.6%
Benzo[a]pyrene	965 15.1%	741 10.4%	703 8.1%	70.5 2.5%	97.9 18.9%	100 16.4%	5,793 16.2%	7,478 30.4%	7,862 30.6%
Indeno [1,2,3-c,d] pyrene	672 0.0%	442 23.5%	435 24.1%	3.87 10.9%	5.06 38.9%	4.91 28.3%	4,454 15.4%	6,762 47.8%	7,196 50.1%
Dibenzo [a,h] anthracene	330 0.0%	157 39.8%	134 13.1%	64.2 15.0%	84.9 22.7%	89.1 21.3%	949 13.7%	1,160 26.8%	1,273 29.9%
Benzo[g,h,i] perylene	651 0.0%	432 24.6%	432 20.5%	76.8 8.5%	77.4 25.7%	81.4 18.8%	4,088 15.6%	5,500 34.7%	5,728 34.1%

[a] Cells highlighted with light yellow have CVs greater than 25% and cells highlighted with orange and bold text have observations less than 2 times the minimum detection limit and blank cells indicate too few observations above detection or accepted for analysis.

Thus, all three sediments had 12 PAHs in common that were measured in concentrations greater than 2*MDL.

Sequim Bay-1 (SQ-1) sediments had the lowest concentration of all PAHs except acenaphthene and fluorene (Table 3-10). Total PAH concentrations for SQ-1 averaged 1,520 ng/g (dry weight). The Eagle Harbor soil had the highest concentration of low- and mid-molecular weight PAHs with total PAH concentration averaging 26,500 ng/g. The Bedford-1 soil had the highest concentrations of high molecular weight PAHs with total PAH concentrations averaging 33,200 ng/g.

3.2.1.1 Influence of PAH Outliers: Table 3-10 shows the mean concentration and CV of all "Day 0" data accepted for statistical analysis and the across time CV for the data at 4^{o}C and -20^{o}C (i.e., all data across a time sequence except for "Day 0"). The Eagle Harbor data exhibited a large number of Day 0 CVs>25%, but in all cases, removal of statistical outliers reduced the CV substantially (Table 3-11). For the Eagle Harbor analysis, replicate number 3 of the Day 0 data was removed from the analysis and plots for all but five of the PAHs. This replicate was generally 2 to 4 times greater than the median concentration for the Day 0 data. In the case of dibenzothiophene and phenanthrene, for example, removing the outlier reduced the CV from 87.9% and 89.8%, respectively to 17% for both compounds. Four other Eagle Harbor extract observations from Day 28 held at -20°C were identified as extreme outliers (observations greater than the 75th percentile plus 3 times the interquartile distance of the Day 0 data) out of a total of 468 observations (1%) and were removed from the analysis (but not the plots). Likewise, for the SQ-1 analysis, replicate 1 of the Day 0 data was removed from the analysis and plots of all of the PAHs. This replicate result was generally less than half the concentration of the median concentration for the Day 0 data. There were a total of 38 observations out of 367 (10%) considered extreme outliers from all PAHs measured in the SQ-1 sediment; thus, they were not removed from the analysis because this percentage was greater than our criteria (Section 2.3). For the Bedford-1 analysis, replicate number 3 of the Day 0 data for fluorene was removed from the analysis and plots because it was nearly half of the median concentration of the Day 0 data. Twenty-four observations out of 271 (9%) were considered extreme outliers which is less than the preset criteria of 10% so these observations were removed from the analysis but not the plots.

3.2.1.2 Statistical Analysis of PAH Extraction Data: The value of CV≤25% is the SW-846 prescribed upper bound for allowable variability between replicates for SVOC extraction. Hence, the results shown in Table 3-10 for means and CVs of across time data (excluding Day 0 data) for samples held at 4°C and -20°C, can be viewed as an estimate of data variability. The variability arising for the across time CV analysis is a combination of sample heterogeneity, analytical precision, and variability with time.

The calculated overall CVs (after removal of the extreme outliers) showed that most of the PAH concentrations (excluding those whose concentrations were below 2*MDL) across all time periods varied less than the SW-846 prescribed replicate precision (CV≤25%; Tables 3-11, 3-12, and 3-13). Eagle Harbor PAH concentration data (Table 3-11) showed the most variability with 15 overall CVs>25% out of a total of 36 holding time analyses (PAH and holding condition). For the lower molecular weight PAHs (anthracene and below), except for 1 methyl naphthalene, the Eagle Harbor soil held at 4°C exhibited a CV>25%, and CVs<25% for those held at -20°C. Higher molecular weight PAHs, such as benzo[k]fluoranthene, benzo[a]pyrene, indeno[1,2,3,-c,d]pyrene, dibenzo[a,h]anthracene, and benzo[g,h,i]perylene exhibited CVs>25% at 4°C and -20°C holding conditions. Only one PAH, indeno[1,2,3,-c,d]pyrene held at 4°C and -20°C, from the SQ-1 sediment exhibited a CV>25% out of a total of 31 holding time analyses (Table 3-12). Of the 19 holding time analyses for the Bedford-1 soil, only naphthalene (4°C and -20°C), phenanthrene (4°C and -20°C), and anthracene (4°C) exhibited overall CVs>25% (Table 3-13).

Table 3-11. PAHs (ng/g) one-sample t-test of the null hypothesis Ho: the sample is from a population with the mean equal to or greater than the Day 0 mean from Appendix B for the Eagle Harbor soil[a].

Analyte	Condition	Day 0 Mean and CV (N = 4)	Overall Mean	Overall Standard Deviation	Overall CV	95% Confidence Limits Lower	95% Confidence Limits Upper	P-value		N
Naphthalene	4°C	489 (20%)	450	142	32%	371	528	0.15	NS	15
	-20°C	489 (20%)	472	111	24%	408	536	0.29	NS	14
1Methyl Naphthalene	4°C	490 (19%)	334	130	39%	246	421	< 0.01	**	11
	-20°C	490 (19%)	404	121	30%	318	490	0.03	*	10
2 Methyl Naphthalene	4°C	119 (17%)	84	30.1	36%	66.6	101	< 0.01	**	14
	-20°C	119 (17%)	116	26	22%	100	131	0.32	NS	13
Acenaphthylene	4°C	97.3 (11%)	72.7	20.7	28%	60.7	84.6	< 0.01	**	14
	-20°C	97.3 (11%)	76.8	25.4	33%	62.1	91.5	< 0.01	**	14
Acenaphthene	4°C	1021 (18%)	811	300	37%	638	984	0.01	*	14
	-20°C	1021 (18%)	1031	225	22%	901	1161	0.56	NS	14
Fluorene	4°C	1270 (19%)	915	386	42%	692	1138	< 0.01	**	14
	-20°C	1270 (19%)	1295	240	19%	1157	1434	0.65	NS	14
Dibenzothiophene	4°C	410 (17%)	256	133	52%	179	333	< 0.01	**	14
	-20°C	410 (17%)	399	76.9	19%	354	443	0.3	NS	14
Phenanthrene	4°C	4530 (17%)	2871	1469	51%	2023	3719	< 0.01	**	14
	-20°C	4530 (17%)	4604	792	17%	4147	5061	0.63	NS	14
Anthracene	4°C	1559 (18%)	1328	402	30%	1096	1560	0.03	*	14
	-20°C	1559 (18%)	1450	292	20%	1274	1627	0.1	NS	13
1 Methyl phenanthrene	4°C	420 (13%)	392	60.3	15%	357	427	0.054	NS	14
	-20°C	420 (13%)	404	60.4	15%	369	438	0.16	NS	14
Fluoranthene	4°C	6504 (12%)	5989	1464	24%	5144	6834	0.11	NS	14
	-20°C	6504 (12%)	6271	695	11%	5870	6672	0.12	NS	14
Pyrene	4°C	4807 (11%)	4701	394	8%	4474	4928	0.17	NS	14
	-20°C	4807 (11%)	4532	531	12%	4225	4839	0.04	*	14
Benzo[a]Anthracene	4°C	1605 (8%)	1451	164	11%	1356	1546	< 0.01	**	14
	-20°C	1605 (8%)	1407	170	12%	1309	1506	< 0.01	**	14
Chrysene	4°C	2026 (10%)	1881	219	12%	1754	2007	0.01	*	14
	-20°C	2026 (10%)	1806	197	11%	1692	1920	< 0.01	**	14
Benzo[b]Fluoranthene	4°C	2469 (14%)	2054	413	20%	1816	2292	< 0.01	**	14
	-20°C	2469 (14%)	1993	429	22%	1734	2252	< 0.01	**	13
Benzo[k] Fluoranthene	4°C	2433 (14%)	1823	670	37%	1436	2210	< 0.01	**	14
	-20°C	2433 (14%)	1747	688	39%	1331	2163	< 0.01	**	13
Benzo[a]Pyrene	4°C	965 (15%)	805	142	18%	723	887	< 0.01	**	14
	-20°C	965 (15%)	784	153	20%	691	876	< 0.01	**	13
Indeno[1,2,3-c,d]Pyrene	4°C	672 (NC)	465	122	26%	378	552	< 0.01	**	10
	-20°C	672 (NC)	462	126	27%	365	558	< 0.01	**	9
Dibenzo[a,h] Anthracene	4°C	330 (NC)	174	80.5	46%	117	232	< 0.01	**	10
	-20°C	330 (NC)	156	67.5	43%	104	208	< 0.01	**	9
Benzo[g,h,i]Perylene	4°C	651 (NC)	454	122	27%	367	541	< 0.01	**	10
	-20°C	651 (NC)	456	110	24%	371	541	< 0.01	**	9

[a] Table B2.1 and B2.2 for Eagle Harbor soil with statistical outliers removed (PAHs highlighted in yellow had concentrations < 2*MDL).

NS = Not significant at $\alpha = 0.05$
* = Significant with $0.01 < p \leq 0.05$.
** = Highly significant with $p \leq 0.01$.
NC = Not calculable, too few observations.

Table 3-12. PAHs (ng/g) one-sample t-test of the null hypothesis Ho: the sample is from a population with the mean equal to or greater than the Day 0 mean from Appendix B for the SQ-1 sediment[a].

Analyte	Condition	Day 0 Mean and CV	Overall			95% Confidence Limits		P-value		N
			Mean	Standard Deviation	CV	Lower	Upper			
Naphthalene	4°C	94.1 (9%)	77.1	14.3	19%	68.5	85.7	0.001	**	13
	-20°C	94.1 (9%)	78.4	16.9	22%	67.7	89.1	0.004	**	12
Acenaphthylene	4°C	9.43 (13%)	8.91	1.13	13%	8.23	9.60	0.062	NS	13
	-20°C	9.43 (13%)	10.2	1.78	17%	9.09	11.2	0.918	NS	13
Acenaphthene	4°C	114 (5%)	97.5	12.5	13%	89.9	105	<0.001	**	13
	-20°C	114 (5%)	96.7	14.1	15%	88.2	105	<0.001	**	13
Fluorene	4°C	105 (9%)	95.1	12.0	13%	87.8	102	0.005	**	13
	-20°C	105 (9%)	95.6	11.9	12%	88.4	103	0.006	**	13
Dibenzothiophene	4°C	6.7 (7%)	5.85	0.799	14%	5.37	6.33	0.001	**	13
	-20°C	6.7 (7%)	5.94	0.779	13%	5.47	6.41	0.002	**	13
Phenanthrene	4°C	189 (7%)	157	23.2	15%	143	171	<0.001	**	13
	-20°C	189 (7%)	158	22.9	14%	144	172	<0.001	**	13
Anthracene	4°C	82.1 (17%)	86.1	11.1	13%	79.4	92.8	0.889	NS	13
	-20°C	82.1 (17%)	89.0	12.9	14%	81.2	96.8	0.961	NS	13
Fluoranthene	4°C	174 (6%)	184	18.7	10%	172	195	0.963	NS	13
	-20°C	174 (6%)	183	18.5	10%	172	194	0.949	NS	13
Pyrene	4°C	157 (3%)	159	14.3	9%	150	167	0.664	NS	13
	-20°C	157 (3%)	157	13.8	9%	149	166	0.548	NS	13
Benzo[a]Anthracene	4°C	105 (13%)	129	22.2	17%	115	142	0.999	NS	13
	-20°C	105 (13%)	131	22.5	17%	117	144	0.999	NS	13
Chrysene	4°C	126 (11%)	136	17.7	13%	125	147	0.972	NS	13
	-20°C	126 (11%)	138	19.2	14%	126	150	0.981	NS	13
Benzo[b]Fluoranthene	4°C	108 (8%)	121	29.9	25%	103	139	0.930	NS	13
	-20°C	108 (8%)	119	26.5	22%	103	135	0.918	NS	13
Benzo[a]Pyrene	4°C	82 (2%)	94.3	17.5	19%	83.7	104.8	0.987	NS	13
	-20°C	82 (2%)	96.1	16.4	17%	86.2	105.9	0.995	NS	13
Indeno[1,2,3-c,d] Pyrene	4°C	4.45 (11%)	4.92	1.74	35%	3.87	5.97	0.826	NS	13
	-20°C	4.45 (11%)	4.81	1.24	26%	4.06	5.55	0.839	NS	13
Dibenzo[a,h] Anthracene	4°C	74.2 (15%)	82.4	17.9	22%	71.6	93.2	0.938	NS	13
	-20°C	74.2 (15%)	85.7	18.3	21%	74.6	96.7	0.979	NS	13
Benzo[g,h,i]Perylene	4°C	91 (8%)	80.5	18.5	23%	69.4	91.7	0.033	*	13
	-20°C	91 (8%)	83.6	14.3	17%	75.0	92.2	0.044	*	13

[a] Tables B3.1 and B3.2 for SQ-1 sediment with statistical outliers removed (PAHs highlighted in yellow had concentrations < 2*MDL).

NS = Not significant at $\alpha = 0.05$
* = Significant with $0.01 < p \leq 0.05$
** = Highly significant with $p \leq 0.01$

Twenty-two holding time analyses out of a total of 86 exhibited CVs>25%. The reason(s) for PAH holding time variability regardless of holding conditions (4°C and -20°C) was not determined, but likely candidates include sample heterogeneity across time, analytical variability across time, and loss of concentration through degradation or volatilization. The latter rationale; however, is considered most likely for those holding time analyses that exhibited a dependence on holding condition; that is, where the 4°C and -20°C holding condition differed. The Eagle Harbor soil was the only material that exhibited a consistent dependence on holding condition and then only for the lower molecular weight PAHs. The dependence on holding temperature (4°C versus -20°C) for the loss of Eagle Harbor soil PAHs is in line with those reported by Rost et al. (2002) where they found low molecular weight PAHs were degraded over time when soils were held at 4°C (see section 1.1).

A one-sample t-test of the null hypothesis Ho: the sample is from a population with the mean equal to or greater than the Day 0 mean was rejected for 15 of the PAHs found in the Eagle Harbor soil (with concentrations >2*MDL) for at least one holding condition (Table 3-11). Rejection of the null hypothesis provides a measure of validity to a potential decrease in concentration. In the Eagle Harbor soil, all of the high molecular weight PAHs [228 mw (benz[a]anthracene) and higher] had mean concentrations that were significantly less than the Day 0 mean for both the 4°C and -20°C holding conditions. Except for pyrene and 1 methyl naphthalene, all the remaining lighter molecular weight PAHs that had means significantly less than the Day 0 mean were those stored at 4°C (Table 3-11). For SQ-1 sediments, the one-sample t-test was not significant for PAHs in Table 3-12 below phenanthrene except benzo[g,h,i] perylene. With the exception of acenaphthylene, the lighter molecular weight PAHs had mean concentrations that were significantly less than the Day 0 mean at both holding conditions (Table 3-12). For the Bedford-1 soil, no PAH exhibited a mean concentration that was significantly less than its Day 0 mean (Table 3-13).

The overall CV and one sample t-test assess data variability, but in slightly different ways. The overall CV compares variability across the entire holding time analysis sequence to the SW-846 prescribed replicate variability (CV<25%), while the t-test is a statistical evaluation of the overall mean response compared to a single timed value using the overall variability. Comparison of these two evaluations is most interesting for the lower molecular weight PAHs (lighter than anthracene; Table 3-11) extracted from the Eagle Harbor soil. These PAHs, except 1 methyl naphthalene, showed a clear distinct difference between holding conditions; that is, soils held at 4°C exhibited overall CVs>25% and a highly significant ($p \leq 0.1$) t-test. Eagle Harbor soil held at -20°; however, exhibit PAH concentrations whose overall CVs<25% and t-tests that are not significant. Even 1 methyl naphthalene, with an overall CV for both holding temperatures greater than 25%, exhibits a difference in the significance of the t-test with the lower temperature. The Eagle Harbor soil results clearly show the potential effect of holding temperature on extraction holding time for the lower molecular weight PAHs. However, the holding temperature effect evidenced in the Eagle Harbor soil is not universal, as neither of the other soils in this study exhibited such a clear cut distinction between holding temperatures.

The lack-of-fit to the linear model was significant for five of the PAHs measured in Eagle Harbor soil regardless of storage temperature and four others at one storage temperature (Table 3-14). Thirteen of the PAHs measured in SQ-1 sediments exhibited a lack-of-fit to the linear model at one storage temperature (Table 3-15). None of the PAHs measured in Bedford-1 soil exhibited a lack-of-fit to the linear model (Table 3-16). The residuals for these analytes did not show a consistent U-shaped pattern through time, nor was there a pattern observed between storage temperatures, and; hence, the lack-of-fit was assumed to be noise. Therefore, the simple linear model was used for all analytes, sediments, and holding temperatures. The slope associated with the number of days held was negative and significantly different from zero for 16 of the PAHs measured (with concentrations >2*MDL) in the Eagle Harbor soil (Table 3-14). All 16 of these PAHs exhibited significantly decreasing slopes in sediment held at 4°C while only three of these were significantly decreasing in sediment held at -20°C. None of the slopes associated with the number of days held were both negative and significantly different from zero for PAHs measured in either SQ-1 sediment or Bedford-1 soil (Tables 3-15 and 3-16). There were some PAHs that had significant positive slopes; however, these were considered to be analytical noise.

Table 3-13. PAHs (ng/g) one-sample t-test of the null hypothesis Ho: the sample is from a population with the mean equal to or greater than the Day 0 mean from Appendix B for the Bedford-1 soil[a].

Analyte	Condition	Day 0 Mean and CV (N = 4)	Overall Mean	Overall Standard Deviation	Overall CV	95% Confidence Limits Lower	95% Confidence Limits Upper	P-value		N
Naphthalene	4°C	283 (25%)	333	119	36%	248	418	0.892	NS	10
	-20°C	283 (25%)	369	109	30%	291	447	0.983	NS	10
Acenaphthylene	4°C	346 (14%)	380	84.1	22%	319	440	0.878	NS	10
	-20°C	346 (14%)	391	74.5	19%	334	448	0.945	NS	9
Acenaphthene	4°C	74.6 (8%)	79.2	9.1	11%	72.2	86	0.916	NS	9
	-20°C	74.6 (8%)	81.2	8.6	11%	74.6	88	0.976	NS	9
Fluorene	4°C	78.6 (23%)	74.7	19.0	25%	60.1	89	0.273	NS	9
	-20°C	78.6 (23%)	87.4	24.9	28%	68.2	107	0.839	NS	9
Dibenzothiophene	4°C	108 (16%)	114	46.1	40%	80.7	147	0.651	NS	10
	-20°C	108 (16%)	115	19.3	17%	98.9	131	0.838	NS	8
Phenanthrene	4°C	1435 (24%)	1643	464	28%	1311	1975	0.905	NS	10
	-20°C	1435 (24%)	1721	448	26%	1401	2041	0.963	NS	10
Anthracene	4°C	343 (18%)	378	98.4	26%	307	448	0.854	NS	10
	-20°C	343 (18%)	383	90.2	24%	313	452	0.891	NS	9
Fluoranthene	4°C	6639 (21%)	7078	1446	20%	6044	8112	0.819	NS	10
	-20°C	6639 (21%)	7318	1421	19%	6301	8335	0.918	NS	10
Pyrene	4°C	6851 (20%)	7380	1464	20%	6333	8427	0.858	NS	10
	-20°C	6851 (20%)	7657	1456	19%	6615	8699	0.943	NS	10
Benzo[a]Anthracene	4°C	4837 (16%)	5297	1054	20%	4543	6051	0.899	NS	10
	-20°C	4837 (16%)	5536	1148	21%	4715	6357	0.957	NS	10
Chrysene	4°C	5278 (16%)	5815	1182	20%	4969	6661	0.908	NS	10
	-20°C	5278 (16%)	6020	1240	21%	5133	6907	0.955	NS	10
Benzo[b]Fluoranthene	4°C	6903 (17%)	7103	1219	17%	6231	7975	0.691	NS	10
	-20°C	6903 (17%)	7335	1194	16%	6481	8189	0.859	NS	10

[a] Tables B4.1 and B4.2 for Bedford-1 soil with statistical outliers removed (PAHs highlighted in yellow had concentrations < 2*MDL). NS = Not significant at $\alpha = 0.05$.

Table 3-14. P-values for the significance of the lack-of-fit and the slope from the linear regression and the best fit simple linear model parameters on the natural log scale for PAHs for Eagle Harbor soil and each holding condition[a]

Analyte	Condition	P-value for Lack-of-Fit		Intercept	Slope	Standard Error	P-value for Slope		df
Naphthalene	4°C	0.028	*	6.171	-0.00264	0.0016	0.127	NS	13
	-20°C	0.008	**	6.165	-0.00086	0.0013	0.535	NS	12
1Methyl Naphthalene	4°C	0.004	**	5.974	-0.00415	0.0019	0.057	NS	9
	-20°C	0.004	**	6.030	-0.00132	0.0019	0.517	NS	8
2 Methyl Naphthalene	4°C	0.014	*	4.576	-0.00441	0.0015	0.013	*	12
	-20°C	0.003	**	4.757	-0.00073	0.0014	0.603	NS	11
Acenaphthylene	4°C	0.018	*	4.430	-0.00391	0.0011	0.004	**	12
	-20°C	0.007	**	4.496	-0.00431	0.0012	0.003	**	12
Acenaphthene	4°C	0.245	NS	7.018	-0.00887	0.0009	< 0.001	**	12
	-20°C	0.026	*	6.948	-0.00072	0.0012	0.552	NS	12
Fluorene	4°C	0.643	NS	7.172	-0.01004	0.0008	< 0.001	**	12
	-20°C	0.316	NS	7.181	-0.00060	0.0009	0.507	NS	12
Dibenzothiophene	4°C	0.186	NS	5.872	-0.01022	0.0011	< 0.001	**	12
	-20°C	0.104	NS	6.027	-0.00115	0.0009	0.229	NS	12
Phenanthrene	4°C	0.366	NS	8.279	-0.00973	0.0011	< 0.001	**	12
	-20°C	0.308	NS	8.447	-0.00052	0.0008	0.543	NS	12
Anthracene	4°C	0.069	NS	7.416	-0.00595	0.0010	< 0.001	**	12
	-20°C	0.193	NS	7.281	-0.00040	0.0010	0.700	NS	11
1 Methyl Phenanthrene	4°C	0.738	NS	6.063	-0.00213	0.0005	0.001	**	12
	-20°C	0.282	NS	6.013	-0.00047	0.0007	0.538	NS	12
Fluoranthene	4°C	0.038	*	8.894	-0.00493	0.0007	< 0.001	**	12
	-20°C	0.442	NS	8.762	-0.00050	0.0005	0.373	NS	12
Pyrene	4°C	0.979	NS	8.486	-0.00071	0.0004	0.074	NS	12
	-20°C	0.295	NS	8.440	-0.00058	0.0006	0.340	NS	12
Benzo[a] Anthracene	4°C	0.773	NS	7.343	-0.00145	0.0004	0.004	**	12
	-20°C	0.272	NS	7.299	-0.00117	0.0005	0.039	*	12
Chrysene	4°C	0.585	NS	7.588	-0.00115	0.0005	0.043	*	12
	-20°C	0.127	NS	7.525	-0.00066	0.0005	0.227	NS	12
Benzo [b] Fluoranthene	4°C	0.360	NS	7.751	-0.00305	0.0006	< 0.001	**	12
	-20°C	0.251	NS	7.719	-0.00285	0.0006	0.001	**	11
Benzo [k] Fluoranthene	4°C	0.002	**	7.807	-0.00870	0.0012	< 0.001	**	12
	-20°C	0.004	**	7.781	-0.00857	0.0012	< 0.001	**	11
Benzo[a]pyrene	4°C	0.084	NS	6.749	-0.00153	0.0007	0.047	*	12
	-20°C	0.044	*	6.702	-0.00107	0.0008	0.232	NS	11
Indeno [1,2,3-c,d] Pyrene	4°C	0.054	NS	6.193	-0.00120	0.0013	0.389	NS	8
	-20°C	0.111	NS	6.009	0.00134	0.0015	0.407	NS	7
Dibenzo [a,h] Anthracene	4°C	0.074	NS	5.440	-0.00558	0.0014	0.004	**	8
	-20°C	0.043	*	5.226	-0.00328	0.0016	0.084	NS	7
Benzo[g,h,i] Perylene	4°C	0.154	NS	6.294	-0.00319	0.0010	0.014	*	8
	-20°C	0.332	NS	6.110	-0.00016	0.0014	0.914	NS	7

[a]. PAHs highlighted in yellow had concentrations < 2*MDL. df = degrees of freedom. NS = Not significant at $\alpha = 0.05$.
* = Significant with $0.01 < p \leq 0.05$. ** = Highly significant with $p \leq 0.01$.

Table 3-15. P-values for the significance of the lack-of-fit and the slope from the linear regression and the best fit simple linear model parameters on the natural log scale for PAHs for SQ-1 sediment and each holding condition[a].

Analyte	Condition	P-value for Lack-of-Fit		Intercept	Slope	Standard Error	P-value for Slope		df
Naphthalene	4°C	0.150	NS	4.392	-0.00232	0.0018	0.214	NS	11
	-20°C	0.237	NS	4.460	-0.00427	0.0021	0.072	NS	10
Acenaphthylene	4°C	0.622	NS	2.221	-0.00151	0.0013	0.262	NS	11
	-20°C	0.058	NS	2.329	-0.00085	0.0017	0.629	NS	11
Acenaphthene	4°C	0.235	NS	4.611	-0.00146	0.0012	0.263	NS	11
	-20°C	0.007	**	4.610	-0.00177	0.0014	0.247	NS	11
Fluorene	4°C	0.372	NS	4.545	0.00007	0.0013	0.957	NS	11
	-20°C	0.019	*	4.554	-0.00007	0.0013	0.960	NS	11
Dibenzothiophene	4°C	0.221	NS	1.764	-0.00024	0.0014	0.867	NS	11
	-20°C	0.002	**	1.786	-0.00047	0.0014	0.749	NS	11
Phenanthrene	4°C	0.231	NS	5.109	-0.00228	0.0013	0.110	NS	11
	-20°C	0.004	**	5.120	-0.00244	0.0013	0.089	NS	11
Anthracene	4°C	0.843	NS	4.468	-0.00074	0.0013	0.578	NS	11
	-20°C	0.062	NS	4.503	-0.00088	0.0015	0.564	NS	11
Fluoranthene	4°C	0.834	NS	5.176	0.00121	0.0010	0.263	NS	11
	-20°C	0.019	*	5.171	0.00121	0.0010	0.236	NS	11
Pyrene	4°C	0.911	NS	5.065	-0.00009	0.0010	0.928	NS	11
	-20°C	0.014	*	5.060	-0.00018	0.0009	0.844	NS	11
Benzo[a] Anthracene	4°C	0.253	NS	4.768	0.00273	0.0017	0.133	NS	11
	-20°C	0.010	**	4.779	0.00298	0.0016	0.087	NS	11
Chrysene	4°C	0.563	NS	4.919	-0.00055	0.0014	0.693	NS	11
	-20°C	0.013	*	4.931	-0.00045	0.0014	0.752	NS	11
Benzo[b] Fluoranthene	4°C	0.106	NS	4.651	0.00459	0.0019	0.034	*	11
	-20°C	0.005	**	4.659	0.00378	0.0018	0.055	NS	11
Benzo[a]pyrene	4°C	0.302	NS	4.456	0.00275	0.0018	0.147	NS	11
	-20°C	0.003	**	4.502	0.00185	0.0016	0.270	NS	11
Indeno[1,2,3-c,d] Pyrene	4°C	0.156	NS	1.365	0.00664	0.0026	0.026	*	11
	-20°C	0.015	*	1.401	0.00525	0.0019	0.018	*	11
Dibenzo [a,h] Anthracene	4°C	0.249	NS	4.339	0.00185	0.0023	0.435	NS	11
	-20°C	0.010	**	4.413	0.00062	0.0022	0.786	NS	11
Benzo[g,h,i] Perylene	4°C	0.102	NS	4.358	0.00011	0.0026	0.966	NS	11
	-20°C	0.011	*	4.449	-0.00149	0.0020	0.474	NS	11

[a] PAHs highlighted in yellow had concentrations < 2*MDL. df = degrees of freedom. NS = Not significant at $\alpha = 0.05$. * = Significant with $0.01 < p \leq 0.05$. ** = Highly significant with $p \leq 0.01$.

Table 3-16. P-values for the significance of the lack-of-fit and the slope from the linear regression and the best fit simple linear model parameters on the natural log scale for PAHs for Bedford-1 soil and each holding condition[a].

Analyte	Condition	p-value for Lack-of-Fit		Intercept	Slope	Standard Error	p-value for Slope		df
Naphthalene	4°C	0.215	NS	5.60	0.0037	0.0014	0.033	*	8
	-20°C	0.184	NS	5.75	0.0032	0.0011	0.021	*	8
Acenaphthylene	4°C	0.355	NS	5.84	0.0019	0.0008	0.050	*	8
	-20°C	0.769	NS	5.87	0.0022	0.0005	0.004	**	7
Acenaphthene	4°C	0.089	NS	4.34	0.0012	0.0006	0.096	NS	7
	-20°C	0.184	NS	4.35	0.0011	0.0004	0.025	*	7
Fluorene	4°C	0.336	NS	4.20	0.0021	0.0012	0.118	NS	7
	-20°C	0.996	NS	4.35	0.0019	0.0014	0.226	NS	7
Dibenzothiophene	4°C	0.063	NS	4.45	0.0036	0.0035	0.341	NS	8
	-20°C	0.502	NS	4.70	0.0015	0.0011	0.206	NS	6
Phenanthrene	4°C	0.233	NS	7.26	0.0028	0.0011	0.032	*	8
	-20°C	0.474	NS	7.32	0.0025	0.0011	0.051	NS	8
Anthracene	4°C	0.132	NS	5.80	0.0027	0.0009	0.019	*	8
	-20°C	0.555	NS	5.87	0.0025	0.0013	0.092	NS	7
Fluoranthene	4°C	0.199	NS	8.80	0.0013	0.0010	0.233	NS	8
	-20°C	0.458	NS	8.83	0.0012	0.0010	0.246	NS	8
Pyrene	4°C	0.179	NS	8.85	0.0011	0.0010	0.264	NS	8
	-20°C	0.386	NS	8.88	0.0012	0.0009	0.250	NS	8
Benzo[a]Anthracene	4°C	0.147	NS	8.49	0.0016	0.0009	0.094	NS	8
	-20°C	0.370	NS	8.53	0.0018	0.0009	0.069	NS	8
Chrysene	4°C	0.174	NS	8.58	0.0018	0.0009	0.070	NS	8
	-20°C	0.402	NS	8.61	0.0019	0.0009	0.059	NS	8
Benzo[b] Fluoranthene	4°C	0.176	NS	8.85	0.0002	0.0009	0.867	NS	8
	-20°C	0.434	NS	8.87	0.0004	0.0008	0.636	NS	8

[a] PAHs highlighted in yellow had concentrations < 2*MDL. df = degrees of freedom. NS = Not significant at $\alpha = 0.05$.
* = Significant with $0.01 < p \leq 0.05$. ** = Highly significant with $p \leq 0.01$.

Table 3-17 summarizes the statistical analyses (CV, t-test, and linear regression) of the PAH concentrations extracted from the three soils/sediments under both holding conditions (4°C and -20°C). Three major conclusions can be drawn from these data. First, the only sediment that exhibited a clear distinction between holding temperature and PAH concentrations was the Eagle Harbor soil, and only then for the lower molecular weight PAHs (anthracene, phenanthrene, dibenzothiophene, fluorene, and acenaphthene).

Table 3-17. Summary of PAH statistical analyses for each soil/sediment and holding condition.[a]

Analyte	Condition	Eagle Harbor		SQ-1		Bedford-1	
		Significantly Less than Day 0 Mean	Significant Negative Slope	Significantly Less than Day 0 Mean	Significant Negative Slope	Significantly Less than Day 0 Mean	Significant Negative Slope
Naphthalene	4°C	NS	NS	**	NS	NS	NS
	-20°C	NS	NS	**	NS	NS	NS
1Methyl Naphthalene	4°C	**	NS	NA	NA	NA	NA
	-20°C	*	NS	NA	NA	NA	NA
2 Methyl Naphthalene	4°C	**	*	NA	NA	NA	NA
	-20°C	NS	NS	NA	NA	NA	NA
Acenaphthylene	4°C	**	**	NS	NS	NS	NS
	-20°C	**	**	NS	NS	NS	NS
Acenaphthene	4°C	*	**	**	NS	NS	NS
	-20°C	NS	NS	**	NS	NS	NS
Fluorene	4°C	**	**	**	NS	NS	NS
	-20°C	NS	NS	**	NS	NS	NS
Dibenzothiophene	4°C	**	**	**	NS	NS	NS
	-20°C	NS	NS	**	NS	NS	NS
Phenanthrene	4°C	**	**	**	NS	NS	NS
	-20°C	NS	NS	**	NS	NS	NS
Anthracene	4°C	*	**	NS	NS	NS	NS
	-20°C	NS	NS	NS	NS	NS	NS
1 Methyl Phenanthrene	4°C	NS	**	NA	NA	NA	NA
	-20°C	NS	NS	NA	NA	NA	NA
Fluoranthene	4°C	NS	**	NS	NS	NS	NS
	-20°C	NS	NS	NS	NS	NS	NS
Pyrene	4°C	NS	NS	NS	NS	NS	NS
	-20°C	*	NS	NS	NS	NS	NS
Benzo[a]Anthracene	4°C	**	**	NS	NS	NS	NS
	-20°C	**	*	NS	NS	NS	NS
Chrysene	4°C	*	*	NS	NS	NS	NS
	-20°C	**	NS	NS	NS	NS	NS
Benzo[b]Fluoranthene	4°C	**	**	NS	NS	NS	NS
	-20°C	**	**	NS	NS	NS	NS
Benzo[k]Fluoranthene	4°C	**	**	NA	NA	NA	NA
	-20°C	**	**	NA	NA	NA	NA
Benzo[a]Pyrene	4°C	**	*	NS	NS	NA	NA
	-20°C	**	NS	NS	NS	NA	NA
Indeno[1,2,3-c,d] Pyrene	4°C	**	NS	NS	NS	NA	NA
	-20°C	**	NS	NS	NS	NA	NA
Dibenzo[a,h]Anthracene	4°C	**	**	NS	NS	NA	NA
	-20°C	**	NS	NS	NS	NA	NA
Benzo[g,h,i]Perylene	4°C	**	*	*	NS	NA	NA
	-20°C	**	NS	*	NS	NA	NA

[a] Cells highlighted in light yellow had overall coefficients of variation greater than 25%; and cells highlighted in orange had observations less than 2*MDL. NS=Not significant (α=0.05); * =Significant (0.01< p≤0.05); ** = Highly significant (p≤ 0.01); and NA = not applicable.

These PAHs extracted from the soil held at 4°C exhibited CVs>25%, a statistically significant t-test, and a statistically significant negative slope. Fluoranthene data was seen as borderline because it's CV=24, its t-test was not significant, but it did yield a slope significantly different from zero. These same PAHs (including fluoranthene), extracted from the same soil but held at -20°C exhibited no significant statistics (CVs<25%, a non-significant t-test, and a non-significant negative slope). Second, for those soils/sediments and PAHs that exhibited no significant statistics (Table 3-17) or mixed statistical outcomes (e.g., phenanthrene, dibenzothiophene, fluorene, and acenaphthene extracted from SQ-1 sediment), the CV<25% indicates that the entire holding time analyses can be considered replicates of one another; hence, there is no significant change over the life of this study (168 days). Finally, there was no consistent pattern among the three soils/sediments and the behavior of PAHs either between holding conditions or by molecular weight.

The linear regression model's estimated lower confidence limit of the slope (β_{LCL}) was utilized to calculate a conservative holding time estimate (prior to extraction) for a 5%, 10% or 20% decrease in concentration to occur for each PAH at each storage temperature. The estimated days until a 10% and 20% decrease in concentration would be observed were all greater than 42 days regardless of storage temperature (Tables 3-18 through 3-20). Seven of the mid to light weight PAHs held at 4°C and two of the higher molecular weight PAHs at both holding conditions from the Eagle Harbor soil decreased by 5% in less than 40 days and by 10% in as little as 46 days (Table 3-18). Three of the mid to light weight PAHs held at both holding temperatures from the SQ-1 sediment decreased by 5% in less than 40 days and by 10% in as little as 49 days (Table 3-19). None of the PAHs from the Bedford-1 soil decreased by 5% in less than 48 days and by 10% in less than 97 days (Table 3-20).

Generally, the -20°C holding temperature would be expected to yield a longer potential holding time than samples held at 4°C because both chemical processes (e.g., volatilization) and biological processes (e.g., degradation) tend to decrease with decreasing temperature. In order to delineate potential holding temperature differences as a function of time, the statistical data should exhibit an overall CV>25, a significant t-test, and a linear regression slope significantly different from zero. Anthracene, phenanthrene, dibenzothiophene, fluorene, and acenaphthene extracted from the Eagle Harbor soil exemplify this behavior (Table 3-18). Many of the estimated holding times listed in Tables 3-18 thru 3-20; however, were calculated from data that exhibited limited variability and; hence, no statistical change in concentration with time (CV<25%). In these cases, the magnitude of estimated holding times depended solely on the linear regression model's estimated lower confidence limit of the slope (β_{LCL}) rather than a discernable (statistically significant) loss of PAH concentration. Hence, the estimated holding time for a given decrease in concentration could be shorter than the 168 day study period and/or exhibit a longer holding time at 4°C than at -20°C.

For the Eagle Harbor soil (Table 3-18), except for two PAHs (pyrene and benzo[k]fluoranthene), the holding times for soils held at -20°C were considerably longer than the holding times for sediment held at 4°C. For the SQ-1 sediment (Table 3-19), which had only small concentrations

Table 3-18. The estimated number of days until a given percentage decrease from the intercept for PAHs (MHT=14 days) from Eagle Harbor soil[a].

Analyte	Holding Condition	5% Decrease	10% Decrease	20% Decrease
Naphthalene	4°C	50	100	201
	-20°C	82	163	326
1Methyl Naphthalene	4°C	35	71	141
	-20°C	52	104	208
2 Methyl Naphthalene	4°C			
	-20°C	64	127	255
Acenaphthylene	4°C			
	-20°C			
Acenaphthene	4°C	32	64	129
	-20°C	106	212	424
Fluorene	4°C	31	61	123
	-20°C	143	285	571
Dibenzothiophene	4°C	23	46	92
	-20°C	96	193	385
Phenanthrene	4°C	34	68	136
	-20°C	181	362	725
Anthracene	4°C	45	90	181
	-20°C	139	278	556
1 Methyl Phenanthrene	4°C	94	189	378
	-20°C	143	286	572
Fluoranthene	4°C	68	136	272
	-20°C	261	522	1044
Pyrene	4°C	283	565	1131
	-20°C	229	459	917
Benzo[a]Anthracene	4°C	158	315	631
	-20°C	161	321	642
Chrysene	4°C	168	337	673
	-20°C	211	422	843
Benzo[b]Fluoranthene	4°C	90	179	359
	-20°C	91	181	362
Benzo[k]Fluoranthene	4°C	34	69	137
	-20°C	34	69	138
Benzo[a]Pyrene	4°C	112	223	446
	-20°C	114	229	458
Indeno[1,2,3-c,d]Pyrene	4°C	73	146	292
	-20°C	134	268	536
Dibenzo[a,h]Anthracene	4°C	31	62	124
	-20°C	37	73	147
Benzo[g,h,i]Perylene	4°C	57	114	228
	-20°C	86	172	344

[a] cells highlighted in light yellow had overall coefficients of variation greater than 25%; and cells highlighted in orange had observations less than 2*MDL.

Table 3-19. The estimated number of days until a given percentage decrease from the intercept for PAHs (MHT=14 days) from SQ-1 sediment.[a]

Analyte	Holding Condition	5% Decrease	10% Decrease	20% Decrease
Naphthalene	4°C	35	71	142
	-20°C	24	49	99
Acenaphthylene	4°C	25	51	102
	-20°C	25	50	101
Acenaphthene	4°C	54	109	219
	-20°C	46	93	186
Fluorene	4°C	80	161	322
	-20°C	75	151	302
Dibenzothiophene	4°C	26	52	105
	-20°C			
Phenanthrene	4°C	49	98	197
	-20°C	48	96	192
Anthracene	4°C	61	123	247
	-20°C	54	109	219
Fluoranthene	4°C	247	495	991
	-20°C	283	566	1132
Pyrene	4°C	114	228	456
	-20°C	116	233	467
Benzo[a]Anthracene	4°C	244	489	979
	-20°C	468	937	1874
Chrysene	4°C	69	138	276
	-20°C	70	140	281
Benzo[b]Fluoranthene	4°C	NA	NA	NA
	-20°C	2643	5286	10572
Benzo[a]Pyrene	4°C	196	393	787
	-20°C	135	271	543
Indeno[1,2,3-c,d]Pyrene	4°C	NA	NA	NA
	-20°C	NA	NA	NA
Dibenzo[a,h]Anthracene	4°C	68	136	273
	-20°C	51	103	207
Benzo[g,h,i]Perylene	4°C	38	77	154
	-20°C	37	75	151

[a] Cells highlighted in light yellow had overall coefficients of variation greater than 25% and a negative estimated slope; and cells highlighted in orange had observations less than 2*MDL. NA = not applicable because the slope and lower 95% confidence limit were positive.

Table 3-20. The estimated number of days until a given percentage decrease from the intercept for PAHs (MHT=14 days) from Bedford-1 soil[a].

Analyte	Holding Condition	5% Decrease	10% Decrease	20% Decrease
Naphthalene	4°C	NA	NA	NA
	-20°C	NA	NA	NA
Acenaphthylene	4°C	66209	132419	264839
	-20°C	NA	NA	NA
Acenaphthene	4°C			
	-20°C			
Fluorene	4°C			
	-20°C			
Dibenzothiophene	4°C	48	97	195
	-20°C	215	431	863
Phenanthrene	4°C	NA	NA	NA
	-20°C	22983	45966	91933
Anthracene	4°C	NA	NA	NA
	-20°C	565	1130	2260
Fluoranthene	4°C	443	886	1773
	-20°C	437	874	1749
Pyrene	4°C	420	840	1681
	-20°C	442	885	1771
Benzo[a]Anthracene	4°C	1211	2423	4847
	-20°C	2358	4717	9434
Chrysene	4°C	2288	4576	9153
	-20°C	4595	9191	18382
Benzo[b]Fluoranthene	4°C	239	478	956
	-20°C	292	584	1169

[a] Cells highlighted in light yellow had overall coefficients of variation greater than 25% and a negative estimated slope; and cells highlighted in orange had observations less than 2*MDL. NA = not applicable because the slope and lower 95% confidence limit were positive.

of PAHs, the reverse was true with the predicted holding time generally being longer for the 4°C storage temperature than the -20°C storage temperature. For the Bedford-1 soil (Table 3-20), three of the PAHs had holding times held at 4°C than at -20°C. The only analytes which had a potential for a significant decrease in concentration over the study’s holding time sequence exhibited an overall CV>25% and concentrations >2*MDL. Of these analytes, only eight had a statistically significant negative slope of which seven were extracted from soil held at 4°C (Table 3-21) while benzo[k]fluoranthene significantly changed at the -20°C storage temperature. Based on the linear regression model, dibenzothiophene exhibited the shortest minimum holding time (92 days) for a 20% decrease in concentration (Table 3-22) which is 6.6 times longer than the current MHT (14 days).

The behavior of six PAHs as a function of time and storage temperature have been plotted below for each soil/sediment (Figures 3-9 to 3-26; see Appendix B for all other PAH data plots). Plots of the observed concentrations through time were compared to the nonparametric upper and lower boundaries of the Day 0 concentration. The PAH concentrations plotted represent low (acenapthylene, fluorene), mid (phenanthrene, pyrene) and high (chrysene, and benzo[a]pyrene) ring number or molecular weight PAHs and are representative of the findings of this study.

Table 3-21. Mean concentration (ng/g), coefficient of variation (CV), and significance of slope across time for analytes with CVs>25%[a].

	Eagle Harbor			Sequim Bay			Bedford-1		
Analyte	**Day 0**	**4°C**	**-20°C**	**Day 0**	**4°C**	**-20°C**	**Day 0**	**4°C**	**-20°C**
Naphthalene	489 19.9%	435 36.0% **NS**	545 52.9% **NS**				283 25.5%	366 37.6% **NS**	
1 Methyl naphthalene	490 18.5%	275 31.2% **NS**	439 52.8% **NS**						
Acenaphthene	1,501 64.8%	754 40.5% **							
Fluorene	1,846 63.4%	818 44.7% **							
Dibenzothiophene	728 87.8%	214 53.7% **							
Phenanthrene	8,199 89.8%	2,418 52.9% **					1,435 24.1%	1,782 28.5% **NS**	
Anthracene	1,962 42.7%	1,265 32.9% **	1,708 58.7% **NS**				343 18.2%	401 29.0% **NS**	446 26.5% **NS**
Fluoranthene	9,277 60.2%	5,849 27.4% **							
Benzo [b] fluoranthene				91.2 8.1%	125 26.5% **NS**				
Benzo [k] fluoranthene	2,433 14.1%	1,579 39.0% **	1,443 39.7% **				2,762 16.7%	4,733 58.7% **NS**	4,964 59.6% **NS**
Benzo[a]pyrene							5,793 16.2%	7,478 30.4% **NS**	7,862 30.6% **NS**
Indeno [1,2,3-c,d] pyrene				3.87 10.9%	5.06 38.9% **NS**	4.91 28.3% **NS**	4,454 15.4%	6,762 47.8% **NS**	7,196 50.1% **NS**
Dibenzo [a,h] anthracene	330 0.0%	157 39.8% **					949 13.7%	1,160 26.8% **NS**	1,273 29.9% **NS**
Benzo[g,h,i] perylene				76.8 8.5%	77.4 25.7% **NS**		4,088 15.6%	5,500 34.7% **NS**	5,728 34.1% **NS**

[a] Cells highlighted with light yellow have significant negative slopes. Blank cells indicate analytes with overall CVs less than 25%, observations less than 2*MDL, or analytes that were not measured. NS=Not significant (α=0.05); ** = Highly significant (p ≤ 0.01).

Table 3-22. Estimated number of days until a 20% decrease in concentration could be observed for those analytes having a significant negative slope, an overall CV> 25%, and observations greater than 2*MDL[a].

	Eagle Harbor			Estimated Number of Days until a 20% Decrease in Concentration Could Be Observed	
Analyte	**Day 0**	**4°C**	**-20°C**	**4°C**	**-20°C**
Acenaphthene	1,501 64.8%	754 40.5% **		129	
Fluorene	1,846 63.4%	818 44.7% **		123	
Dibenzothiophene	728 87.8%	214 53.7% **		92	
Phenanthrene	8,199 89.8%	2,418 52.9% **		136	
Anthracene	1,962 42.7%	1,265 32.9% **		181	
Fluoranthene	9,277 60.2%	5,849 27.4% **		272	
Benzo[k]fluoranthene	2,433 14.1%	1,579 39.0% **	1,443 39.7% **	137	138
Dibenzo[a,h]anthracene	330 0.0%	157 39.8% **		124	

[a] Cells highlighted with light yellow have significant negative slopes. Blank cells indicate analytes with overall CVs less than 25%, observations less than 2*MDL, or analytes that were not measured. ** = Highly significant (p ≤ 0.01).

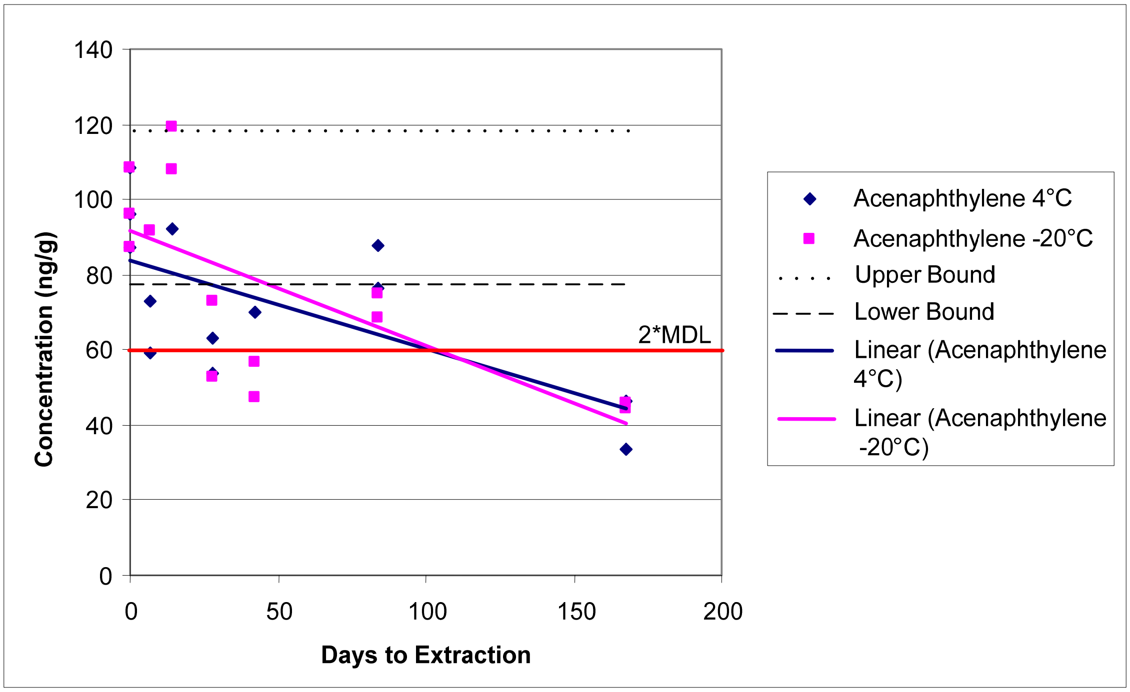

Figure 3-9. Observed acenaphthylene concentration for Eagle Harbor soil at both the 4°C and -20°C holding temperature by holding time, significant regression lines, and associated Day 0 nonparametric bounds (2*MDL is indicated by the red line).

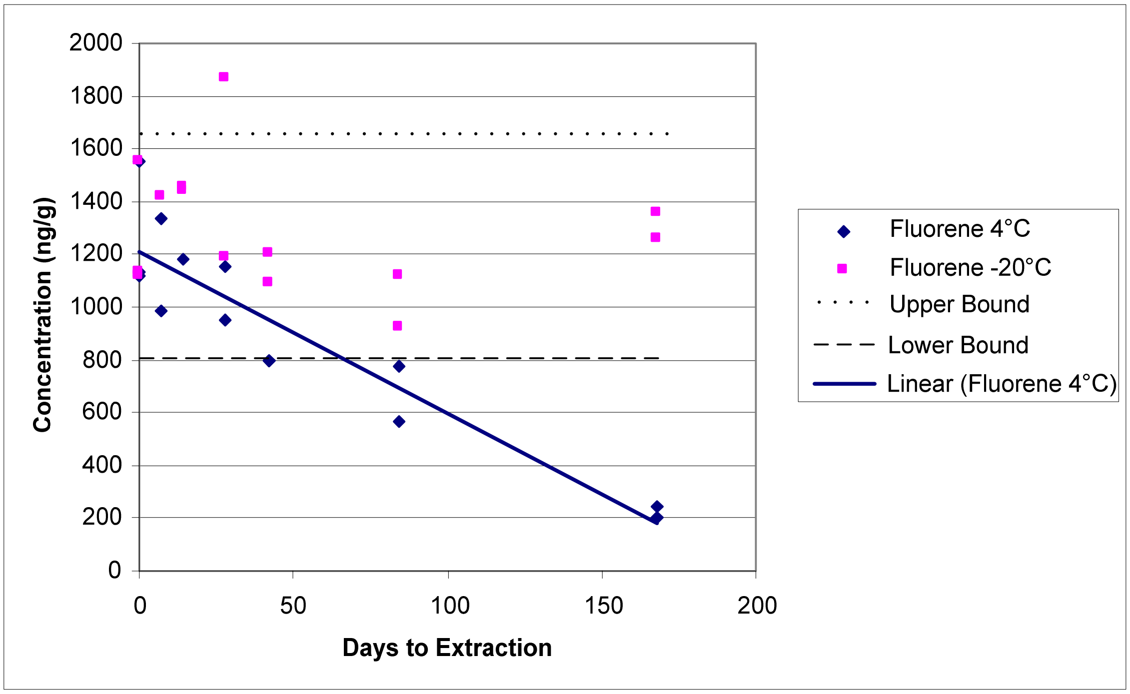

Figure 3-10. Observed fluorene concentration for Eagle Harbor soil at both the 4°C and -20°C holding temperature by holding time, significant regression line, and associated Day 0 nonparametric bounds.

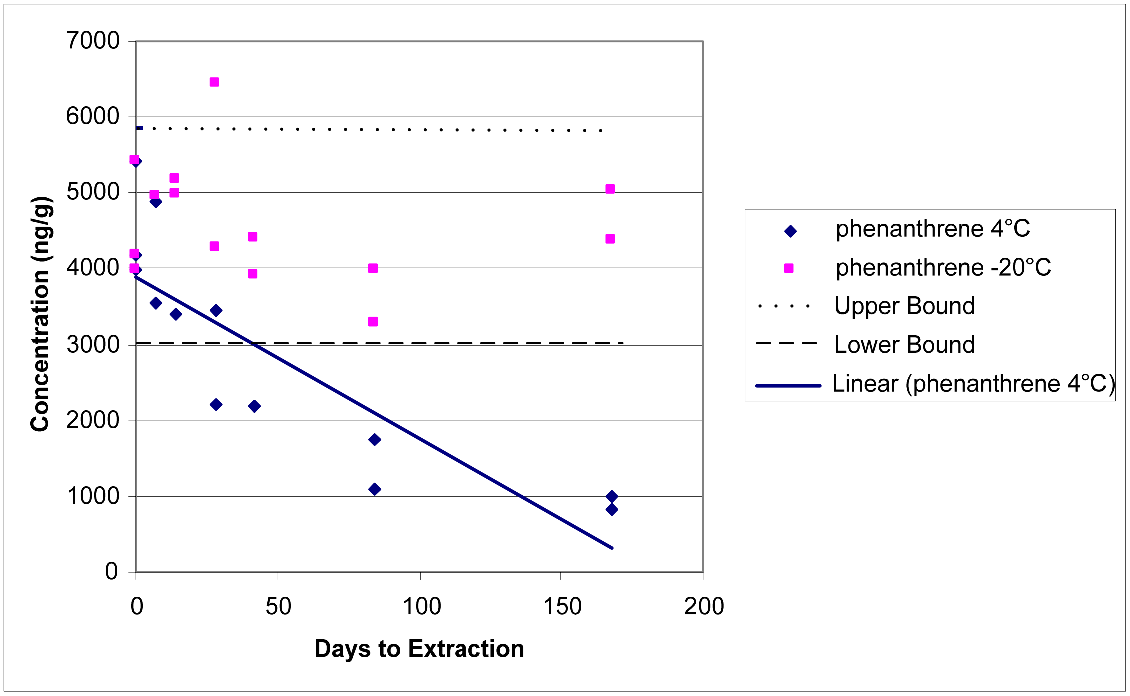

Figure 3-11. Observed phenanthrene concentration for Eagle Harbor soil at both the 4°C and -20°C holding temperature by holding time, significant regression line, and associated Day 0 nonparametric bounds.

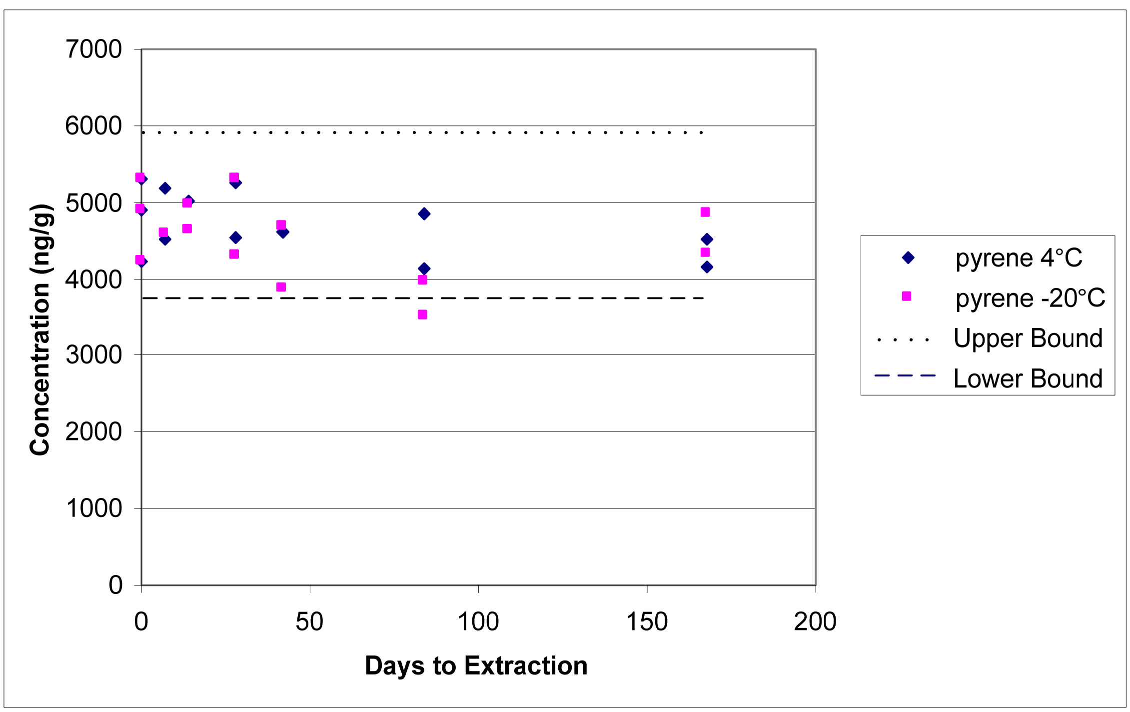

Figure 3-12. Observed pyrene concentration for Eagle Harbor soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there were no significant trends.

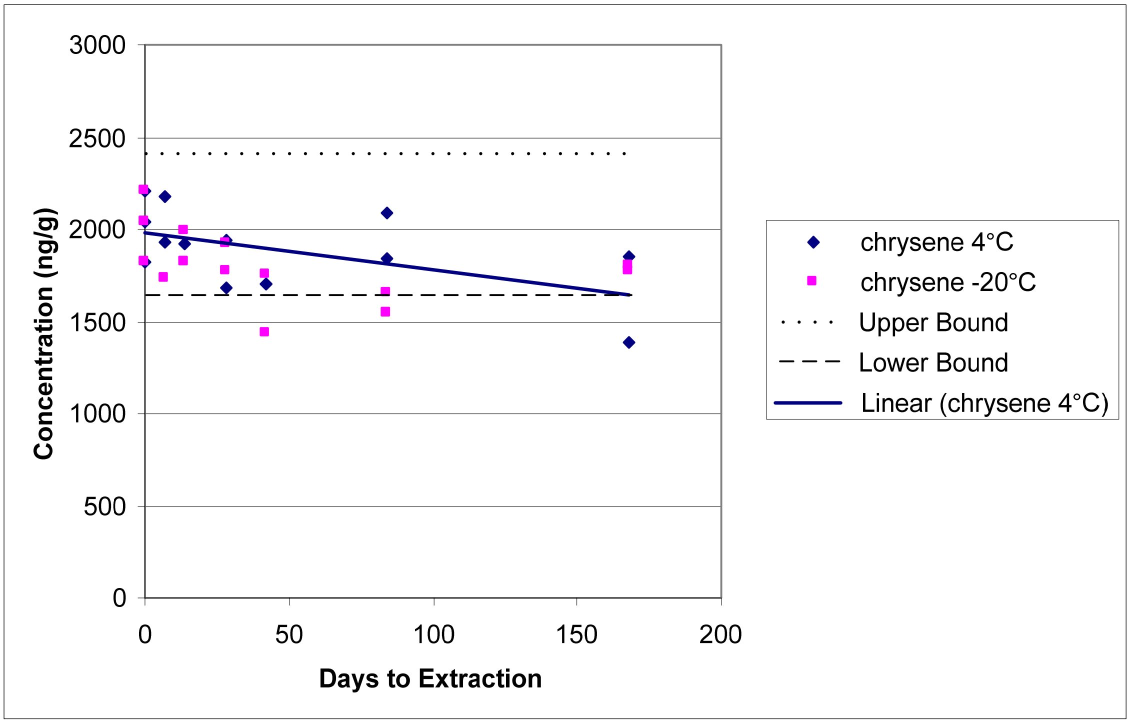

Figure 3-13. Observed chrysene concentration for Eagle Harbor soil at both the 4°C and -20°C holding temperature by holding time, significant regression line, and associated Day 0 nonparametric bounds.

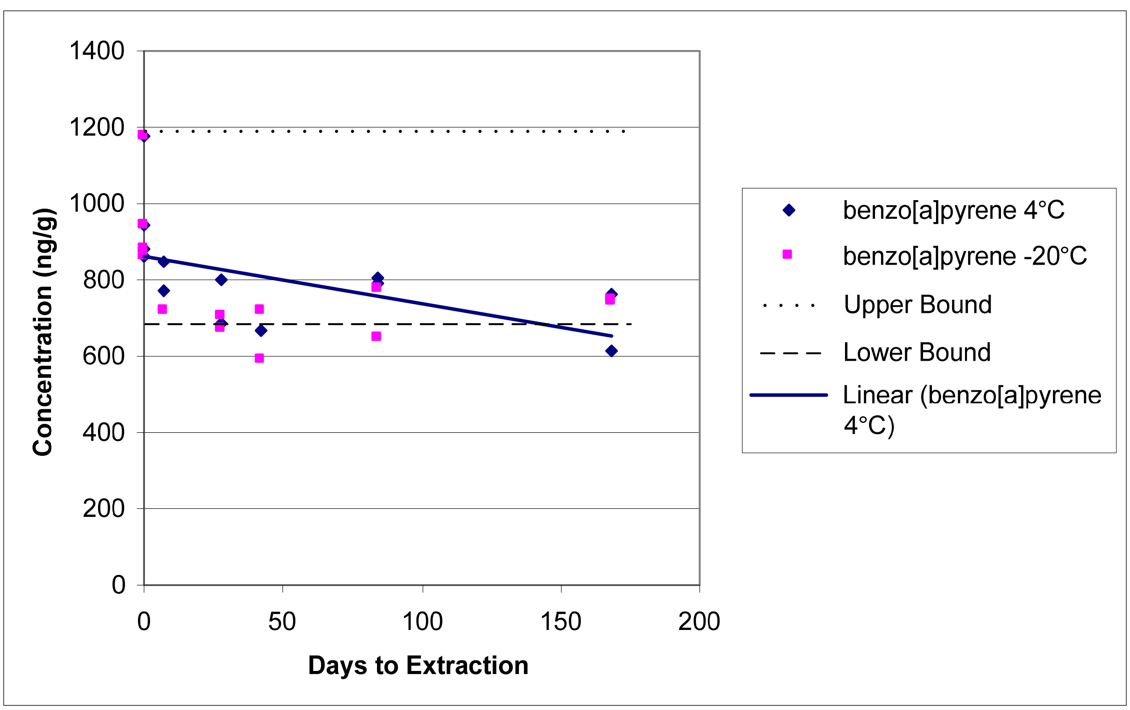

Figure 3-14. Observed benzo[a]pyrene concentration for Eagle Harbor soil at both the 4°C and -20°C holding temperature by holding time, significant regression line, and associated Day 0 nonparametric bounds.

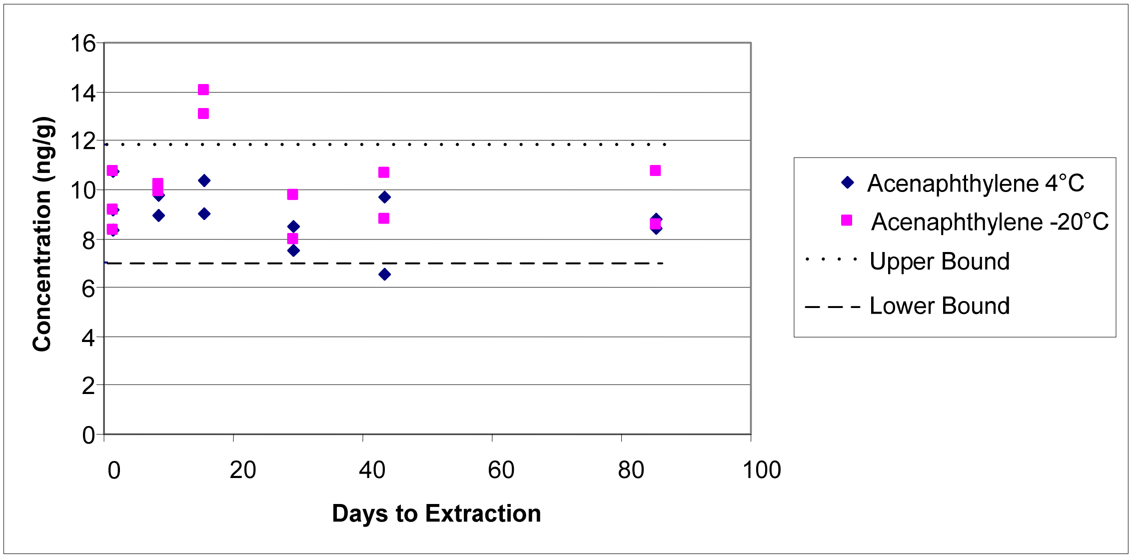

Figure 3-15. Observed acenaphthylene concentration for SQ-1 sediment at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

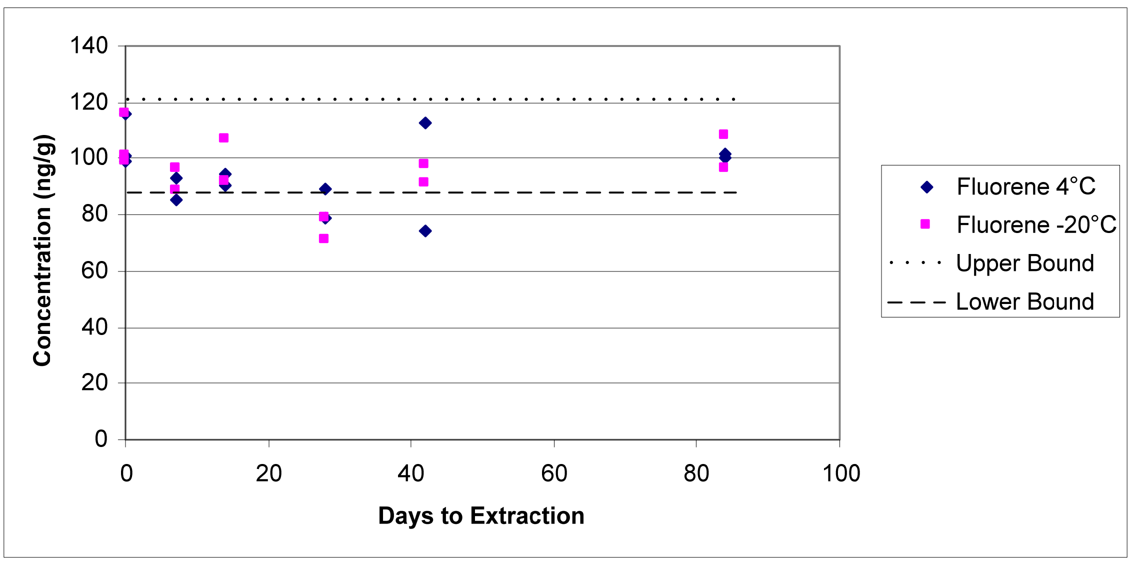

Figure 3-16. Observed fluorene concentration for SQ-1 sediment at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

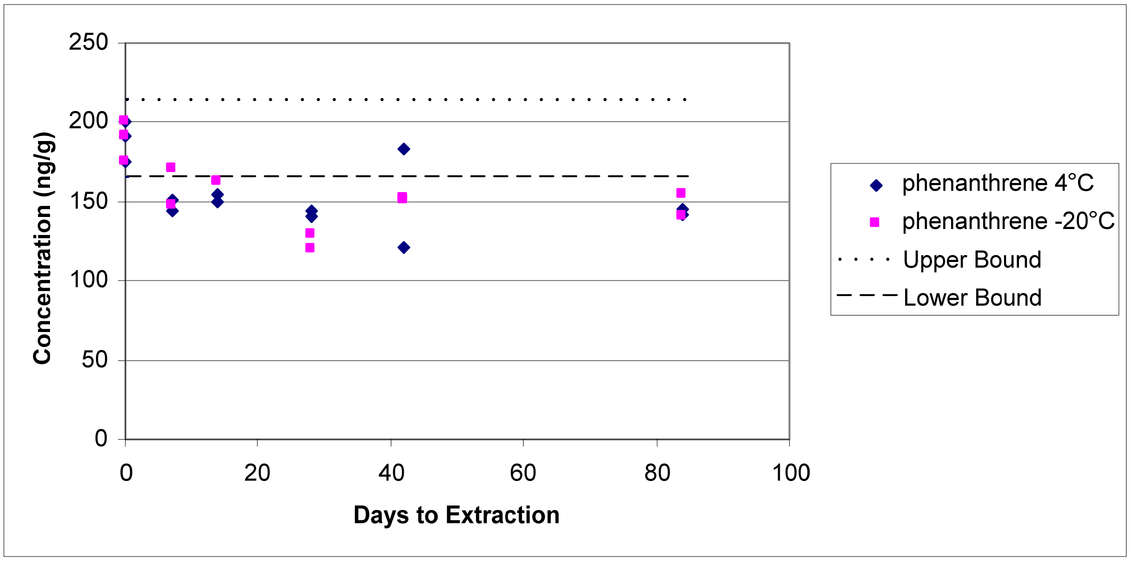

Figure 3-17. Observed phenanthrene concentration for SQ-1 sediment at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

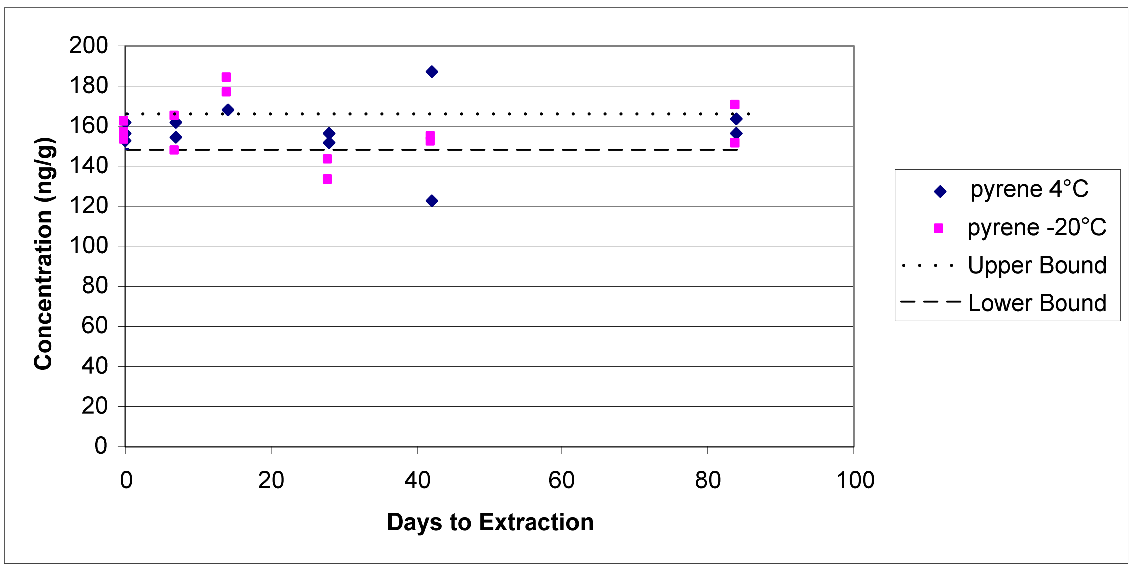

Figure 3-18. Observed pyrene concentration for SQ-1 sediment at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

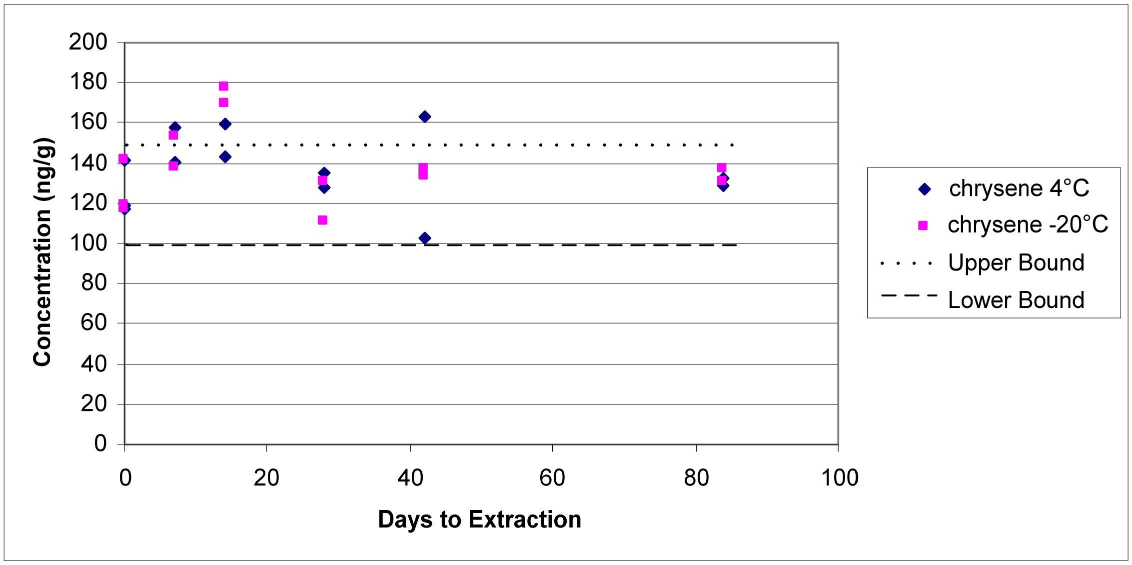

Figure 3-19. Observed chrysene concentration for SQ-1 sediment at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

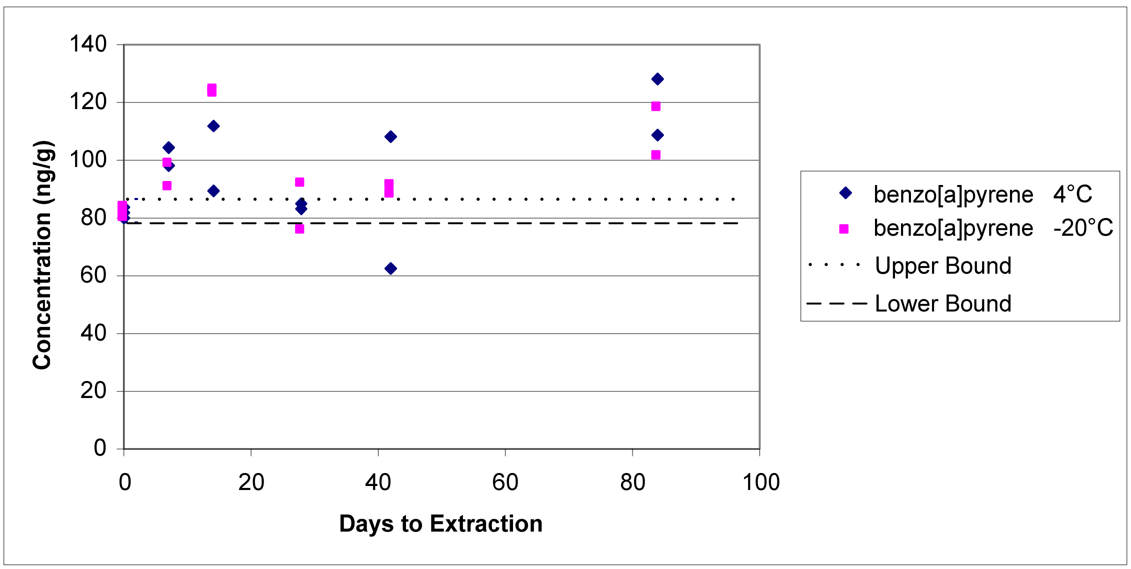

Figure 3-20. Observed benzo[a]pyrene concentration for SQ-1 sediment at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

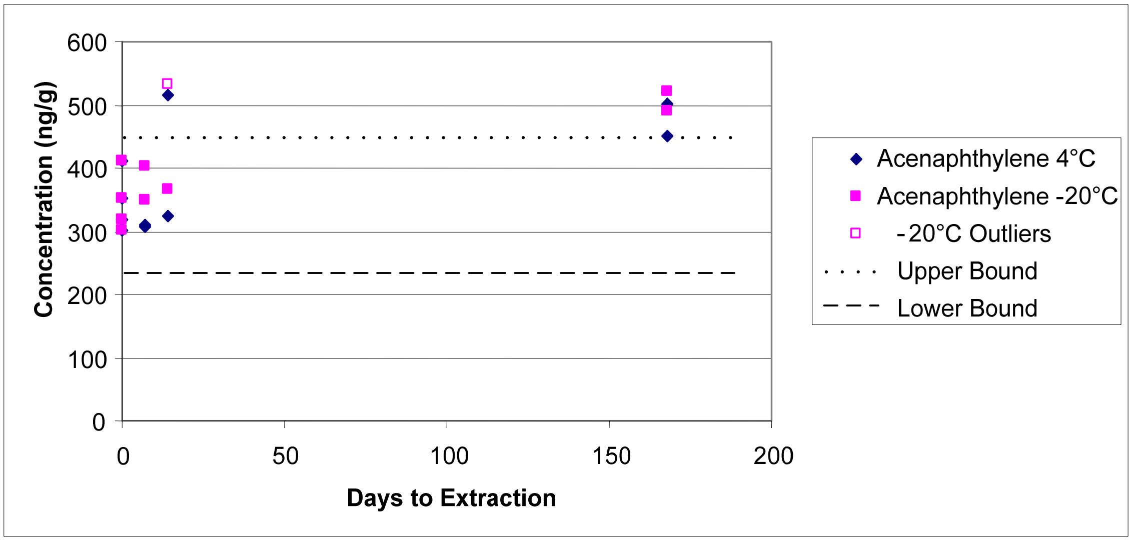

Figure 3-21. Observed acenaphthylene concentration for Bedford-1 soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

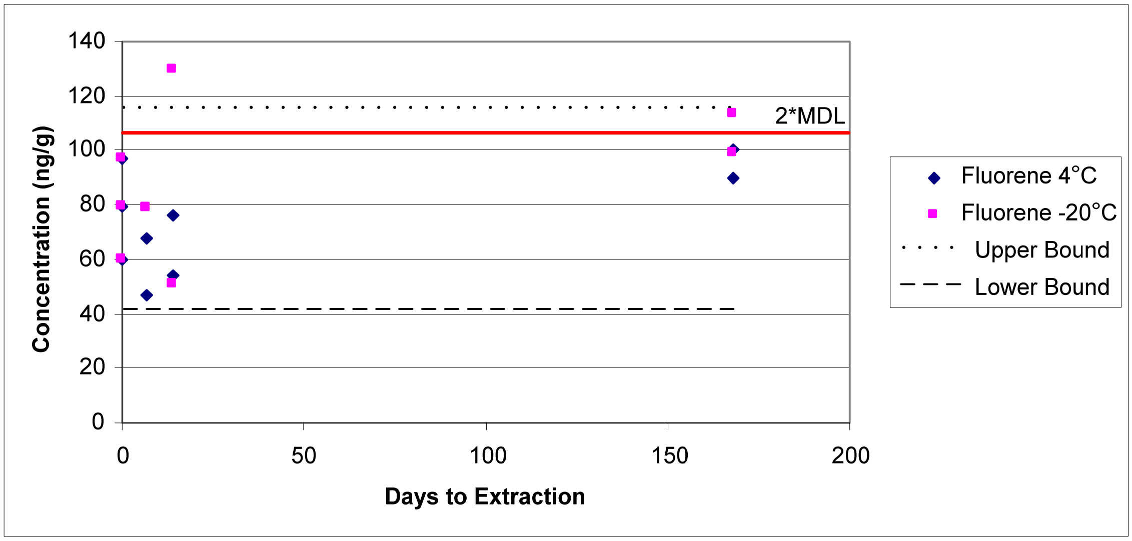

Figure 3-22. Observed fluorene concentration for Bedford-1 soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend (2*MDL is indicated by the red line).

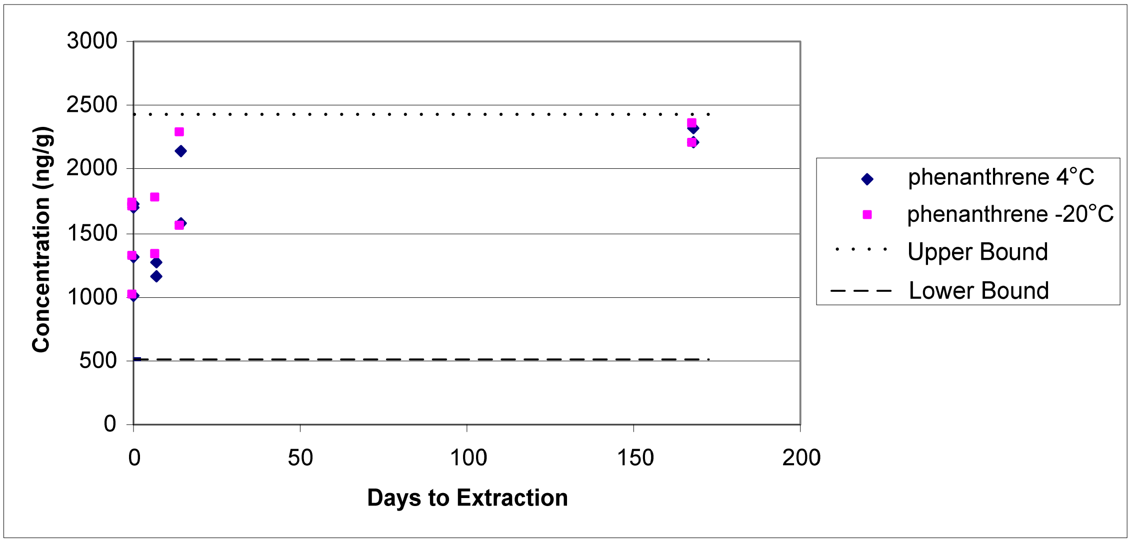

Figure 3-23. Observed phenanthrene concentration for Bedford-1 soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

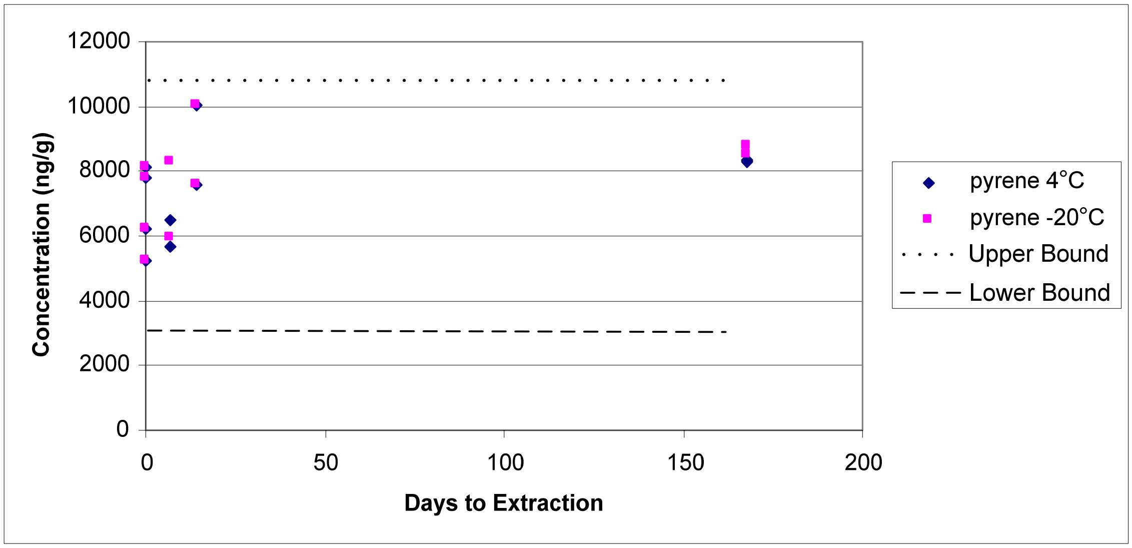

Figure 3-24. Observed pyrene concentration for Bedford-1 soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

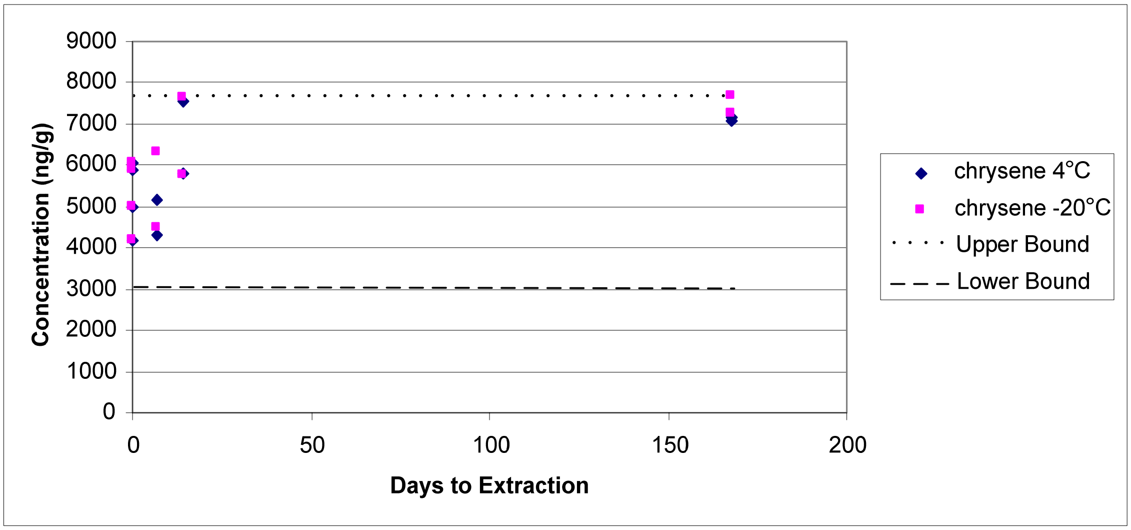

Figure 3-25. Observed chrysene concentration for Bedford-1 soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

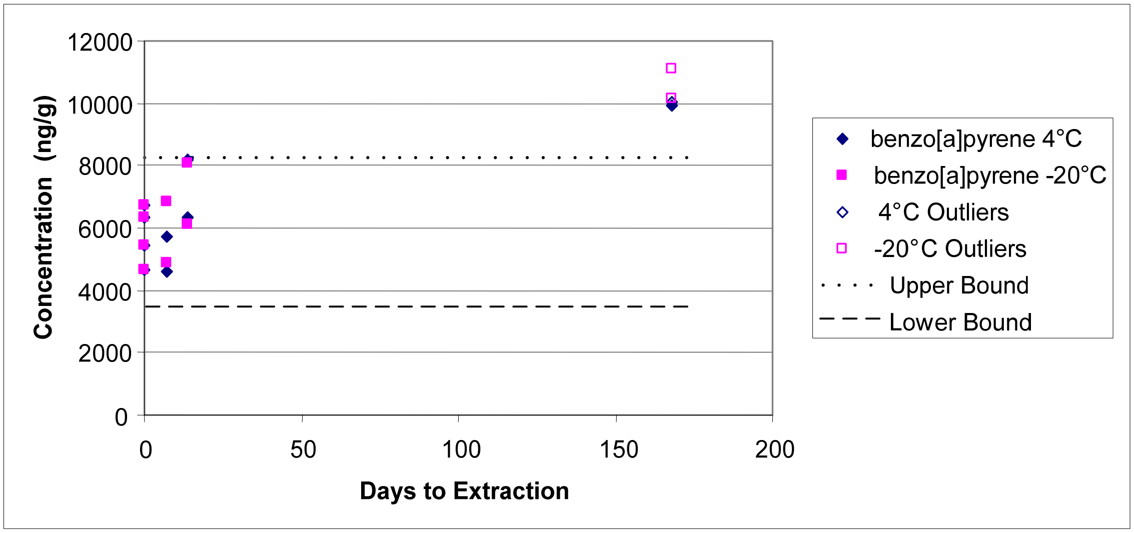

Figure 3-26. Observed benzo[a]pyrene concentration for Bedford-1 soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant negative trend.

For the Eagle Harbor soil's fluorene, and phenathrene data, storage at -20°C limited the loss of these PAHs as well as the other five (Figs. 3-10, 3-11 and Table 3-22). While the loss of chrysene and benzo[a]pyrene, regardless of storage temperature, was limited, most of the data are still within the 95% confidence interval (Fig. 3-13, 3-14). For the most part, the six representative PAHs exhibited stability for a length of time at least double that of the recommended MHT in all 3 soils/sediments and both storage conditions.

All of the Eagle Harbor and SQ-1 PAHs and all but six of the Bedford-1 PAHs had observations that fell outside of the Day 0 nonparametric boundaries (Figs. 3-21 to 3-26). For the Bedford-1 soil, the higher molecular weight PAHs (benzo[k]fluoranthene and heavier) had only extreme outliers for observations on day 168. No observations that could be used for the analysis after day 14 (Fig. 3-24). Thus, only these PAHs were plotted and a holding time was not calculated.

3.2.1.3 PAH Holding Time Study – Conclusions: The objective of this study was to determine if significant loses of PAHs occurred when sediment/soil samples were stored at either 4°C or -20°C for a period of 168 days (12*MHT). Samples from three field sites were examined. Of the 20 compounds that were quantified, there were only significant differences in the mean concentration between samples stored at the two temperatures for about half of the PAHS in the Eagle Harbor soil (Tables 3-10 and 3-21). The estimated number of days for eight PAH compounds to decrease by 20% in Eagle Harbor soil ranged from 92 to 272 days for storage at 4°C and 138 days for one PAH stored at -20°C (Table 3-22). These data indicate that the stability of PAHs varies with both sediment/soil type and storage conditions. The instability of the lower molecular weight PAHs in the Eagle Harbor soil stored at 4°C is consistent with results of other studies and probably is the result of both volatilization and biodegradation. Storage of the Eagle Harbor soil at -20°C prior to extraction was observed to ameliorate the problem of low molecular weight PAH concentration loss.

3.2.2 Polychlorinated Biphenyls (PCBs)

Concentrations of PCB congeners and Aroclors were characterized through time in three sediments/soils; Housatonic River sediment, SQ-1 sediment, and Tri-Cities soil, and for two holding temperatures (4°C and -20°C) (Appendix A, Descriptive Statistics Tables A-8 to A-10). None of the analytes were analyzed in all three of the sediments/soils (Table 3-23). Housatonic River sediments were analyzed for Aroclors 1254 and 1260. The SQ-1 sediment was analyzed for Aroclor 1254, and Tri-Cities soil was analyzed for Aroclors 1242 and 1260 and seven PCB congeners. All of the observed concentrations for the specific congeners and aroclors tested were above 2*MDL. The SQ-1 sediment (after correction) had the lowest concentration of Aroclor 1254 averaging 125 ng/g (dry weight). The Housatonic River sediment had the highest concentration of Aroclor 1260 averaging 23,400 ng/g. The Tri-Cities soil had the highest concentration of Aroclor 1242 averaging 26,800 ng/g.

The value of CV≤25% was considered the allowable variability between replicates for SVOC extraction. Table 3-23 shows the mean concentration and CV of all Day 0 data accepted for statistical analysis (including potential statistical outliers), and the across time CV for the data at 4^{o}C and -20^{o}C (i.e., all data across a time sequence except for Day 0). For the Aroclor analyses, only the SQ-1 sediment exhibited Day 0 CVs>25%, but once the data was surrogate corrected (discussed below), the CV was reduced to 0.6%. No other Day 0 CVs exceeded 25% although congener PCB-8 extracted from the Tri-Cities soil came close with a CV=24.7%.

Table 3-23. Mean PCB concentration (ng/g) and CV for all data across time accepted for analysis[a].

	Housatonic River			Sequim Bay			Tri-Cities		
Analyte	**Day 0**	**4°C**	**-20°C**	**Day 0**	**4°C**	**-20°C**	**Day 0**	**4°C**	**-20°C**
Aroclor 1242							26,239 9.90%	27,053 18.8%	28,408 17.3%
Aroclor 1254	6,955 4.91%	5,590 11.8%	5,804 13.9%	46.8 33.7%	104 47.6%	104 41.5%			
Aroclor 1260	24,880 3.92%	22,580 13.4%	22,816 11.2%				10,653 18.4%	12,198 24.5%	12,803 19.5%
PCB 8							418 24.7%	607 26.2%	605 28.4%
PCB 52							717 14.7%	785 14.5%	916 17.8%
PCB 153							1,463 14.8%	1,406 29.5%	1,614 31.2%
PCB 138							927 16.1%	1,067 20.0%	1,179 18.4%
PCB 187							425 14.3%	507 32.5%	561 21.5%
PCB 180							857 16.3%	982 28.5%	1,054 16.9%
PCB 170							544 15.3%	585 25.1%	666 23.5%

[a] Cells highlighted with light yellow have CVs greater than 25%, and blank cells indicate analytes for which a sediment was not characterized.

The results shown in Table 3-23 for the mean and CV of across time data (excluding Day 0 data) for sediment held at 4°C and -20°C, can be viewed as an estimate of data variability. The variability arising for the across time CV analysis is a combination of sample heterogeneity, analytical precision, and the variability with time. Given the metric of CV≤25%, much of the data for a given time sequence (excluding Day 0), soil or sediment, and storage temperature could be considered valid replicates regardless of holding time.

For the SQ-1 Aroclor 1254 analyses, 1 observation from the -20°C sediments and two from the 4°C sediments were identified as extreme outliers (observations greater than the 75th percentile plus 3 times the interquartile distance of the Day 0 data). These observations (3 out of 20 = 15%) were identified in the plot (Fig. 3-29; discussed below) but they were not removed from the analysis since the number of extreme outliers was greater than 10%. For the Tri-Cities soil, analysis of individual PCB congeners, eight observations from the -20°C sediments and seven from the 4°C sediments (15 out of 257 = 6%) were considered extreme outliers and were removed from the analysis but not the plots (Fig. 3-34 to 3-40; discussed below).

3.2.2.1 Surrogate Correction of SQ-1 Sediment PCB Extraction Data: The SQ-1 sediment was this project's first PCB extraction study. Over the life of the timed study with this sediment, it was observed that surrogate recovery (concentration and % recovery) increased with holding time (days to extraction; Figure 3-27). Thus, the SQ-1 results for Aroclor 1254 were surrogate corrected using the surrogate PCB-198 per procedure (see section 2.2.4). However, even though extracts were not held greater than 40 days (the MHT based on the analytical method), it was noticed that extracts older than 30 days and surrogate corrected had a reduced Aroclor 1254 concentration (Figure 3-28). The age of the extract appeared to be a confounding factor.

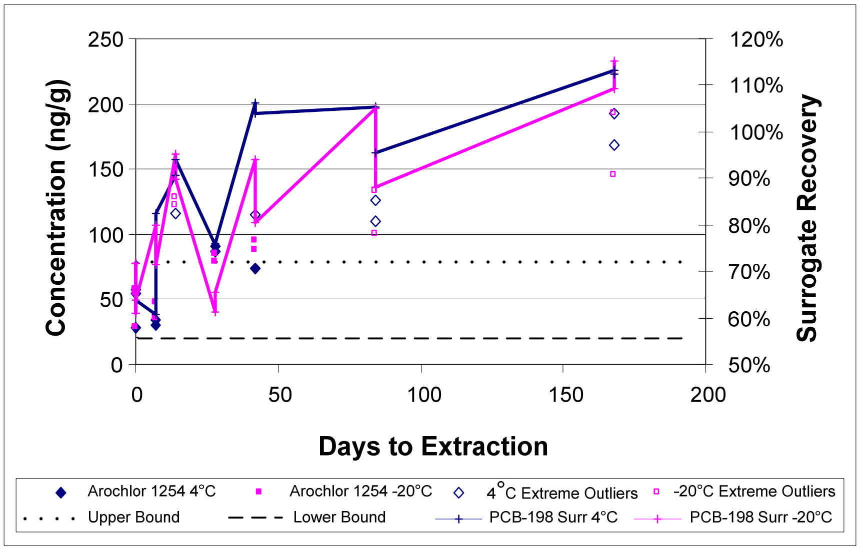

Figure 3-27. SQ-1 sediment raw Aroclor 1254 data and surrogate recovery as a function of holding time (days to extraction).

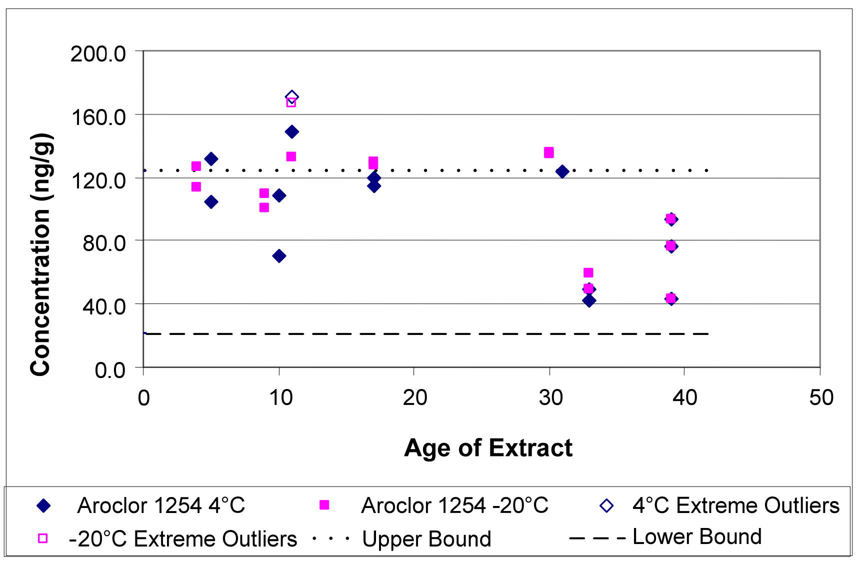

Figure 3-28. SQ-1 surrogate corrected data as a function of the age of extract.

Extracts older than 30 days were from the early sampling periods (Day 0-Day 7). While the reason for the apparent time dependence was not determined, for the statistical analysis, only extracts held for less than 30 days were used and the starting time of the experiment (Day 0) was moved to the original Day 14. Interestingly, the same extract of SQ-1 for PCB analysis was utilized in the PAH study (section 3.3.1) and no evidence of this type of behavior was noted in those analyses. Regardless of organic contaminant of interest, all remaining extracts (except for Bedford-1 pesticide) where analyzed prior to 30 days.

3.2.2.2 Statistical Analysis of PCB Extraction Data: Once analyte extraction data for all soils, storage temperatures, and holding time sequence were surrogate corrected (SQ-1 sediment) and statistical outliers removed, data for a given soil and storage temperature were pooled across time (0 to 168 days). The mean, standard deviation and CV were calculated for the pooled data (Table 3-24). Strictly based on the metric CV≤25% as a measure of acceptable replicate precision, the overall CV showed that all measurements for a given soil and analyte could be considered valid replicates despite holding times prior to extraction stretching over 168 days. The exceptions to this observation were congeners PCB 8 (at 4^{o}C and -20^{o}C), PCB 153 (at 4^{o}C and -20^{o}C), and PCB 180 (at 4^{o}C), which exhibited CVs slightly greater than 25. These data confirm the general perception that PCBs in soils and sediments tend to have a long half-life. These findings do not preclude the possibility that PCB concentrations change over the time studied; rather, by the aforementioned metric data falls within the acceptance criterion for replicate precision.

A one-sample t-test of the null hypothesis Ho: the sample is from a population with the mean equal to or greater than the Day 0 mean, was rejected for both Aroclors found in the Housatonic River sediments at both holding temperatures (Table 3-24). For the SQ-1 sediment and the Tri-Cities soil, none of the PCBs had mean concentrations that were significantly less than the Day 0 mean. With an overall CV<25%, rejection of the null hypothesis provides a measure of data variability and validity to any potential decrease in concentration suggested by linear regression (discussed below). Unlike the analysis of the PAH data, no PCB data exhibited a holding time analysis with an overall CV>25% and a significant test. In fact, only the Housatonic River sediment Aroclors and 5 Tri-Cities soil PCB congeners [8, 153 (at 4°C and -20°C) and 180 (at 4°C)] exhibited holding time analyses with mixed statistical analyses (CV<25% but a significant t-test, or a CV>25% but a non-significant t-test). The other holding time analyses yielded data that exhibited both an overall CV<25% and a non-significant t-test (Table 3-24) and; therefore, these PCB concentrations must be considered stable over the 168 day period of the study.

The lack-of-fit to the linear model was significant for seven of the PCBs measured in all three sediments (Table 3-25). The residuals for these analytes did not show a consistent U-shaped pattern through time, and therefore, the lack-of-fit was assumed to be noise. Hence, the simple linear model was used for all analytes, sediments, and holding temperatures. The slope associated with the number of days held was negative and significantly different from zero for both Aroclors measured in the Housatonic River sediment and for both holding conditions (Table 3-25). Neither of the slopes associated with the number of days held were significantly different from zero for Aroclor 1254 measured in SQ-1 sediment. For the Tri-Cities soil, only PCB 153 (at both holding temperatures) had a significant, negative slope while PCB 8 (at 4°C) exhibited a significant positive slope. There was no consistent pattern between the three samples and the behavior of the aroclors or PCB congeners.

Table 3-24. PCB (ng/g) one-sample t-test of the null hypothesis Ho: the sample is from a population with the mean equal to or greater than the Day 0 mean with statistical outliers removed.

Analyte	Condition	Day 0 Mean and CV (N = 5)	Overall Mean	Overall Standard Deviation	Overall CV	95% Confidence Limits Lower	95% Confidence Limits Upper	P-value[a]		N
Housatonic River										
Aroclor 1254	4°C	6955 (5%)	5931	845	14%	5481	6381	<0.001	**	16
	-20°C	6955 (5%)	6111	875	14%	5626	6596	0.001	**	15
Aroclor 1260	4°C	24880 (4%)	23155	2820	12%	21652	24658	0.014	*	16
	-20°C	24880 (4%)	23366	2400	10%	22037	24695	0.014	*	15
SQ-1 (Surrogate Corrected)										
Aroclor 1254	4°C	135 (1%)	124	27.4	22%	104	144	0.115	NS	10
	-20°C	135 (1%)	128	18.1	10%	115	141	0.116	NS	10
Tri-Cities										
Aroclor 1242	4°C	26239 (10%)	26848	3817	14%	24541	29155	0.712	NS	13
	-20°C	26239 (10%)	27270	3922	14%	25098	29442	0.837	NS	15
Aroclor 1260	4°C	10653 (18%)	12370	2511	20%	10920	13820	0.988	NS	14
	-20°C	10653 (18%)	12266	2498	20%	10935	13597	0.990	NS	16
PCB 8	4°C	418 (25%)	569	175	31%	457	680	0.994	NS	12
	-20°C	418 (25%)	528	165	31%	432	623	0.986	NS	14
PCB 52	4°C	717 (15%)	800	103	13%	735	866	0.991	NS	12
	-20°C	717 (15%)	848	143	17%	762	935	0.997	NS	13
PCB 153	4°C	1463 (15%)	1417	398	28%	1176	1658	0.341	NS	13
	-20°C	1463 (15%)	1577	448	28%	1338	1816	0.836	NS	16
PCB 138	4°C	927 (16%)	1080	189	18%	966	1194	0.994	NS	13
	-20°C	927 (16%)	1116	227	20%	995	1237	0.998	NS	16
PCB 187	4°C	425 (14%)	427	68	16%	375	479	0.545	NS	9
	-20°C	425 (14%)	463	89	19%	403	523	0.907	NS	11
PCB 180	4°C	857 (16%)	991	261	26%	833	1149	0.956	NS	13
	-20°C	857 (16%)	1005	187	19%	905	1104	0.997	NS	16
PCB 170	4°C	544 (15%)	594	138	23%	510	677	0.890	NS	13
	-20°C	544 (15%)	617	134	22%	543	691	0.973	NS	15

[a] NS = Not significant at $\alpha = 0.05$; * = Significant with $0.01 < p \leq 0.05$; ** = Highly significant with $p \leq 0.01$.

The linear regression model's estimated lower confidence limit of the slope (β_{LCL}) was utilized to calculate a conservative holding time estimate (prior to extraction) for a 5%, 10% or 20% decrease in concentration to occur for each Aroclor or PCB congener and storage temperature. Based on the linear regression analysis, the PCBs sampled from the Housatonic River sediment (aroclors) and the Tri-Cities soil (aroclors and congeners) had a minimum holding time of 65 days until a 5% decrease in the natural log concentration would be expected (Table 3-26). PCB 52 and 153 had the shortest holding times for both holding conditions. Only one of the PCBs (PCB 8) had a positive estimated lower confidence limit on the slope (β_{LCL}) and; thus, the number of days until a given percentage decrease in concentration could not be calculated for the 4°C holding condition. For all but PCB 52, the holding time for the -20°C holding condition was greater than the 4°C holding condition with the minimum holding time for a 5% decrease being 65 days for PCB 52. Given the prescribed SW-846 metric of CV<25% for replicate samples, the shortest holding time for a 20% decrease in concentration was estimated to be 260 days, which is 18.5 times longer than the current SW-846 prescribed 14 days.

Table 3-25. P-values for the significance of the lack-of-fit and the slope from the linear regression and the best fit simple linear model parameters on the natural log scale for PCBs by sediment and holding condition.

Analyte and Holding Temperature	P-value for Lack of Fit		Intercept	Slope	Standard Error	P-value for Slope		df[a]
Housatonic River								
Aroclor 1254 4°C	0.009	**	8.750	-0.00167	0.00051	0.006	**	14
Aroclor 1254 -20°C	0.005	**	8.769	-0.00140	0.00056	0.026	*	13
Aroclor 1260 4°C	0.043	*	10.10	-0.00138	0.00047	0.011	*	14
Aroclor 1260 -20°C	0.057	NS	10.12	-0.00143	0.00032	0.001	**	13
Sequim Bay (Surrogate corrected)								
Aroclor 1254 4°C	0.108	NS	4.689	0.00200	0.00127	0.152	NS	8
Aroclor 1254 -20°C	0.065	NS	4.787	0.00103	0.00076	0.210	NS	8
Tri-Cities								
Aroclor 1242 4°C	0.040	*	10.227	-0.00082	0.00065	0.229	NS	11
Aroclor 1242 -20°C	0.112	NS	10.229	-0.00058	0.00071	0.428	NS	13
Aroclor 1260 4°C	0.349	NS	9.375	0.00060	0.00102	0.565	NS	12
Aroclor 1260 -20°C	0.093	NS	9.343	0.00117	0.00102	0.273	NS	14
PCB 8 4°C	0.196	NS	6.122	0.00693	0.00222	0.011	*	10
PCB 8 -20°C	0.309	NS	6.082	0.00548	0.00294	0.087	NS	12
PCB 52 4°C	0.204	NS	6.668	0.00035	0.00133	0.797	NS	10
PCB 52 -20°C	0.015	*	6.722	0.00032	0.00173	0.857	NS	11
PCB 153 4°C	0.140	NS	7.369	-0.00314	0.00114	0.019	*	11
PCB 153 -20°C	0.007	**	7.443	-0.00277	0.00117	0.033	*	14
PCB 138 4°C	0.667	NS	6.916	0.00113	0.00079	0.177	NS	11
PCB 138 -20°C	0.188	NS	6.927	0.00159	0.00099	0.130	NS	14
PCB 187 4°C	0.286	NS	6.038	0.00026	0.00114	0.829	NS	7
PCB 187 -20°C	0.419	NS	6.065	0.00203	0.00123	0.134	NS	9
PCB 180 4°C	0.785	NS	6.803	0.00142	0.00106	0.209	NS	11
PCB 180 -20°C	0.127	NS	6.862	0.00078	0.00091	0.409	NS	14
PCB 170 4°C	0.162	NS	6.306	0.00118	0.00104	0.281	NS	11
PCB 170 -20°C	0.037	*	6.375	0.00078	0.00130	0.559	NS	13

[a] df = degrees of freedom; NS = Not significant at $\alpha = 0.05$; * = Significant with $0.01 < p \leq 0.05$;
** = Highly significant with $p \leq 0.01$.

As a result of the wide variability in the slope estimate for Aroclor 1254 measured in the SQ-1 sediment (Table 3-25), the estimated numbers of days until a 10% decrease in natural log concentration from the best-fit intercept was estimated as zero to one day. Confounding this wide variability was the previously discussed concerns associated with SQ-1 Day 0 and Day 7 measurements that required surrogate correction. Even with surrogate correction; however, the analyte's concentration appeared to be linked to extract age (Fig. 3-28). While it is believed that data manipulation may have inserted bias into the values, it clearly reduced the variability of the Day 0 data (prior to surrogate correction CV=33.7%, but after correction CV=0.6%). The resulting tight data set placed inordinate dependence on Day 0 data that can be clearly seen in the plotted data (Fig. 3-29). Because of these concerns the data for SQ-1 sediments were not presented in Table 3-26. Even with these concerns; however, the overall CV (Table 3-24) for the SQ-1 sediment aroclor data suggests that there is no substantive change in the aroclor concentration over the life of the study (168 days).

Table 3-26. The estimated number of days until a given percentage decrease from the intercept for PCBs (MHT=14 days)[a].

Sediment	Holding Condition	5% Decrease	10% Decrease	20% Decrease
Housatonic River				
Aroclor 1254	4°C	157	315	630
	-20°C	168	337	674
Aroclor 1260	4°C	211	422	844
	-20°C	239	478	956
Tri-Cities				
Aroclor 1242	4°C	227	455	911
	-20°C	243	486	972
Aroclor 1260	4°C	289	579	1158
	-20°C	454	908	1817
PCB 8	4°C	NA	NA	NA
	-20°C	331	663	1326
PCB 52	4°C	127	255	511
	-20°C	96	192	385
PCB 153	4°C	65	130	260
	-20°C	70	140	281
PCB 138	4°C	579	1159	2318
	-20°C	649	1298	2597
PCB 187	4°C	124	248	496
	-20°C	402	805	1610
PCB 180	4°C	370	740	1481
	-20°C	291	583	1166
PCB 170	4°C	284	569	1139
	-20°C	157	314	628

[a] Cells highlighted in light yellow had overall CVs>25%, cells highlighted in orange had CVs>25% and a negative estimated slope; cells highlighted in blue had CVs<25% and a negative estimated slope. NA = not applicable because the slope and lower 95% confidence limit were positive.

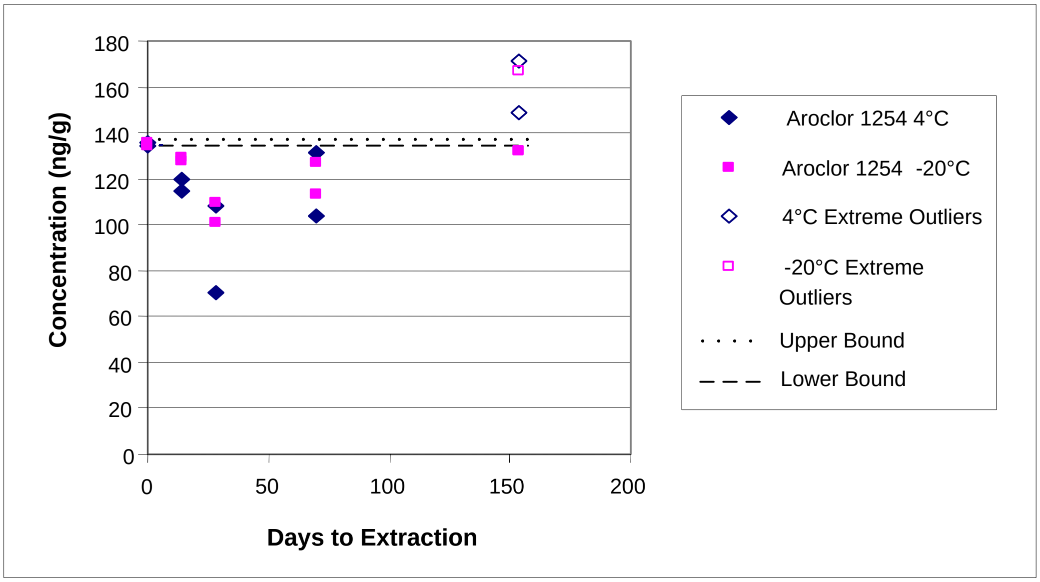

Figure 3-29. Observed Aroclor 1254 concentration for SQ-1 sediment at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

Plots of the observed concentration through time were compared to the nonparametric upper and lower boundaries of the Day 0 concentration for the Housatonic River sediment and the Tri-Cities soil (Fig. 3-30 to 3-40). All of the PCBs had observations that fell outside of the Day 0 nonparametric boundaries. Regression lines are shown for those holding time sequences that exhibited a negative slope (Aroclor 1254 and 1260 - Housatonic River and PCB 153 - Tri-Cities). The PCB 153 congener extracted from the Tri-Cities soil appears to decrease over time (Fig. 3-30) as the data exhibited a statistically significant negative slope (Table 3-25), its CV was slightly greater than 25% (28.1% for both holding temperatures), but the t-test was not significant, and the plotted data remained (for the most part) within the nonparametric bounds. Taken together, the statistical data suggests that there is a decrease in PCB 153 over the life of the study. The regression model estimated that a decrease in PCB 153 concentration of 20% would require 260 days (Table 3-26) which appears to be in agreement with the plotted data (Fig. 3-30), but was beyond the duration of this study. With the exception of the Housatonic River sediment Aroclors (Fig. 3-31 and 3-32; discussed below), the remaining plots show the variability of the extraction data discussed previously, but also shows the stability of PCB congeners and Aroclors though the holding time sequence of this study regardless of holding temperature (Figs. 3-33 to Fig. 3-40).

The Housatonic River sediment Aroclor (1254 and 1260) data exhibited significant negative slopes at both holding temperatures (Table 3-25). However, inspection of the data plots for these Aroclors showed an anomaly that was difficult to explain (Fig. 3-31 and 3-32). For Aroclor 1254 the initial extractions (Day 0 and Day 7) had similar concentration means and distributions, but concentrations at Day 14 had decreased to below the Day 0 lower bound and maintained that concentration for the remaining 154 day time sequence (Fig. 3-31). While this behavior yielded a statistically significant linear regression (Table 3-25), the plotted data suggests an extraction

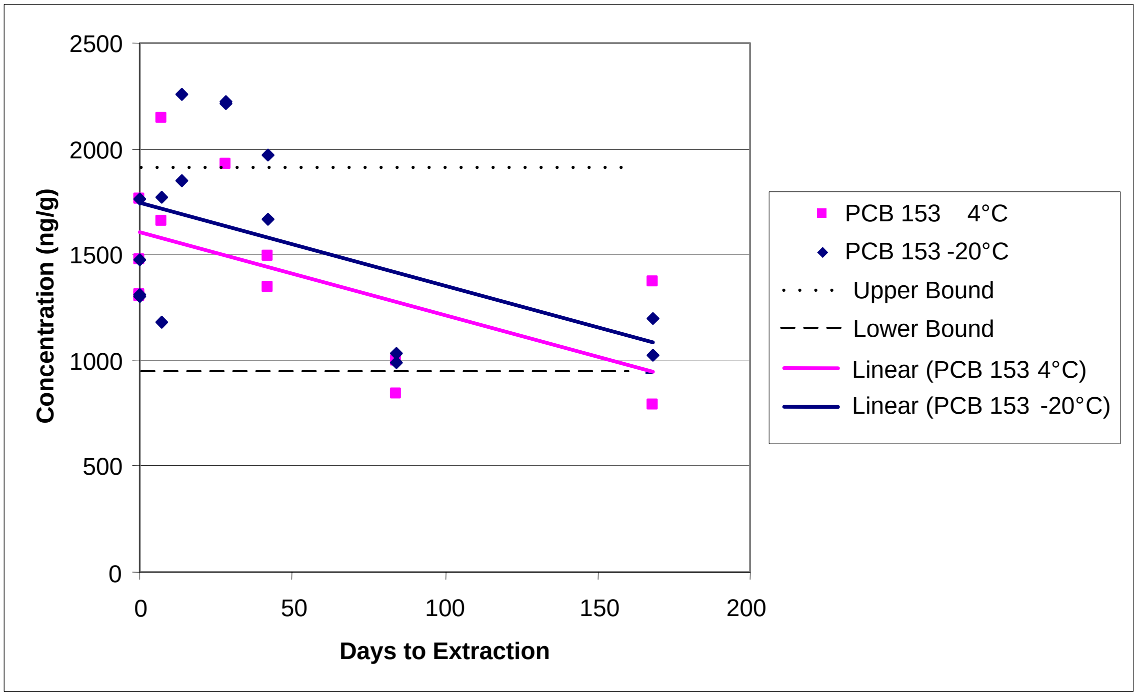

Figure 3-30. Observed PCB 153 concentration for Tri-Cities soil at both the 4°C and -20°C holding temperature by holding time, significant regression lines, and associated Day 0 nonparametric bounds.

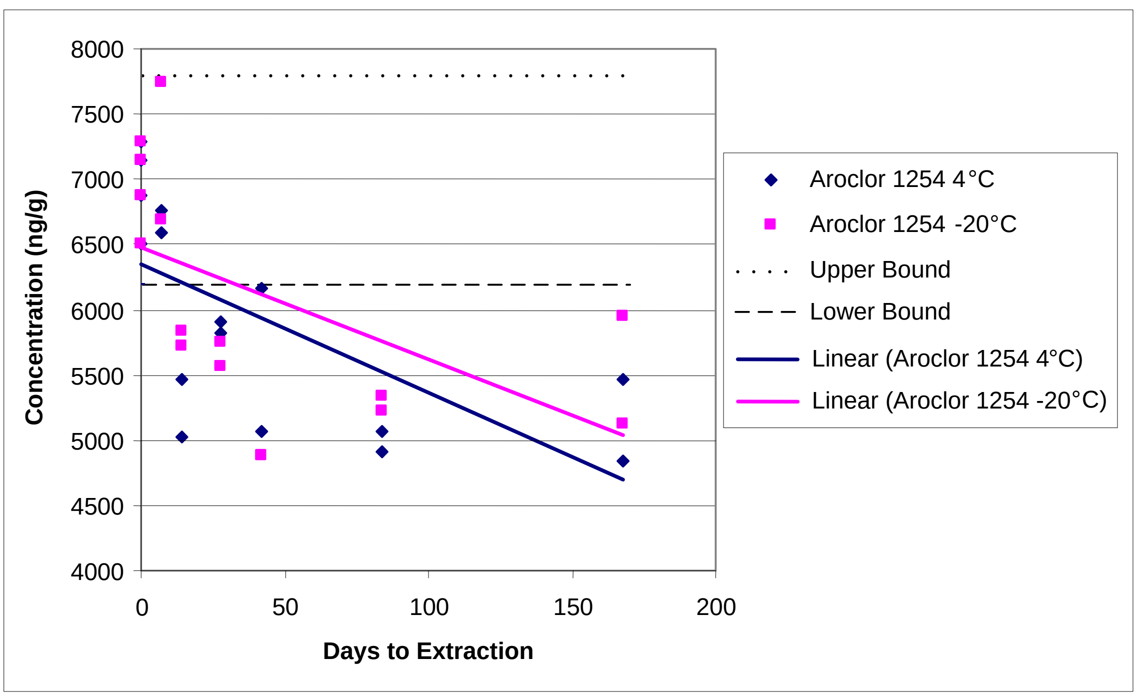

Figure 3-31. Observed Aroclor 1254 concentration for Housatonic River sediment at both the 4°C and -20°C holding temperature by holding time, significant regression lines, and associated Day 0 nonparametric bounds.

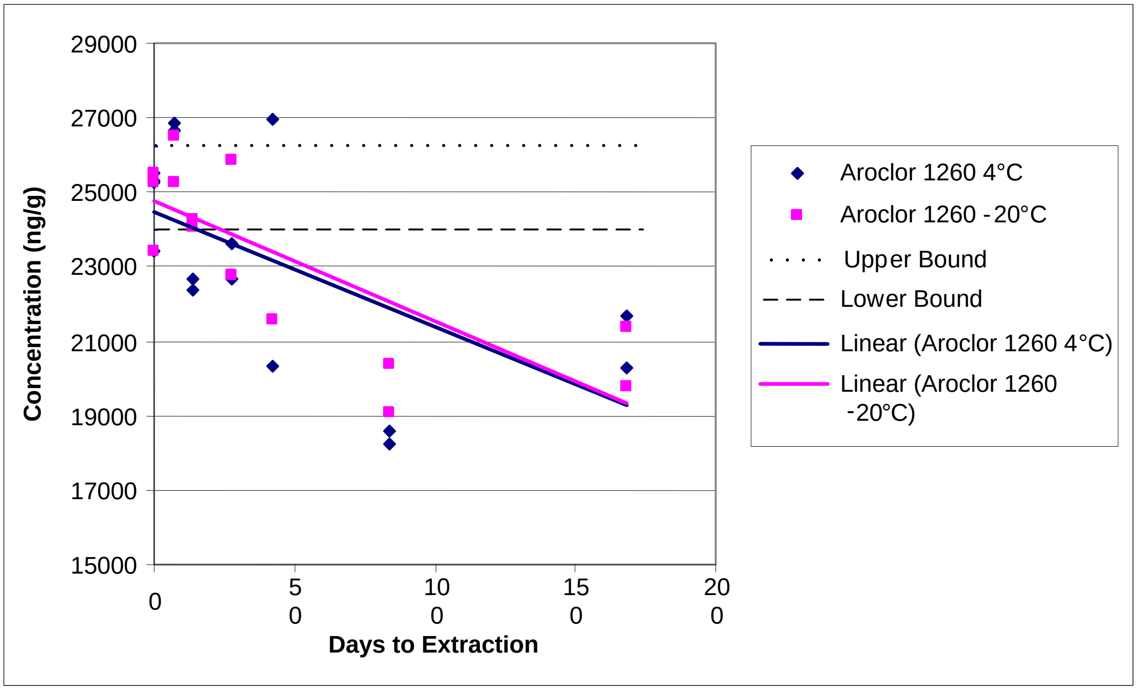

Figure 3-32. Observed Aroclor 1260 concentration for Housatonic River sediment at both the 4°C and -20°C holding temperature by holding time, significant regression lines, and associated Day 0 nonparametric bounds.

or analysis error because of the sharp break between 7 and 14 days. An explanation for this behavior; however, could not be discerned from a reevaluation of the raw data. Despite this aberrant behavior the overall CV<25% suggests that the holding time sequence concentrations of the Aroclor would be within replicate precision prescribed by SW-846 (Table 3-24); hence the concentration did not change significantly during the 168 day study. This conclusion was essentially the same as that arising from the regression analysis in that a 5% decrease in concentration required 157 days; essentially the length of the study. The extract concentration data for Aroclor 1260 behaved in a similar manner (Fig. 3-32) and yielded very similar conclusions (Table 3-24 and 3-26).

3.2.2.3 PCB Holding Time Study – Conclusions: The objective of PCB extraction study was to determine if significant loses of PCBs occurred when sediment/soil samples were stored at either 4°C or -20°C for a period of 168 days. Samples from three field sites were examined. Of the three Aroclors and 7 congeners that were quantified, there was no difference in the mean concentration between samples stored at the two temperatures (Table 3-23). The minimum estimated number of days required for Aroclors to decrease by 20% was 630 days (Aroclor 1254; Housatonic River sediment) and 260 days for PCB 153 stored at 4°C (Table 3-26); both of these time estimates are well beyond the currently prescribed 14 day MHT.

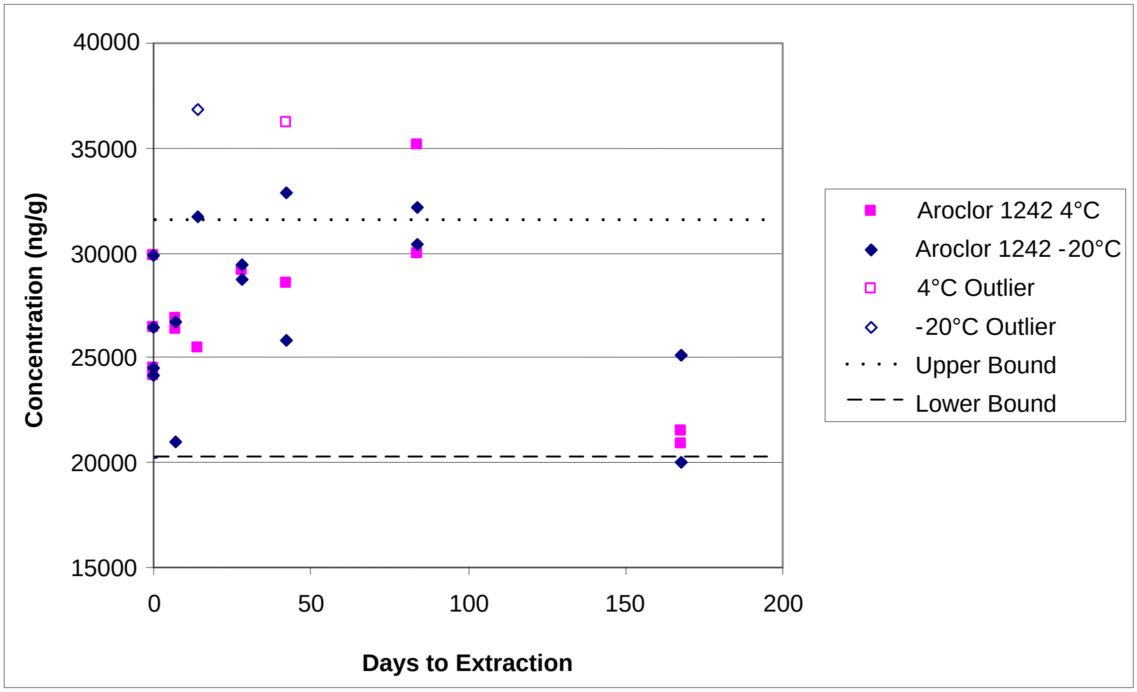

Figure 3-33. Observed Aroclor 1242 concentration for Tri-Cities soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

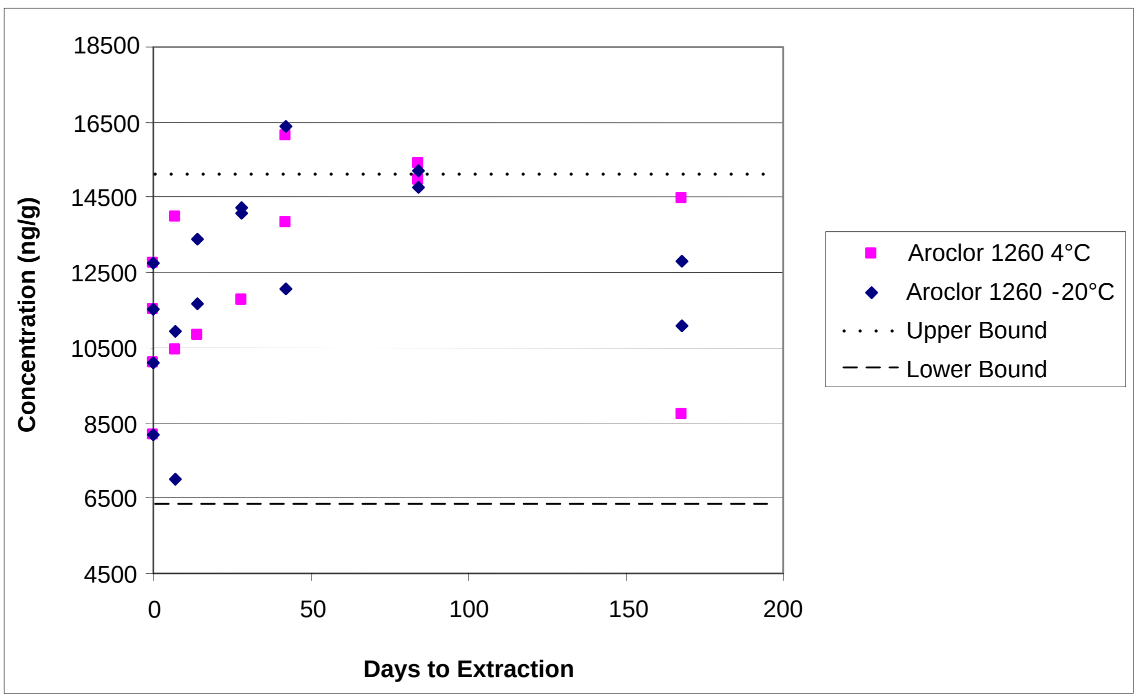

Figure 3-34. Observed Aroclor 1260 concentration for Tri-Cities soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

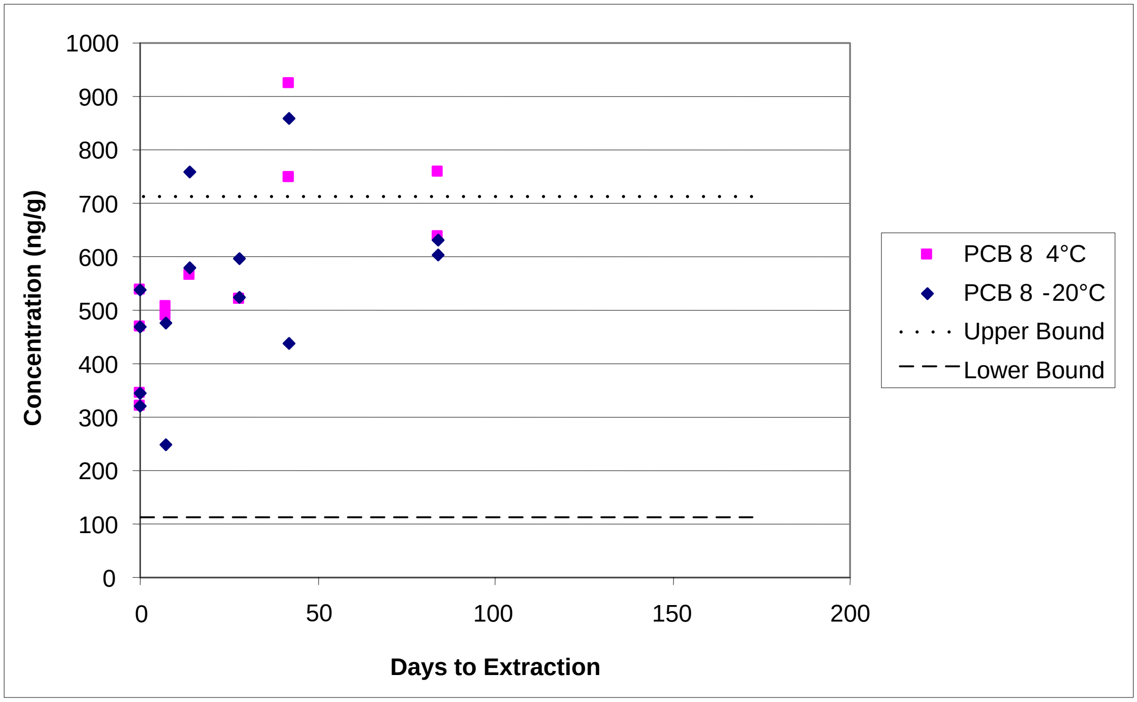

Figure 3-35. Observed PCB 8 concentration for Tri-Cities soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant negative trend.

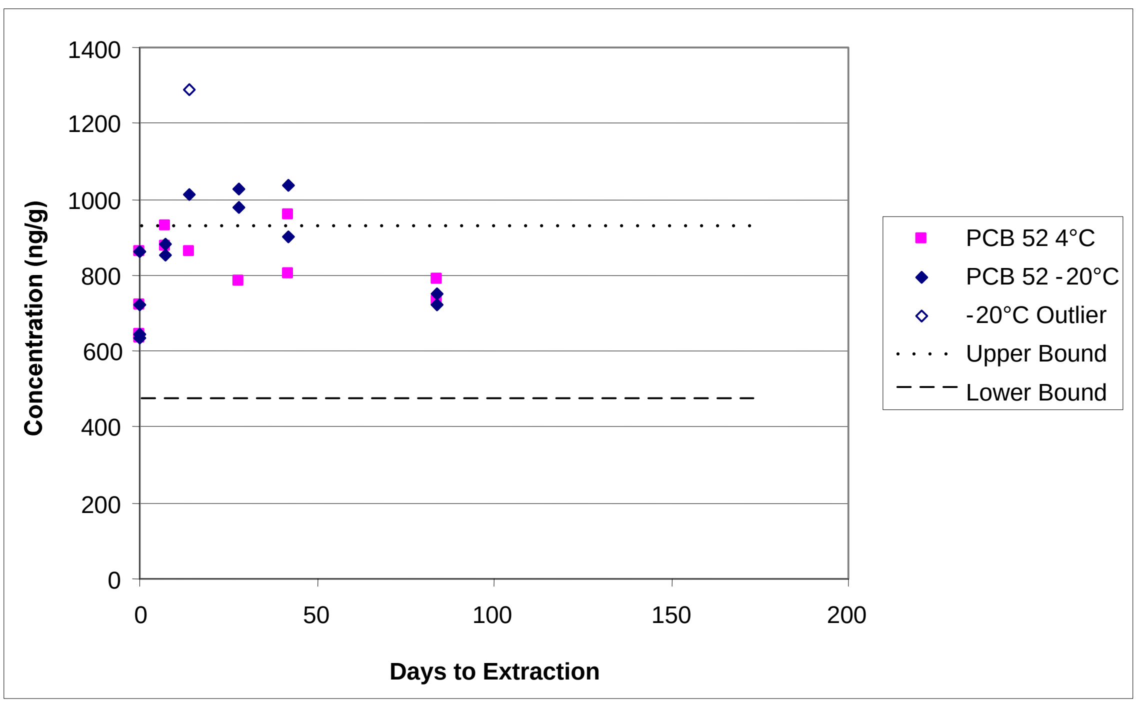

Figure 3-36. Observed PCB 52 concentration for Tri-Cities soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

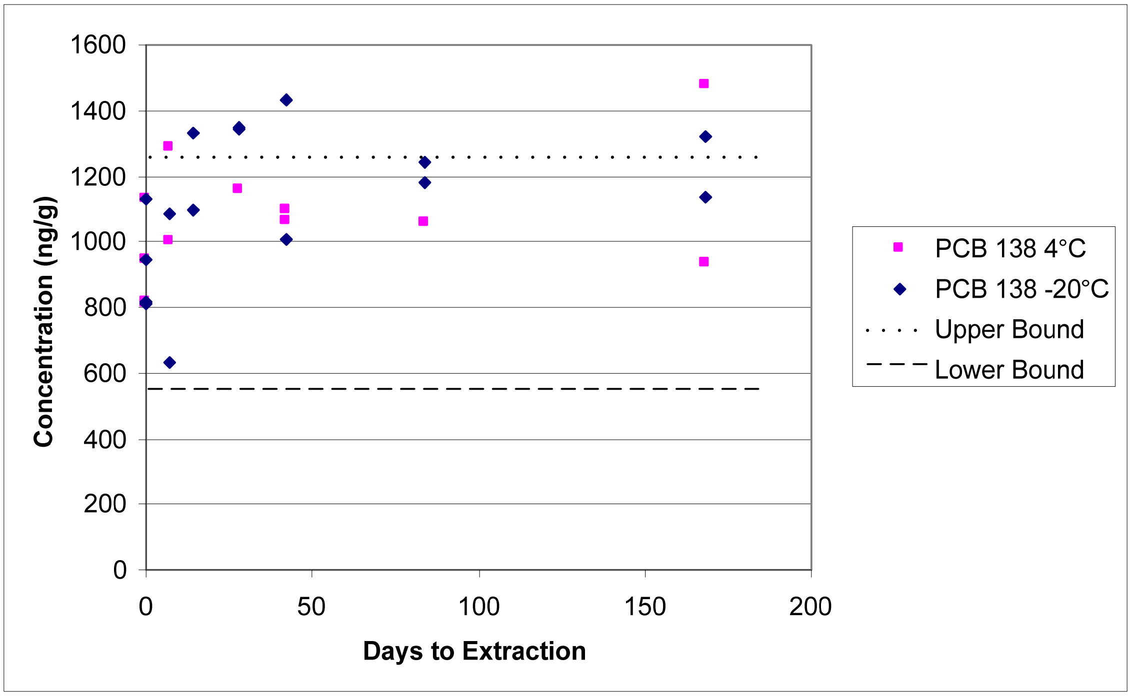

Figure 3-37. Observed PCB 138 concentration for Tri-Cities soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was not a significant decrease in concentration.

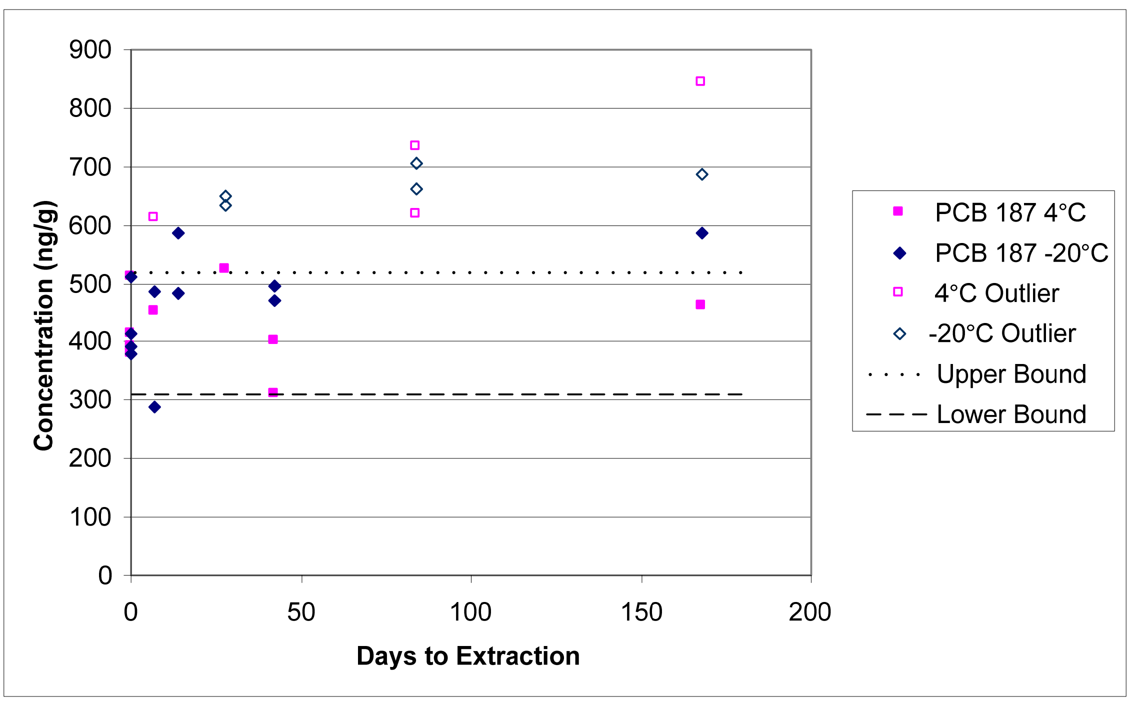

Figure 3-38. Observed PCB 187 concentration for Tri-Cities soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was not a significant decrease in concentration.

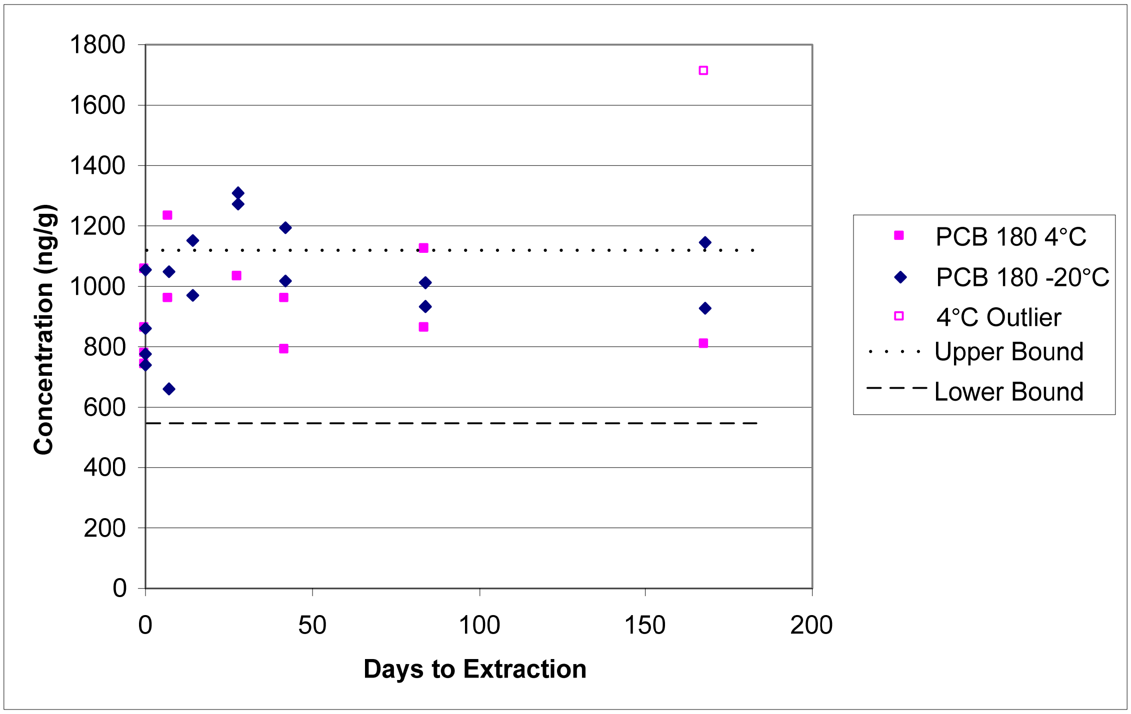

Figure 3-39. Observed PCB 180 concentration for Tri-Cities soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

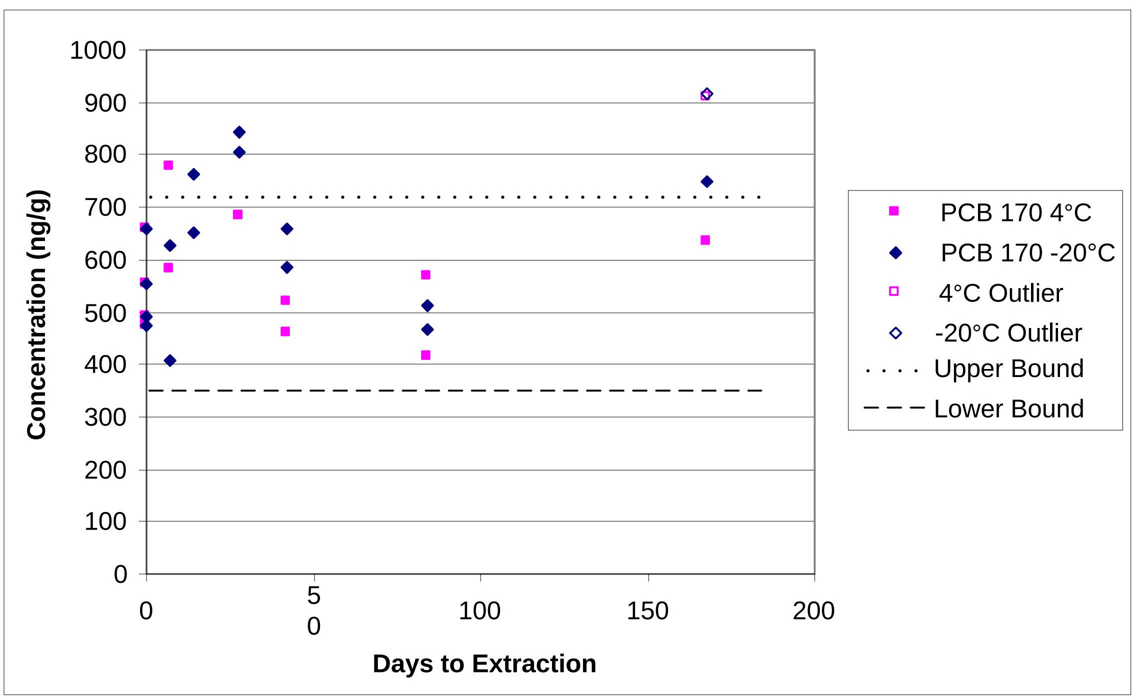

Figure 3-40. Observed PCB 170 concentration for Tri-Cities soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

3.2.3 Pesticides

Concentrations of pesticides were characterized through time for each of four soils/sediments; Housatonic River sediment, Sequim Bay (SQ-1) reference sediment, Tri-Cities soil, and Bedford-1 soil and two holding temperatures (4°C and -20°C) (Appendix A, Descriptive Statistics Tables A-11 to A-14). None of the analytes were analyzed in all four of the sediments/soils. The pesticides that were characterized across time for each soil/sediment are listed in Table 3-27. All of the observed concentrations were above 2*MDL except for Housatonic River sediment concentrations for 4,4-DDD and SQ-1 sediment concentrations for γ-BHC (Table 3-27). The SQ-1 sediment had the lowest concentration of all pesticides with its highest concentration being α-chlordane averaging 11 ng/g (dry weight). The Tri-Cities soil had the highest α and γ chloradane concentrations averaging about 6,000 ng/g while and the Housatonic River sediments had the highest 2,4-DDT concentrations averaging 1100 ng/g.

As with the PAH and PCB extractions, the value of CV≤25% is considered the allowable variability between replicates for pesticide extraction. Table 3-27 shows the mean concentration and CV of all Day 0 data accepted for statistical analysis (including potential statistical outliers) and the across time CV for the data at 4^{o}C and -20^{o}C (i.e., all data across a time sequence except for Day 0). The SQ-1 sediment exhibited Day 0 CVs>25% for most of the pesticides extracted from this sediment (Table 3-27), but once the data were surrogate corrected (as with the PCB Aroclor) the CV was reduced considerably (discussed below). The only other soil/sediment to exhibit CV>25% was the Day 0 Housatonic River sediment 4,4-DDD, whose concentration was < 2*MDL. Interestingly, the Bedford-1 soil Day 0 analyses suggested the same curious analysis time dependence observed for the SQ-1 Aroclors (section 3.3.2.1). However, unlike the SQ-1 analyses, the Day 0 Bedford-1 pesticide data were below the CV≤25% metric.

The results shown in Table 3-27 for the mean and CV of across time data (excluding Day 0 data) for sediment held at 4^{o}C and -20^{o}C, can be viewed as an estimate of data variability. The variability arising for the across time CV analysis is a combination of sample heterogeneity, analytical precision, and the variability with time. Given the metric of CV≤25%, much of the data for a given time sequence (excluding Day 0), soil/sediment, and storage temperature could be considered valid replicates regardless of holding time.

For the Housatonic River sediment, five observations from the -20°C holding temperature and three for the 4°C holding temperature (8 out of 100 = 8%) were identified as extreme outliers (observations greater than the 75th percentile plus 3 times the interquartile distance of the Day 0 data) and were removed from the analysis. For the SQ-1 analysis, 15 observations from the -20°C holding temperature and 21 from the 4°C holding temperature out of 183 (20%) were identified as extreme outliers. Because 20% of the data were considered extreme outliers and this amount was greater than the limit of 10%, these data were not removed from the analysis. For the Bedford-1 soil analysis, seven observations from the -20°C holding temperature and eight from the 4°C holding temperature out of 84 (18%) were identified as extreme outliers. These data were not removed from the analysis.

Table 3-27. Mean concentration (ng/g) and coefficient of variation (CV) for all pesticide data across time accepted for analysis[a].

	Housatonic River			Sequim Bay (Surrogate corrected)			Tri-Cities			Bedford-1		
Analyte	**Day 0**	**4°C**	**-20°C**	**Day 0**	**4°C**	**-20°C**	**Day 0**	**4°C**	**-20°C**	**Day 0**	**4°C**	**-20°C**
α-BHC				0.661 4.02%	1.15 33.4%	1.16 23.3%						
γ-BHC				**0.640 12.6%**	**1.17 35.2%**	**1.09 30.9%**						
2,4-DDE				1.25 26.0%	4.26 47.9%	3.87 41.9%						
γ-Chlordane							5,326 22.4%	5,678 23.9%	6,251 24.6%			
α-Chlordane				4.43 28.3%	9.33 43.8%	9.03 29.7%	5,971 21.8%	6,131 20.8%	6,821 22.5%			
Trans Nonachlor				1.04 31.4%	1.77 33.5%	1.81 22.6%	3,678 23.6%	3,930 22.4%	4,325 23.5%			
4,4-DDE	139 2.52%	137 16.4%	142 17.1%	1.36 30.9%	2.67 46.5%	2.55 33.9%						
2,4-DDD				0.488 21.6%	1.88 65.8%	1.58 72.0%				93.0 8.36%	96.0 24.4%	96.3 23.7%
4,4-DDD	**36.4 35.7%**	**23.2 22.7%**	**26.0 41.9%**	1.04 29.9%	2.26 38.5%	2.44 24.5%				355 2.23%	409 10.0%	412 7.96%
2,4-DDT	197 4.80%	189 16.6%	196 16.4%	0.408 35.6%	0.928 40.3%	0.815 20.1%						
4,4-DDT	1,107 4.22%	1,061 14.3%	1,064 11.9%							64.0 10.3%	95.9 30.5%	92.6 23.2%
MIREX				0.798 36.1%	1.62 35.7%	1.76 22.7%						

[a] Cells highlighted with light yellow have CVs greater than 25%, and cells highlighted with orange and bold text have observations less than 2*MDL. Blank cells indicate analytes for which a soil/sediment was not characterized.

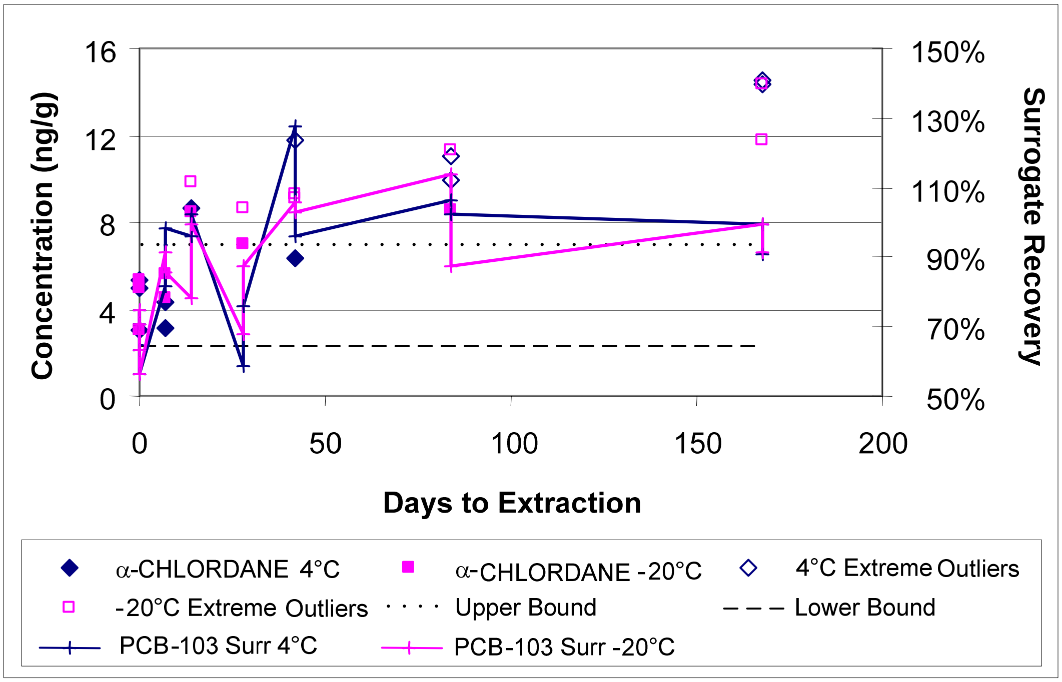

Figure 3-41. SQ-1 sediment raw α-chlordane data and surrogate recovery.

3.2.3.1 Surrogate Correction of SQ-1 Sediment Pesticide Extraction Data: As with the SQ-1 sediment PCB analyses, surrogate recovery for the SQ-1sediment pesticide results generally increased with holding time (days to extraction; Fig. 3-41). Thus, the SQ-1 results were surrogate corrected using either PCB 103 or PCB 198 based on their molecular weight (Table 3-28). Even though extracts were not held for more than 40 days, extracts older than 30 days showed a reduced concentration (Figure 3-42). Those extracts held for more than 30 days were from Day 0 and Day 7 sampling periods. Thus, for the statistical analysis, only extracts held for less than 30 days were used, and the starting time of the experiment (Day 0) was moved to Day 14 data. The Bedford-1 soil pesticide results also showed an increase in the surrogate recovery with holding time (Figure 3-43) and; thus, these data were surrogate corrected using the surrogates listed in Table 3-28.

3.2.3.2 Statistical Analysis of Pesticide Extraction Data: Once analyte extraction data for all soils/sediments, storage temperatures, and holding time sequences were surrogate corrected as necessary (SQ-1 and Bedford-1) and statistical outliers removed, data for a given soil and storage temperature were pooled across time (0 to 168 days). The mean, standard deviation and CV were calculated for the pooled data (Table 3-29). Strictly based on CV≤25% as a measure of acceptable replicate precision, the overall CV showed that only 12 out of the 40 holding time sequence pooled data sets did not meet the CV metric. Two of the holding time sequences with CV>25% exhibited concentrations at < 2MDL, namely, 4,4-DDD from the Housatonic River sediment and γ-BHC from the SQ-1 sediment. The remaining pooled data at CV>25% were extracted from the SQ-1 sediment (5), Tri-Cities soil (2), and one from Bedford-1 sediment. The remaining 28 holding time sequence studies all exhibit an overall CV<25% (Table 3-29), which suggests that these data met the SW-846 prescribed criteria for replicate precision except for the obvious fact that the data were collected over a period of 168 days.

Table 3-28. Surrogates used to correct each pesticide analyte for SQ-1 sediment and Bedford-1 soil.

Analyte	Surrogate
α-BHC	PCB 103
γ-BHC	PCB 103
2,4-DDE	PCB 103
α-Chlordane	PCB 103
Trans Nonachlor	PCB 103
4,4-DDE	PCB 103
2,4-DDD	PCB 103
4,4-DDD	PCB 198
2,4-DDT	PCB 198
4,4-DDT	PCB 198
MIREX	PCB 198

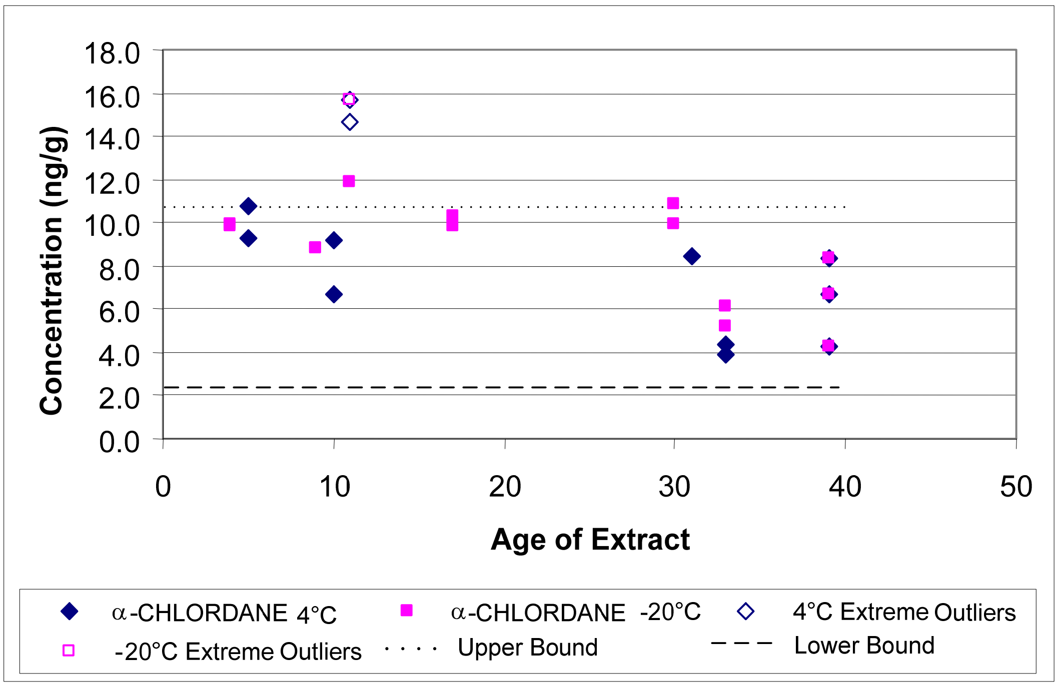

Figure 3-42. SQ-1 sediment α-chlordane surrogate corrected data as a function of the age of extract.

A one-sample t-test of the null hypothesis Ho: the sample is from a population with the mean equal to or greater than the Day 0 mean, was rejected for a total of 8 holding time sequence studies (Table 3-29). Interestingly, only one holding time sequence exhibiting a significant t-test also exhibited a CV>25% (i.e., Housatonic River sediment for 4,4-DDD held at 4°C), but this pesticide holding time sequence had concentrations <2*MDL. The remaining 7 holding time sequences presented conflicting statistical data; that is, they exhibited statistically significant t-tests, but their overall CV was <25%. The Tri-Cities and Bedford-1 soils did not have any pesticides that had mean concentrations that were significantly less than the Day 0 means.

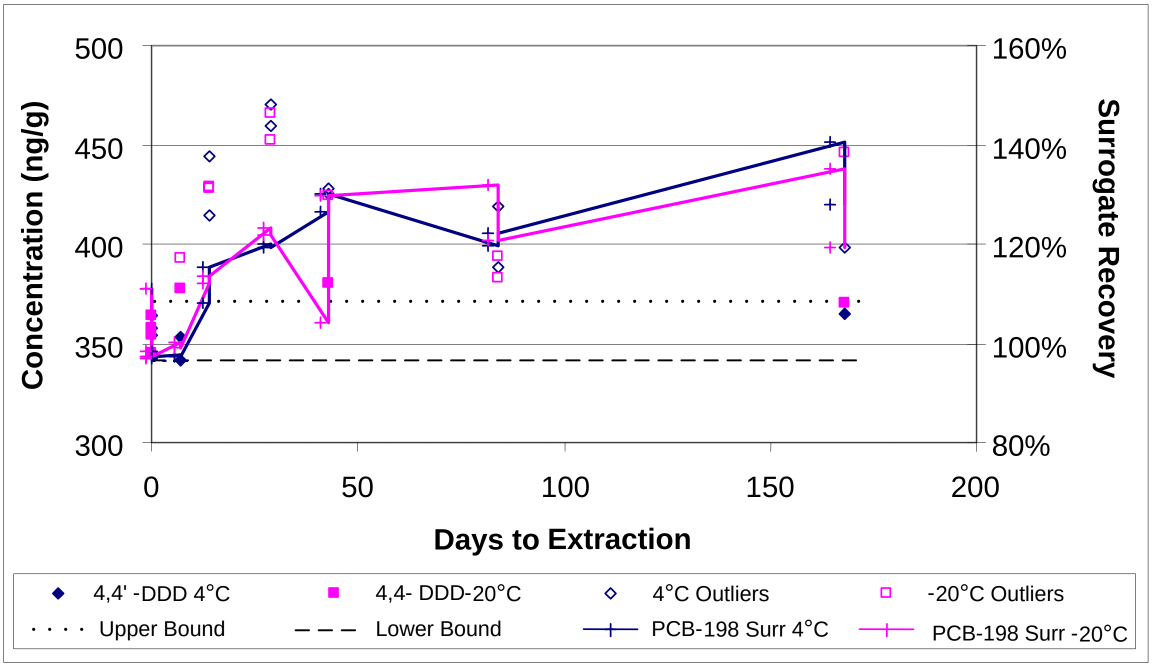

Figure 3-43. Bedford-1 soil raw 4,4'-DDD data and percent recovery of the surrogate.

Overall, 18 of 40 holding time sequences exhibited conflicting CV and t-test results; the series either had CV<25% and significant t-tests (7 series), or CV>25% and non-significant t-tests (11series) (Table 3-29). The 21 remaining holding time sequences exhibited CVs<25% and a non-significant t-test (Table 3-29). For these 21 holding time sequences, the pesticide concentrations did not change significantly over the 168 day life of the study. For the 18 holding time sequences that exhibited conflicting CV and t-test statistics the potential for a small change in concentration cannot be ruled out. However, the series that had an overall CV<25% essentially exhibited variability that would fall within the current SW-846 prescribed replicate precision acceptance.

The lack-of-fit to the linear model (using the natural log scale) was significant for 12 of the 40 pesticide holding time sequences measured in all sediments/soils at both holding temperatures (Table 3-30). As with the PAH and PCB analysis, the pesticide residuals for the analytes did not show a consistent U-shaped pattern through time and; therefore, the lack-of-fit was assumed to be noise. Hence, the simple linear model was used for all analytes, sediments/soils, and holding temperatures. The slope associated with the number of days held was negative and significantly different from zero for 5 of the pesticide holding time series measured. Pesticides 4,4'-DDE from Housatonic River sediment and 4,4-DDD from Bedford-1 soil had significantly decreasing concentrations when held at both 4°C and -20°C, while 2,4-DDT from Housatonic River sediment had significantly decreasing concentrations when held at -20°C. None of the slopes associated with the number of days held were both negative and significantly different from zero for pesticides measured in either SQ-1 sediment or Tri-Cities soil. There was no observable, consistent pattern between the sediments/soils, temperature, and the behavior of the pesticides.

Table 3-29. Pesticides (ng/g) one-sample t-test of the null hypothesis Ho: the sample is from a population with the mean equal to or greater than the Day 0 mean[a].

Analyte	Temp	Day 0 Mean and CV (N = 5)	Overall Mean	Overall Standard Deviation	Overall CV	95% Confidence Limits Lower	95% Confidence Limits Upper	P-value		N
Housatonic River										
4,4-DDE	4°C	139 (3%)	132	13.5	10%	124	140	0.031	*	14
4,4-DDE	-20°C	139 (3%)	134	10.1	8%	127	140	0.048	*	11
4,4-DDD	4°C	36.4 (36%)	26.5	9.42	36%	21.5	31.5	<0.001	**	16
4,4-DDD	-20°C	36.4 (36%)	30.6	11.9	39%	23.4	37.7	0.051	NS	13
2,4-DDT	4°C	197 (5%)	187	23.5	13%	174	200	0.070	NS	15
2,4-DDT	-20°C	197 (5%)	185	16.7	9%	174	196	0.022	*	11
4,4-DDT	4°C	1107 (4%)	1073	133	12%	1002	1144	0.158	NS	16
4,4-DDT	-20°C	1107 (4%)	1069	98.3	9%	1007	1132	0.104	NS	12
SQ-1 (Surrogate Corrected)										
α-BHC	4°C	1.37 (7%)	1.32	0.203	15%	1.15	1.49	0.265	NS	8
α-BHC	-20°C	1.37 (7%)	1.33	0.151	11%	1.22	1.44	0.201	NS	10
γ-BHC	4°C	1.34 (8%)	1.32	0.343	26%	1.03	1.60	0.429	NS	8
γ-BHC	-20°C	1.34 (8%)	1.26	0.285	23%	1.06	1.47	0.205	NS	10
2,4-DDE	4°C	3.98 (2%)	4.87	1.80	37%	3.36	6.38	0.898	NS	8
2,4-DDE	-20°C	3.98 (2%)	4.66	1.47	32%	3.61	5.71	0.991	NS	10
α-Chlordane	4°C	10.4 (7%)	10.88	2.97	27%	8.40	13.4	0.679	NS	8
α-Chlordane	-20°C	10.4 (7%)	10.58	2.02	19%	9.14	12.0	0.624	NS	10
Trans Nonachlor	4°C	2.3 (4%)	2.05	0.291	14%	1.81	2.30	0.024	*	8
Trans Nonachlor	-20°C	2.3 (4%)	2.12	0.192	9%	1.98	2.25	0.007	**	10
4,4-DDE	4°C	3.04 (6%)	3.18	0.811	26%	2.50	3.86	0.681	NS	8
4,4-DDE	-20°C	3.04 (6%)	3.03	0.584	19%	2.61	3.44	0.473	NS	10
2,4-DDD	4°C	0.735 (3%)	2.12	1.01	48%	1.27	2.96	0.997	NS	8
2,4-DDD	-20°C	0.735 (3%)	1.85	1.09	59%	1.08	2.63	0.995	NS	10
4,4-DDD	4°C	2.85 (5%)	2.58	0.583	23%	2.17	3.00	0.091	NS	10
4,4-DDD	-20°C	2.85 (5%)	2.61	0.373	14%	2.32	2.89	0.043	*	9
2,4-DDT	4°C	0.915 (16%)	1.01	0.231	23%	0.841	1.17	0.866	NS	10
2,4-DDT	-20°C	0.915 (16%)	0.877	0.095	11%	0.803	0.950	0.105	NS	9
MIREX	4°C	2.02 (1%)	1.84	0.333	18%	1.60	2.07	0.057	NS	10
MIREX	-20°C	2.02 (1%)	1.88	0.201	11%	1.73	2.04	0.038	*	9
Tri-Cities										
γ-Chlordane	4°C	5326 (22%)	5864	1129	19%	5212	6516	0.951	NS	14
γ-Chlordane	-20°C	5326 (22%)	6004	1584	26%	5089	6919	0.933	NS	14
α-Chlordane	4°C	5971 (22%)	6421	1150	18%	5690	7152	0.899	NS	12
α-Chlordane	-20°C	5971 (22%)	6577	1573	24%	5669	7485	0.913	NS	14
Trans Nonachlor	4°C	3678 (24%)	4044	816	20%	3526	4562	0.925	NS	12
Trans Nonachlor	-20°C	3678 (24%)	4130	1063	26%	3516	4744	0.932	NS	14
Bedford -1 (Surrogate Corrected)										
2,4-DDD	4°C	109 (8%)	108	13.1	12%	101	115	0.406	NS	16
2,4-DDD	-20°C	109 (8%)	109	10.6	10%	103	115	0.529	NS	16
4,4-DDD	4°C	352 (5%)	348	33.0	10%	330	366	0.302	NS	16
4,4-DDD	-20°C	352 (5%)	352	29.5	8%	337	368	0.502	NS	16
4,4-DDT	4°C	63.3 (6%)	76.2	20.5	27%	65.2	87.1	0.988	NS	16
4,4-DDT	-20°C	63.3 (6%)	74.5	14.1	19%	67.0	82.1	0.997	NS	16

[a] Highlighted cells have overall CV>25 (statistical outliers were removed). NS = Not significant at $\alpha = 0.05$; * = Significant with $0.01 < p \leq 0.05$; ** = Highly significant with $p \leq 0.01$.

Table 3-30. P-values for the significance of the lack-of-fit and the slope from the linear regression and the best fit simple linear model parameters on the natural log scale for pesticides by sediment/soil and holding condition.

Analyte and Holding Temperature	P-value for Lack of Fit		Intercept	Slope	Standard Error	P-value for Slope		df[a]
Housatonic River								
4,4-DDE 4°C	0.267	NS	4.94	-0.00239	0.00077	0.009	**	12
4,4-DDE -20°C	0.002	**	4.94	-0.00183	0.00050	0.005	**	9
4,4-DDD 4°C	0.059	NS	3.21	0.000379	0.00150	0.803	NS	14
4,4-DDD -20°C	0.263	NS	3.38	-0.000680	0.00184	0.719	NS	11
2,4-DDT 4°C	0.047	*	5.23	-0.000215	0.00076	0.783	NS	13
2,4-DDT -20°C	0.150	NS	5.28	-0.00233	0.00053	0.002	**	9
4,4-DDT 4°C	0.010	**	6.97	-0.0000249	0.00062	0.968	NS	14
4,4-DDT -20°C	0.013	*	6.97	-0.0000023	0.00058	0.997	NS	10
Sequim Bay (Surrogate Corrected)								
α-BHC 4°C	0.134	NS	0.176	0.00146	0.00092	0.163	NS	6
α-BHC -20°C	0.219	NS	0.211	0.00126	0.00053	0.045	*	8
γ-BHC 4°C	0.016	*	0.098	0.00238	0.00129	0.115	NS	6
γ-BHC -20°C	0.067	NS	0.120	0.00167	0.00130	0.236	NS	8
2,4-DDE 4°C	0.164	NS	1.230	0.00477	0.00103	0.004	**	6
2,4-DDE -20°C	0.073	NS	1.364	0.00254	0.00149	0.126	NS	8
α-Chlordane 4°C	0.094	NS	2.148	0.00328	0.00119	0.033	*	6
α-Chlordane -20°C	0.143	NS	2.234	0.00209	0.00070	0.018	*	8
Trans Nonachlor 4°C	0.134	NS	0.693	0.00026	0.00101	0.804	NS	6
Trans Nonachlor -20°C	0.375	NS	0.771	-0.00048	0.00052	0.390	NS	8
4,4-DDE 4°C	0.131	NS	0.938	0.00304	0.00112	0.035	*	6
4,4-DDE -20°C	0.204	NS	0.984	0.00206	0.00072	0.020	*	8
2,4-DDD 4°C	0.007	**	0.103	0.00811	0.00223	0.011	*	6
2,4-DDD -20°C	0.001	**	-0.085	0.00933	0.00286	0.011	*	8
4,4-DDD 4°C	0.001	**	0.860	0.00117	0.00151	0.458	NS	8
4,4-DDD -20°C	0.089	NS	0.951	-0.00005	0.00093	0.962	NS	7
2,4-DDT 4°C	0.396	NS	-0.151	0.00245	0.00123	0.082	NS	8
2,4-DDT -20°C	0.264	NS	-0.143	0.00011	0.00067	0.879	NS	7
MIREX 4°C	0.087	NS	0.528	0.00116	0.00119	0.362	NS	8
MIREX -20°C	0.076	NS	0.610	0.00030	0.00066	0.660	NS	7
Tri-Cities								
γ-Chlordane 4°C	0.183	NS	8.61	0.00109	0.00087	0.235	NS	12
γ-Chlordane -20°C	0.306	NS	8.50	0.00613	0.0027	0.044	*	12
α-Chlordane 4°C	0.907	NS	8.65	0.00398	0.0013	0.011	*	10
α-Chlordane -20°C	0.302	NS	8.63	0.00511	0.0025	0.065	NS	12
Trans Nonachlor 4°C	0.919	NS	8.17	0.00469	0.0014	0.006	**	10
Trans Nonachlor -20°C	0.337	NS	8.14	0.00583	0.0026	0.047	*	12
Bedford-1 (Surrogate Corrected)								
2,4-DDD 4°C	0.581	NS	4.68	-0.000223	0.00055	0.690	NS	14
2,4-DDD -20°C	0.290	NS	4.68	0.000116	0.00045	0.802	NS	14
4,4-DDD 4°C	0.006	**	5.91	-0.00143	0.00028	<0.001	**	14
4,4-DDD -20°C	0.030	*	5.91	-0.00102	0.00031	0.005	**	14
4,4-DDT 4°C	0.001	**	4.36	-0.00134	0.0012	0.302	NS	14
4,4-DDT -20°C	0.002	**	4.27	0.000628	0.00086	0.475	NS	14

[a] df = degrees of freedom; NS = Not significant at $\alpha = 0.05$; * = Significant with $0.01 < p \leq 0.05$; and ** = Highly significant with $p \leq 0.01$.

Due to the wide variability in the slope estimate for many of the pesticides measured in the SQ-1 sediment [also observed for PCB Aroclors (section 3.3.2.2)], the estimated numbers of days until a particular percent decrease (5%, 10%. or 20%) in natural log concentration from the best-fit intercept was estimated as 0 to 24 days. Therefore, the SQ-1 sediment data were removed from Table 3-31 because this calculation was dependent on Day 0 concentrations, which may have been biased as a result of surrogate correction and analysis of extracts after 30 days but before 40 days. However, it can not be ignored that 14 out of 20 pooled SQ-1 pesticide data exhibited corrected CVs<25%, which implies no significant change occurred for these analytes over the 168 day study.

The remaining pesticides sampled from the Housatonic River, Tri-Cities, and Bedford-1 sediments/soils had an estimated minimum holding time of 108 days or 217 days until a decrease in the concentration of 10% or 20%, respectively, would be expected (Table 3-31). The estimated time required for concentration decreases of 10% and 20% were 7.7 and 15.5 times longer than the current SW-846 prescribed MHT for pesticides (14 days). Four of the pesticide holding time sequences (all associated with the Tri-Cities soil; Table 3-31) exhibited positive estimated slopes associated with the lower confidence limits (β_{LCL}) and; thus, the number of days until a given percentage decrease in concentration could not be calculated. However, all four of the pesticide holding time sequences with positive slopes exhibited non-significant t-tests, two [α-chlordane (4°C) and trans nonachlor (4°C)] had overall CVs<25%, and the other two [γ-chlordane (-20°C) and trans nonachlor (-20°C)] had overall CVs of 26.4 and 25.7, suggesting that the concentrations associated with these four pesticide holding time sequences did not change significantly over the 168 day life of the study.

Plots of the observed concentration through time were compared to the nonparametric upper and lower boundaries of the Day 0 concentration (Fig. 3-44 to 3-56). The pesticide 4,4'-DDD from the Housatonic River sediment and all pesticides from Tri-Cities soil fell within the Day 0 nonparametric bounds. All other pesticides had observations that were either greater or less than these boundaries. Regression lines were included in the plots only when the slope was significantly less than zero and negative.

Some of the Housatonic River sediment 4,4'–DDD concentrations were below 2*MDL and its overall CV was >25% (regardless of holding temperature). An inspection of the plot (Fig. 3-44) shows that the pesticide's concentration, while low, is apparently stable of the life of the study. The other pesticides extracted from the Housatonic River sediment (4,4'-DDE, 2,4-DDT, and 4,4-DDT) exhibited greater variability, and at least several extreme outliers (Fig. 3-45, 3-46, and 3-47). The 4,4'-DDE and 2,4-DDT analyses yielded a significant and negative slope for sediments held at -20°C for both pesticides and at 4°C for 4,4'-DDE. However, as can be seen from the plots of both pesticides (Fig. 3-45 and 3-46), if the extreme outliers were removed from the analysis, allowed the regression slope became significant and negative. Despite the outlier data removal, the estimated time estimated for an observed 5% decrease in concentration of 4,4'-DDE and 2,4-DDT was calculated to be a minimum of 60 days (Table 3-31); more than 4 times the currently prescribed SW-846 MHT metric of 14 days. The impact of outlier removal to meet the 10% criteria for inclusion/exclusion of the data (see Section 2.3) can be seen in Fig. 3-47 where only a single data point was removed from the final timed data set. The similarity in

Table 3-31. The estimated number of days until a given percentage decrease from the intercept for pesticides (MHT=14 days) by sediment/soil and holding condition[a].

Analyte	Holding Condition	5% Decrease	10% Decrease	20% Decrease
Housatonic River				
4,4-DDE	4°C	60	121	242
4,4-DDE	-20°C	83	167	334
4,4-DDD	4°C			
4,4-DDD	-20°C			
2,4-DDT	4°C	140	280	560
2,4-DDT	-20°C	74	149	299
4,4-DDT	4°C	258	516	1032
4,4-DDT	-20°C	270	541	1083
Tri-Cities				
γ-Chlordane	4°C	533	1066	2133
γ-Chlordane	-20°C	NA	NA	NA
α-Chlordane	4°C	NA	NA	NA
α-Chlordane	-20°C	1177	2354	4708
Trans Nonachlor	4°C	NA	NA	NA
Trans Nonachlor	-20°C	NA	NA	NA
Bedford-1 (Surrogate Corrected)				
2,4-DDD	4°C	167	334	669
2,4-DDD	-20°C	273	546	1092
4,4-DDD	4°C	146	292	584
4,4-DDD	-20°C	176	352	705
4,4-DDT	4°C	54	108	217
4,4-DDT	-20°C	176	353	706

[a] Cells highlighted with light yellow have CVs greater than 25% and a negative estimated slope and cells highlighted in orange had concentrations < 2*MDL.NA = not applicable because the slope and lower 95% confidence limit were positive.

behavior between 2,4-DDT (Fig. 3-46) and 4,4-DDT (Fig. 3-47) during the initial 84 days and the final timed extraction at 168 days was nearly the same yet the outlier removal changed the result from a significant regression line slope to a non-significant regression line slope. The 4,4-DDT did not have a slope significantly different than zero. In the case of 4,4-DDT, the same 5% decrease in concentration was estimated to require a minimum of 258 days.

Pesticides extracted from the SQ-1 sediment are presented in Figures 3-48 to 3-52 which represent only five of the ten pesticides extracted from the SQ-1 sediment. The remaining plots are presented in Appendix B. As previously discussed, the SQ-1 sediment pesticide data required surrogate correction, which caused the T = 0 replicates to be very tightly centered on the mean (note the narrow upper and lower bounds in Figs. 3-48 to 3-52). Despite the need for surrogate correction and the low concentrations of all the SQ-1 extracted pesticides, the data are relatively tight over the life of the study. Unlike the Housatonic River sediment data for 4,4'-DDE and 2,4-DDT, outlier removal does not appear to have greatly effected the regression line slope of the plotted data.

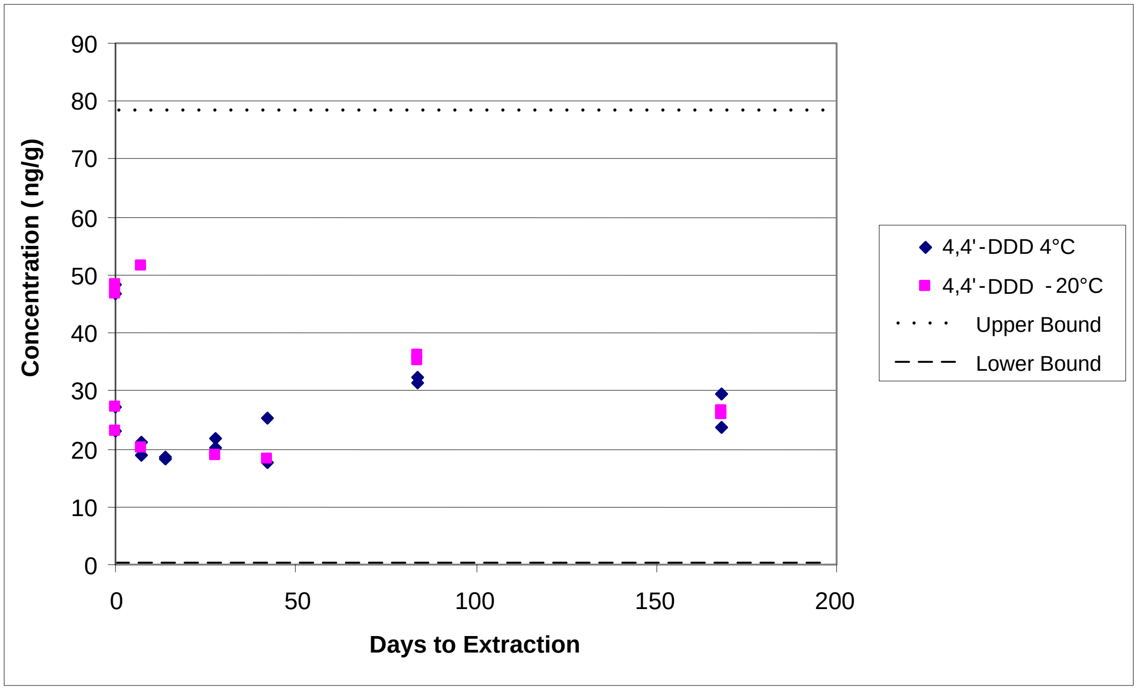

Figure 3-44. Observed 4,4'-DDD concentration for Housatonic River sediment at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

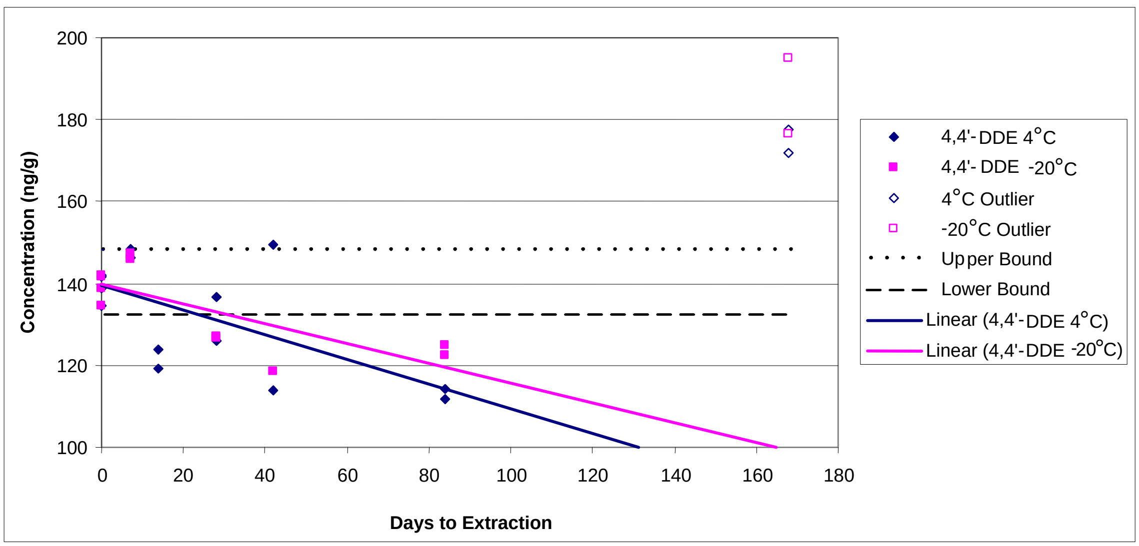

Figure 3-45. Observed 4,4'-DDE concentration for Housatonic River sediment at both the 4°C and -20°C holding temperature by holding time, significant regression lines, and associated Day 0 nonparametric bounds.

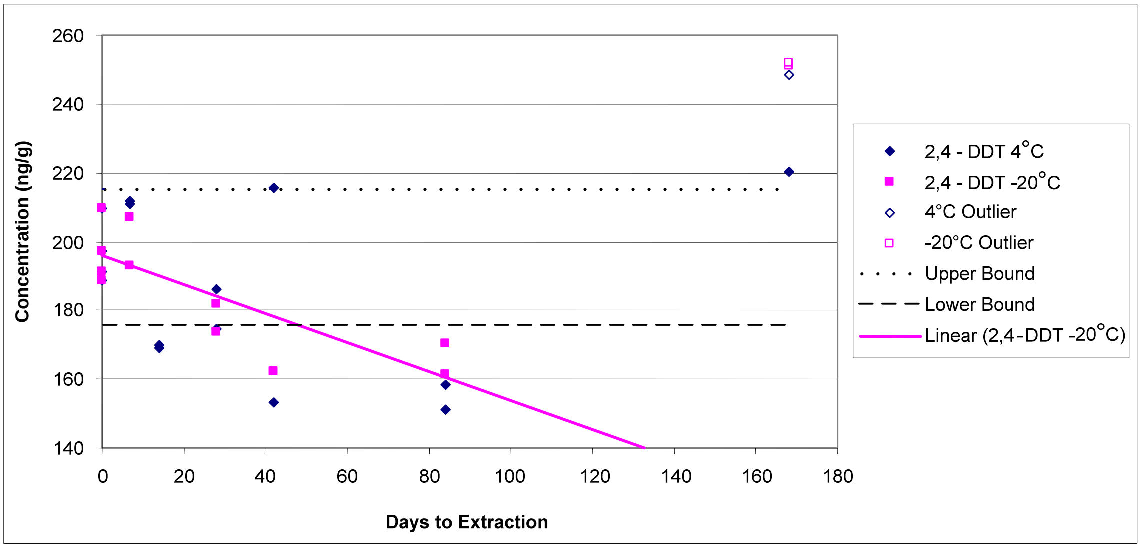

Figure 3-46. Observed 2,4'-DDT concentration for Housatonic River sediment at both the 4°C and -20°C holding temperature by holding time, significant regression line, and associated Day 0 nonparametric bounds.

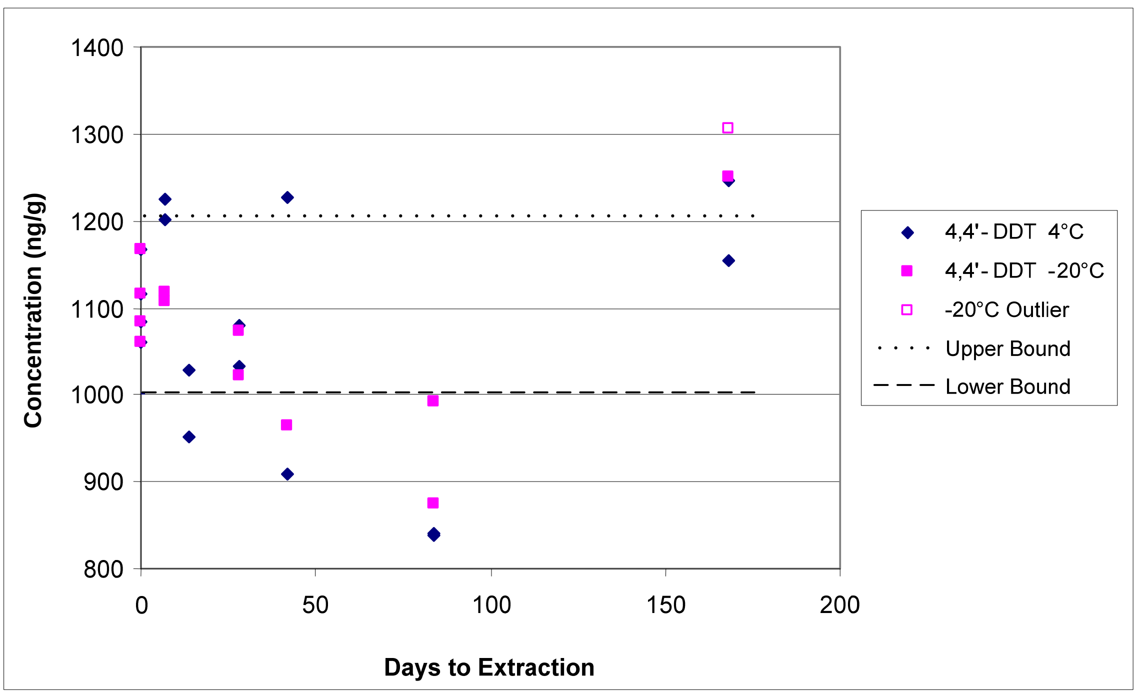

Figure 3-47. Observed 4,4'-DDT concentration for Housatonic River sediment at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

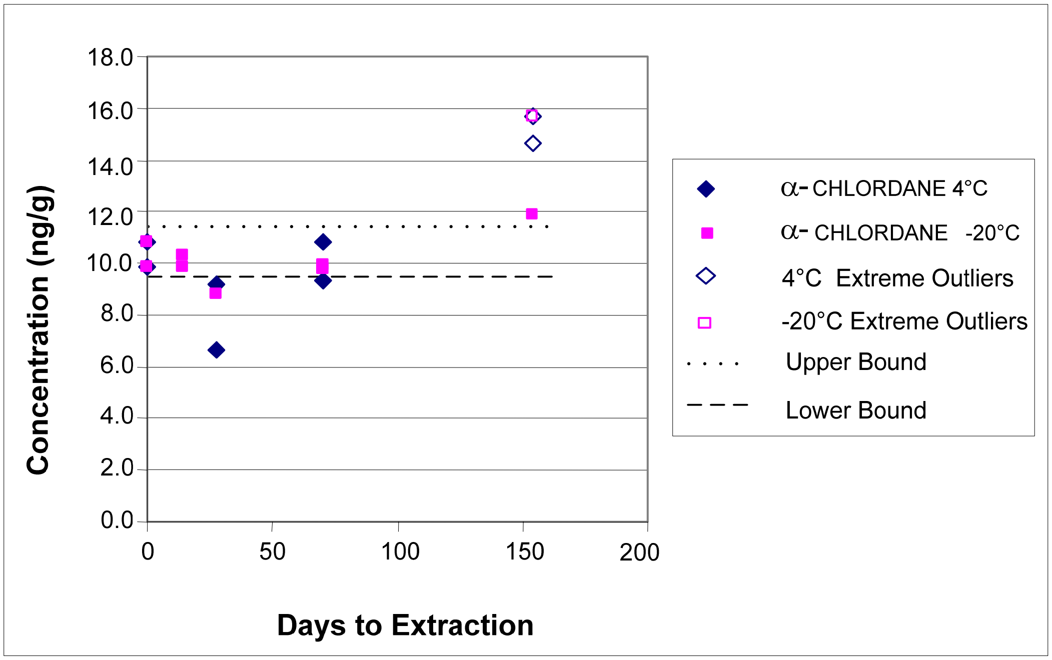

Figure 3-48. Observed α-chlordane concentration for SQ-1 sediment (surrogate corrected) at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant negative trend.

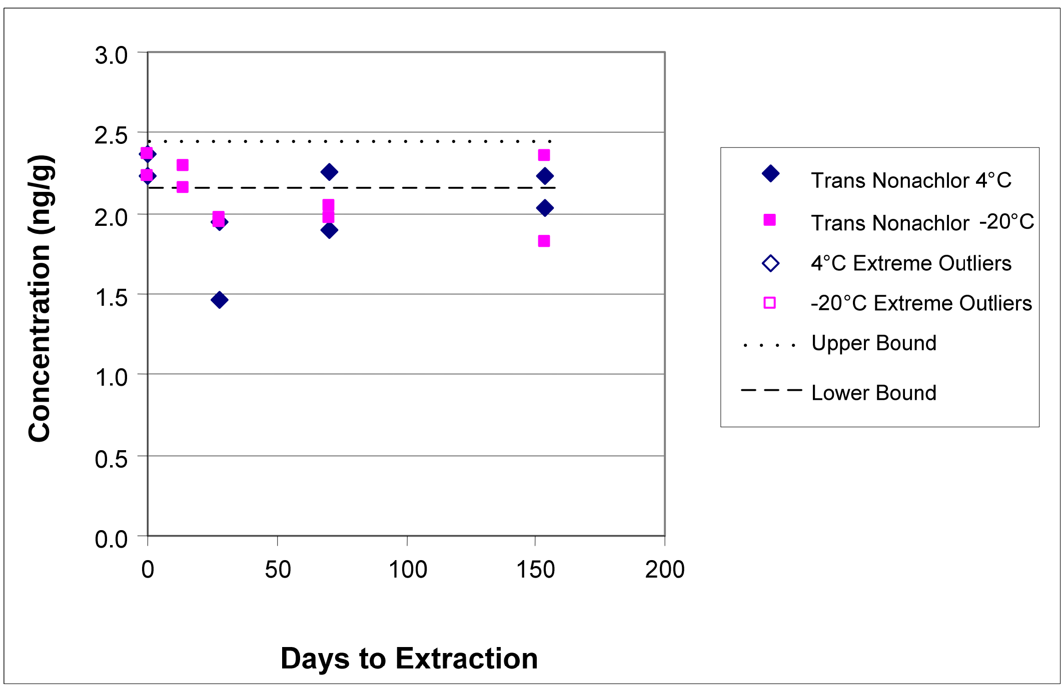

Figure 3-49. Observed trans nonachlor concentration for SQ-1 sediment (surrogate corrected) at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

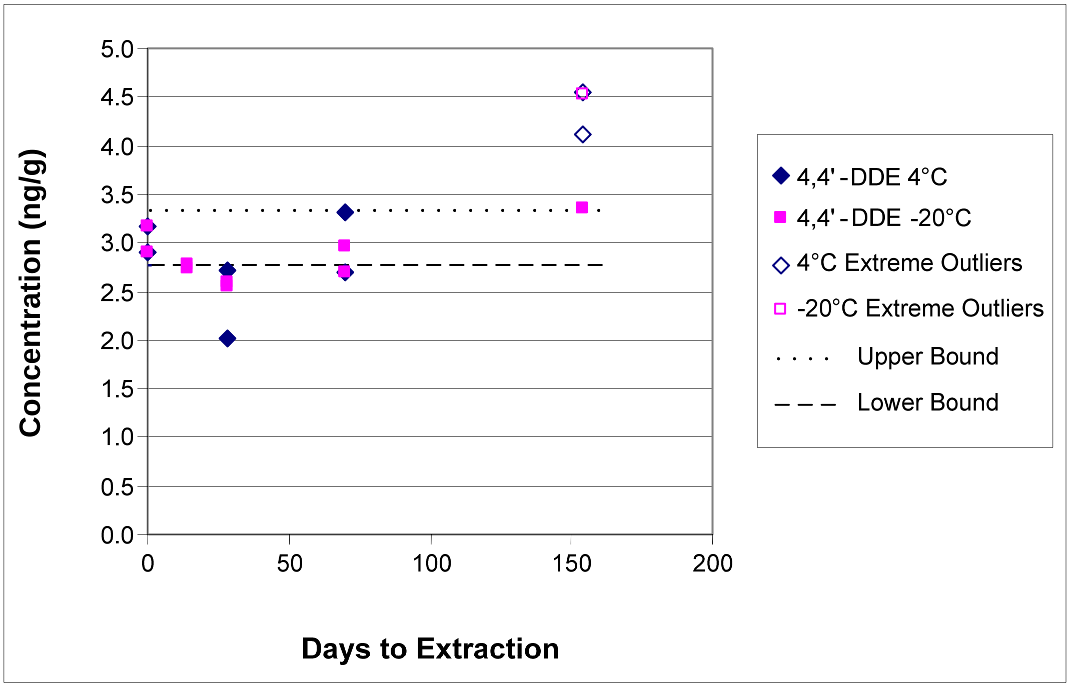

Figure 3-50. Observed 4,4'-DDE concentration for SQ-1 sediment (surrogate corrected) at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant negative trend.

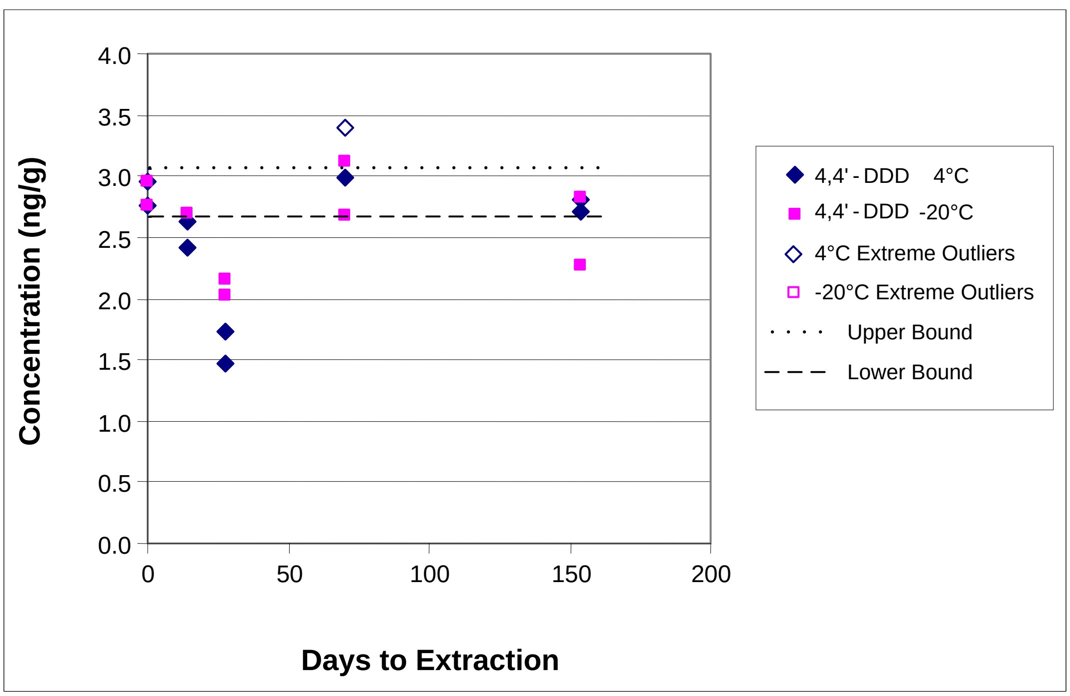

Figure 3-51. Observed 4,4'-DDD concentration for SQ-1 sediment (surrogate corrected) at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

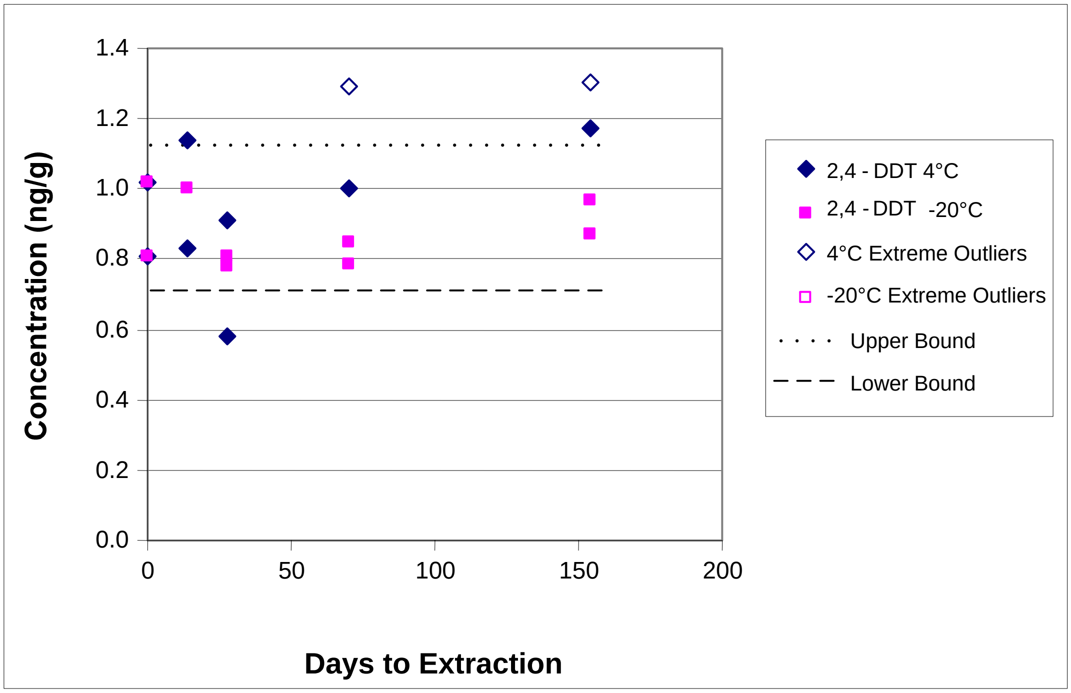

Figure 3-52. Observed 2,4'-DDT concentration for SQ-1 sediment (surrogate corrected) at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

All the Tri-Cities soil extracted pesticides (α-, and γ-chlordane, and trans nonachlor) holding time sequences had non-significant t-tests; only γ-chlordane (at -20°C) and trans nonachlor (at -20°C) had overall CVs>25% (both pesticides CV=26%); and the regression slope was either non-significant or positive (Table 3-30). From these statistical results it is clear why the Tri-Cities soil extracted pesticide data fell within the Day 0 nonparametric bounds (Fig. 3-53 to 3-55) indicating no significant trends in pesticide concentrations through time.

Of the three Bedford-1 soil extracted pesticides, only 4,4-DDD, and 4,4-DDT are plotted below (Fig. 3-56 and 3-57) while the plot for 2,4-DDD is presented in Appendix B. The 4,4-DDD extract data did have a significant and negative slope at both holding temperatures, its CVs<25% and the t-test was not significant (Table 3-30). Inspection of the plotted data (Fig. 3-56) shows the slope to be minimal, which is reflected in the minimum estimated time (146 days) required to observe a 5% decrease in concentration (Table 3-31). The data plotted for the Bedford-1 soil extracted 4,4-DDT were surrogate corrected and exhibited the numerous outliers that were not removed for analyses because of the 18% outlier percentage. Even with the outliers accounted for, there was essentially no change in 4,4-DDT concentration over the life of the study.

3.2.3.3 Pesticide Holding Time Study – Conclusions: The objective of the pesticide extraction study was to determine if significant loses of chlorinated pesticides occurred when sediment/soil samples were stored at either 4°C or -20°C for a period of 6 months. Samples from four field sites were examined. Of the 12 compounds that were quantified, there was no

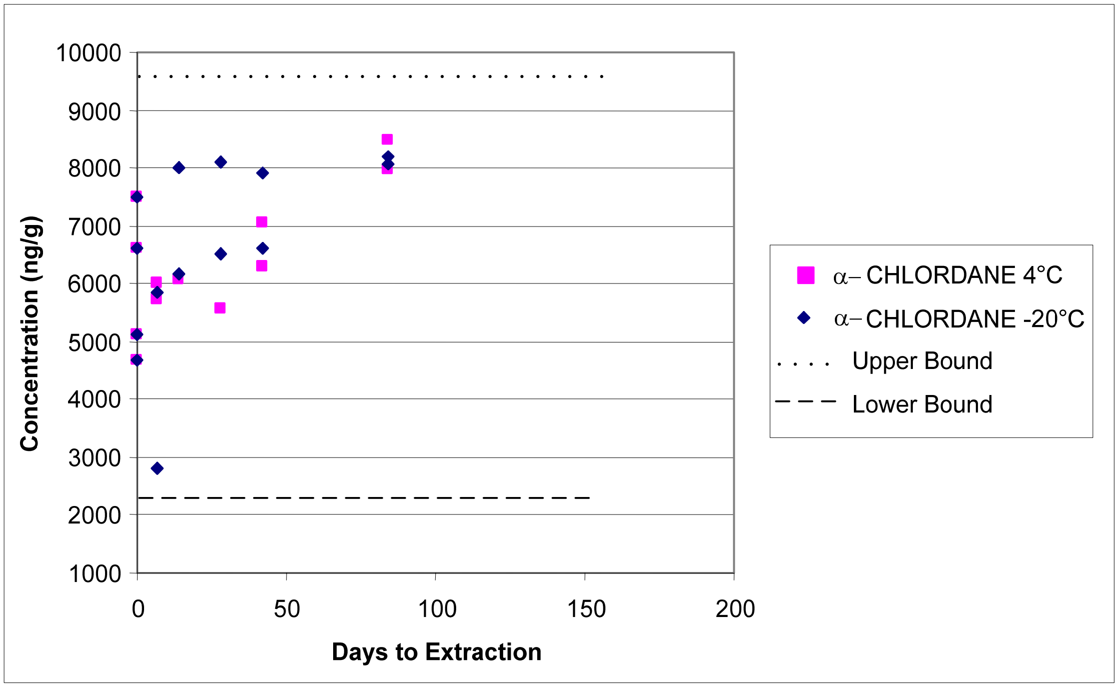

Figure 3-53. Observed α-chlordane concentration for Tri-Cities soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant negative trend.

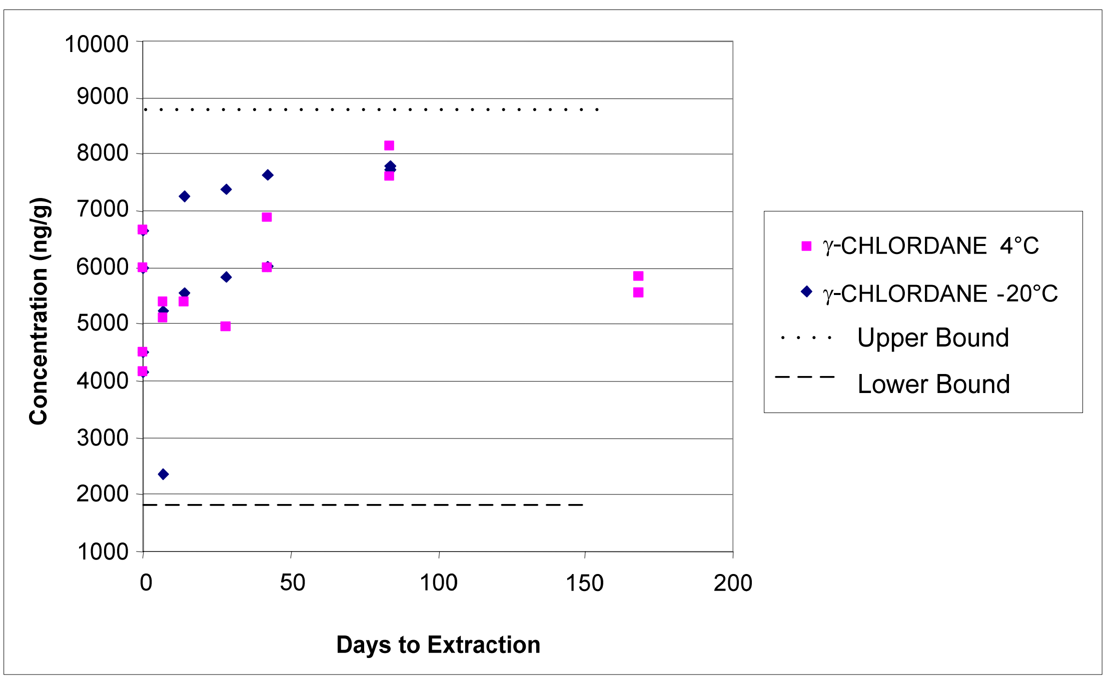

Figure 3-54. Observed γ-chlordane concentration for Tri-Cities soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant negative trend.

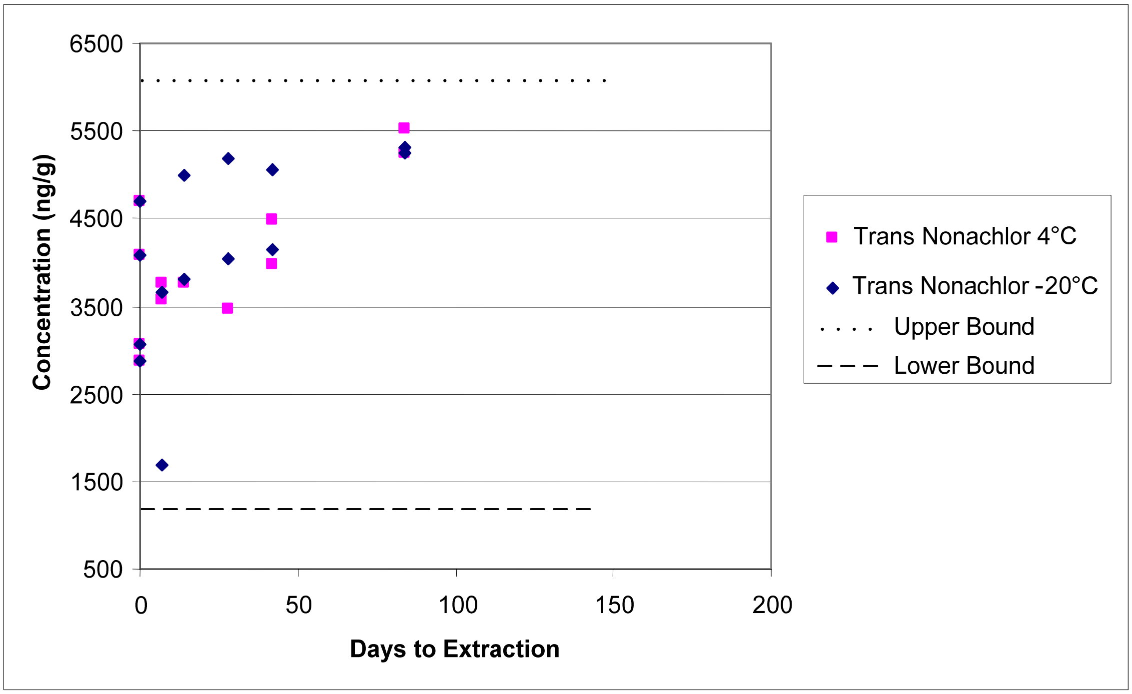

Figure 3-55. Observed trans nonachlor concentration for Tri-Cities soil at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant negative trend.

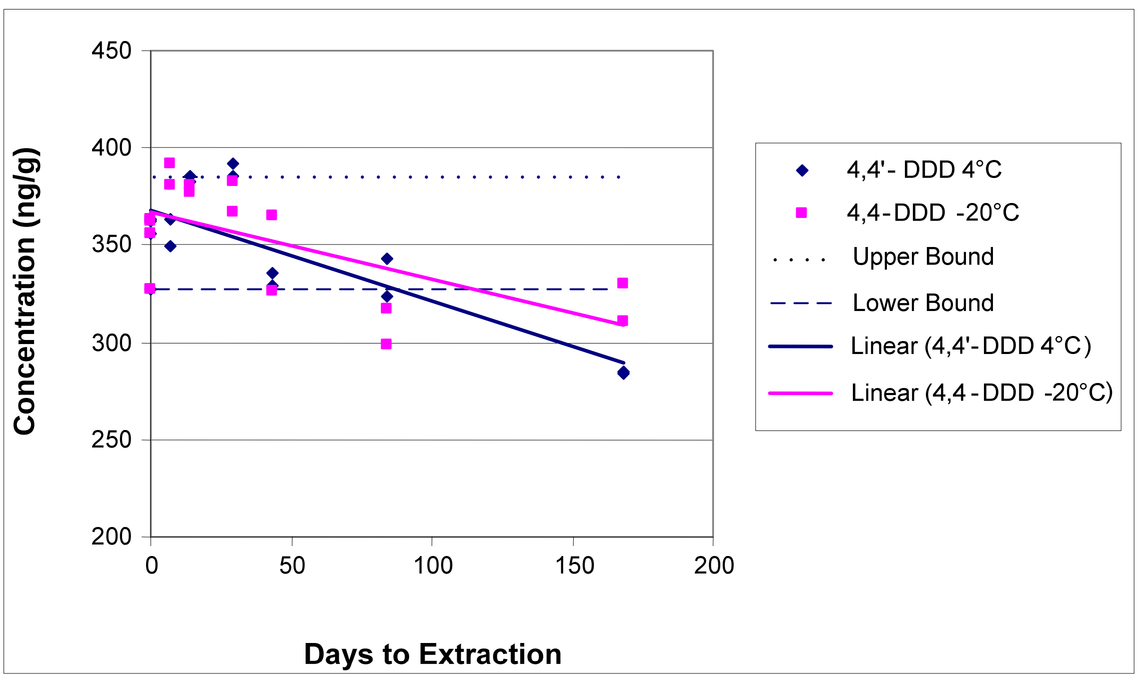

Figure 3-56. Observed 4,4'-DDD concentration for Bedford-1 soil (surrogate corrected) at both the 4°C and -20°C holding temperature by holding time, significant regression lines, and associated Day 0 nonparametric bounds.

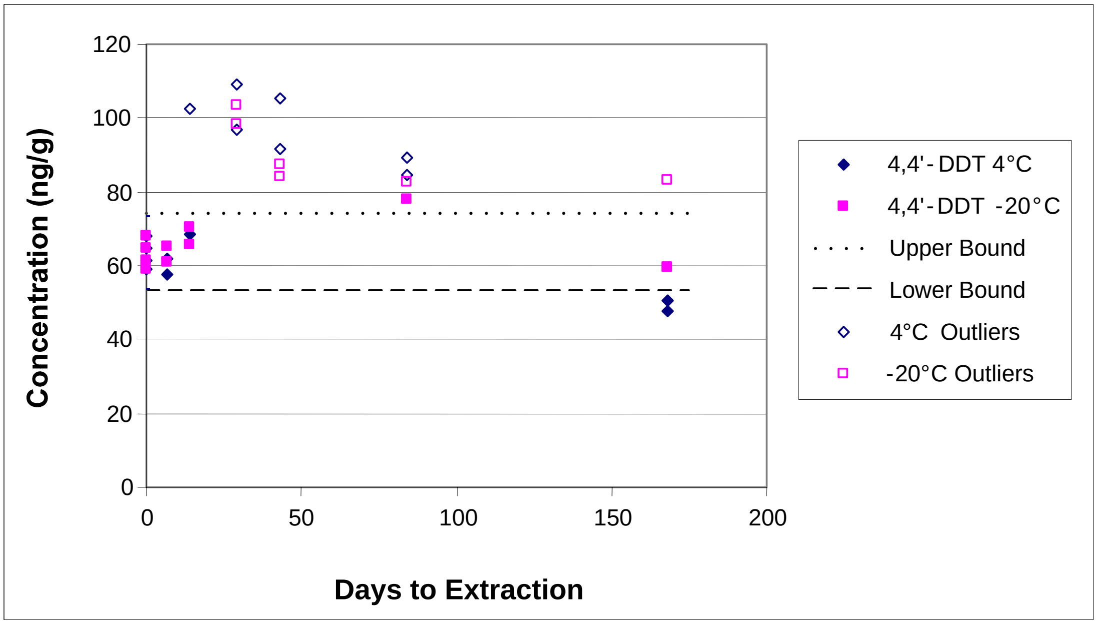

Figure 3-57. Observed 4,4'-DDT concentration for Bedford-1 soil (surrogate corrected) at both the 4°C and -20°C holding temperature by holding time and associated Day 0 nonparametric bounds; there was no significant trend.

difference in the mean concentration between samples stored at the two temperatures (Table 3-27). The estimate for the number of days for pesticides to decrease by 20% is 217 days for 4,4-DDT stored at 4°C and greater than 217 days for other compounds in three sediment/soils (Table 3-31). The data for SQ-1 samples could not be evaluated for stability because the initial concentrations were significantly lower than the concentrations in the stored samples.

3.3 Acid Extraction of Metals

The six month holding time between sample collection and extraction/analysis is a substantial time period. The larger issue of drying a solid matrix (i.e., a soil or sediment) is often questioned. The extraction method allows the sample to be dried, but drying is not required. However, sample homogeneity is typically more easily achieved with dried and sieved materials.

This study utilized a soil and sediment to determine if extractable concentrations of As, Cu, Pb, and Zn changed with time, and the impact of air drying the sample. The soil and sediment utilized in this study exhibited very different pHs and particle size distributions (Table 3-32).

3.3.1 Statistical Analysis of Metals Extraction

Metals (As, Cu, Pb, and Zn) were characterized through time for Sinclair river sediment and Wilmington soil and for holding conditions (moist and air-dried) (Appendix A Descriptive Statistics Tables A-15, A-16). The Sinclair sediment had the highest concentrations of Cu and Zn averaging at least 487 µg/g and 448 µg/g, respectively (Table 3-33). The Wilmington soil had the highest concentrations of As and Pb averaging at least 62 µg/g and 5653 µg/g, respectively (Table 3-33). Within replicate (Day 0) CVs ranged from 6.4% (As) to 15.9% (Pb) for the Sinclair River sediment.

Table 3-32. Sediment/soil properties of materials used in metal acid-extraction study.

Sediment/Soil	Metal Analyses	pH	Eh	OC[a]	Sand	Silt	Clay
			mv	-------------------	%	----------------------	
Wilmington Soil	As, Cu, Pb, Zn	1.6	742	1.84	8.5	78.1	13.4
Sinclair River Sediment	As, Cu, Pb, Zn	7.7	462	2.79	35.4	16.4	48.2

Table 3-33. Heavy metals (μg/g) one-sample t-test of the null hypothesis Ho: the sample is from a population with the mean equal to or greater than the Day 0 mean.

Metal	Condition	Day 0 Mean and CV (N = 5)	Overall Mean	Overall Standard Deviation	Overall CV	95% Confidence Limits Lower	95% Confidence Limits Upper	P-value		N
Sinclair										
As	Wet	22.5 (6%)	22.5	2.18	10%	21.1	23.8	0.469	NS	13
As	Dry	22.5 (6%)	20.7	2.51	12%	19.2	22.2	0.013	*	13
Cu	Wet	504 (10%)	510	61.8	12%	473	548	0.642	NS	13
Cu	Dry	504 (10%)	487	41.8	9%	462	512	0.083	NS	13
Pb	Wet	164 (16%)	165	26.1	16%	148	182	0.548	NS	12
Pb	Dry	164 (16%)	180	43.7	24%	152	207	0.880	NS	12
Zn	Wet	470 (6%)	469	26.1	6%	453	484	0.427	NS	13
Zn	Dry	470 (6%)	448	32.6	7%	429	468	0.017	*	13
Wilmington										
As	Wet	63.4 (5%)	63.5	3.83	6%	61.2	65.8	0.521	NS	13
As	Dry	63.4 (5%)	62.0	4.64	8%	59.2	64.8	0.148	NS	13
Cu	Wet	122 (6%)	125	8.8	7%	120	130	0.890	NS	13
Cu	Dry	122 (6%)	127	9.79	8%	121	133	0.955	NS	13
Pb	Wet	5676 (8%)	5653	813	14%	5162	6144	0.461	NS	13
Pb	Dry	5676 (8%)	5771	677	12%	5362	6180	0.690	NS	13
Zn	Wet	61.5 (8%)	62.7	7.89	13%	57.7	67.7	0.707	NS	12
Zn	Dry	61.5 (8%)	63.7	5.62	9%	60.1	67.2	0.900	NS	12

NS = Not significant at $\alpha = 0.05$; * = Significant with $0.01 < p \leq 0.05$.

The CVs ranged from 4.8% (As) to 8.3% (Pb) for the Wilmington soils. Two observations from Day 0 were removed from the analysis, one observation for Pb from the Sinclair sediment and one observation for Zn from the Wilmington soil because of possible sample contamination. Data for each holding time sequence were pooled (Table 3-33). Only one pooled data set exhibited a CV>20% (i.e., Sinclair River sediment for Pb held in the dry condition). The remaining data sets exhibited fairly tight CVs across time ranging from 5.6 to 15.8. The pooled CV data suggests that no chemically significant change in concentration occurred during the 12 month time sequence; further, the pooled data exhibited no clear cut difference between moist or dry sample handling techniques. The holding time sequence pooled CV data (with the exception of the Sinclair River sediment Pb, air-dried series) are well within the SW-846 prescribed replicate precision metric of CV≤20% for the hot acid metal extraction from soils/sediments.

A one-sample t-test of the null hypothesis Ho: the sample is from a population with the mean equal to or greater than the Day 0 mean, was rejected for the dry Sinclair sediment for As and Zn

(Table 3-33). The remaining 14 data sets failed to reject the null hypothesis. For those holding time sequences that exhibited CV<20% and a non-significant t-test, the extractable concentrations did not changed significantly over the 12 month period of this study. Importantly, Pb extracted from the air-dried Sinclair sediment exhibited a non-significant t-test, but a pooled CV>20%. In contrast, Zn and As extracted from the air-dried Sinclair River sediment exhibited a pooled CV<20%, but a significant t-test. These apparent contradictory statistics can be reconciled by inspection of the data plots (Figs. 3-58 to 3-60).

The Sinclair River sediment As plot (Fig. 3-58) showed As concentrations to be low and the Day 0 mean to be very tightly focused around 22.5 μg/g sediment. In contrast, the concentration for the dry sediment at 217 days was the lowest value measured and was outside the Day 0 nonparametric bounds. In addition, the 392 day dry sediment As concentration was also low. These two holding time data sets were responsible for the As significant t-test. Likewise, the extracted Zn concentration plot for the air-dried Sinclair River sediment (Fig. 3-58) exhibited a similar pattern at 392 days; the mean of these data were well outside the Day 0 mean (470 μg/g sediment) which was sufficient to reject the t-test null hypothesis. The Pb extraction from the air-dried Sinclair River sediment (Fig. 3-60), on the other hand, exhibited only one data set whose mean (253 μg/g sediment) that was well outside of the Day 0 mean (164 μg/g sediment) and resulted in an overall CV>20%, but a non-significant t-test. It seems clear that despite the conflicting statistics the extractable concentrations of As, Pb, and Zn from the air-dried Sinclair sediment did not change significantly over the 392 day period of this study.

The lack-of-fit to the linear model was significant only for As from the wet Sinclair River sediment (Table 3-34). The residuals; however, did not show a consistent U-shaped pattern through time suggesting that a parameter for curvature was not needed in the model. Therefore, the simple linear model was used for all sediments and holding temperatures. Except for Zn in both dry sediments, the slope associated with the number of days held was not significantly different from zero for any of the remaining metals and sediments ($p > 0.07$; Table 3-34). For all metals and sediments; however, the absolute value of the estimated slope was very small (<0.001) suggesting that a significant decrease was not occurring within the 392 day time frame of the study.

The estimated numbers of days until a 5% decrease in metal concentration from the estimated intercept would be observed were all greater than 177 days; a 20% decrease in concentration was estimated to require 709 days for As (Table 3-35) which had the least amount of time required for a 20% change to be detected. Zn from the Wilmington dry sediment had a positive estimated lower confidence limit on the slope (β_{LCL}) and; thus, the number of days until a given percentage decrease in concentration could not be calculated. Except for Pb in both matrices and Cu in Wilmington soil, it appeared that the holding times for matrices held in moist state were longer than the holding time for sediment held in an air-dried state. However, these estimates were made from data whose slopes were not significantly different from zero and no difference was observed between wet and air-dried samples. Hence, the estimated time required for a given increase was directly related to the data's variability. The conservative estimate; however, is the smaller number of days.

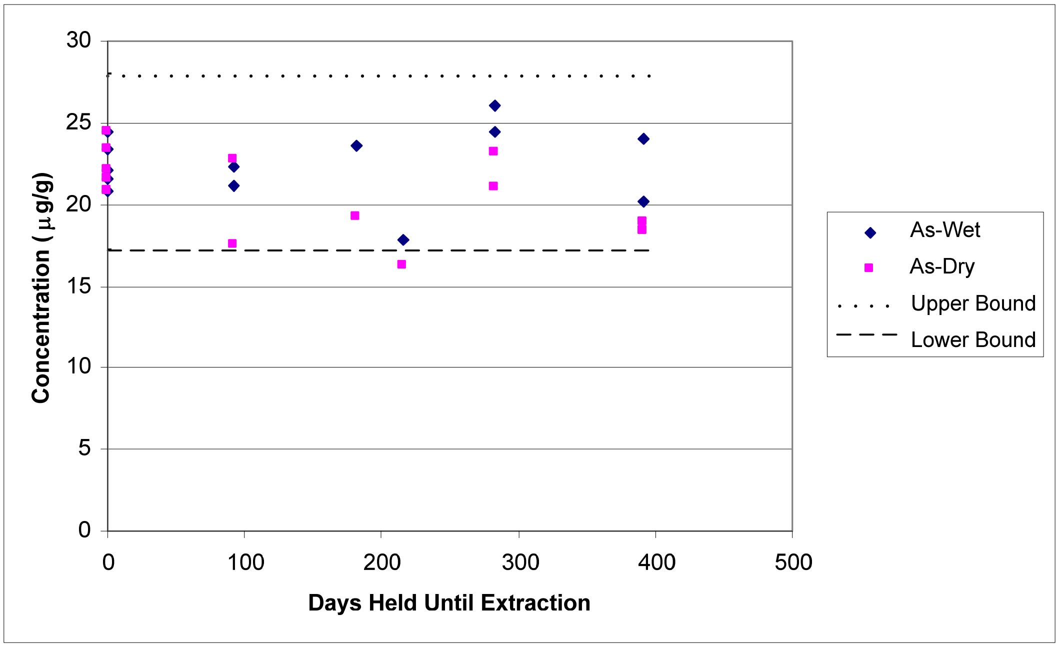

Figure 3-58. Observed As concentration for Sinclair River sediment for both the wet and dry holding condition over holding time and associated Day 0 nonparametric bounds.

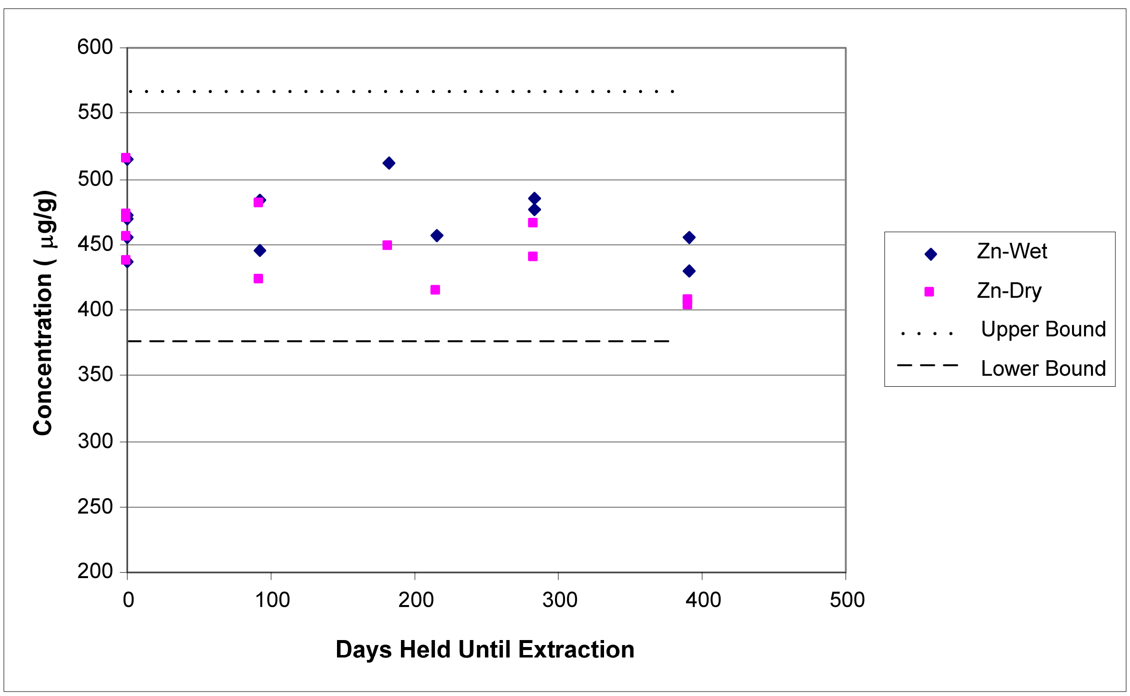

Figure 3-59. Observed Zn concentration for Sinclair River sediment for both the wet and dry holding condition over holding time and associated Day 0 nonparametric bounds.

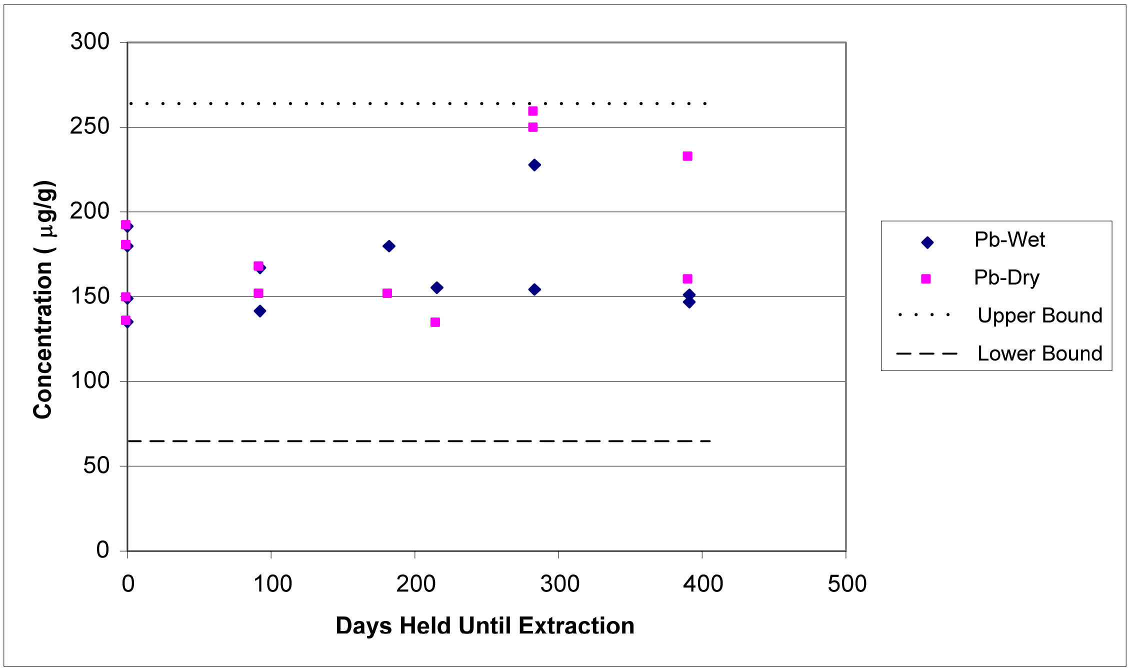

Figure 3-60. Observed Pb concentration for Sinclair River sediment for both the wet and dry holding condition over holding time and associated Day 0 nonparametric bounds.

Table 3-34. P-values for the significance of the lack-of-fit and the slope from the linear regression and the best fit simple linear model parameters on the natural log scale for heavy metals for each sediment and holding condition.

Metal	P-value for Lack of Fit		Intercept	Slope	Standard Error	P-value for Slope		Df
Sinclair Wet								
As	0.048	*	3.100	0.000048	0.00020	0.815	NS	11
Cu	0.696	NS	6.254	-0.000172	0.00023	0.475	NS	11
Pb	0.651	NS	5.093	0.000014	0.00031	0.965	NS	10
Zn	0.350	NS	6.159	-0.000074	0.00011	0.507	NS	11
Sinclair Dry								
As	0.114	NS	3.082	-0.000391	0.00022	0.099	NS	11
Cu	0.798	NS	6.230	-0.000303	0.00015	0.066	NS	11
Pb	0.114	NS	5.052	0.000707	0.00042	0.127	NS	10
Zn	0.594	NS	6.150	-0.000315	0.00011	0.014	*	11
Wilmington Wet								
As	0.576	NS	4.156	-0.00005	0.00012	0.709	NS	11
Cu	0.128	NS	4.823	0.00002	0.00014	0.909	NS	11
Pb	0.191	NS	8.694	-0.00044	0.00025	0.107	NS	11
Zn	0.161	NS	4.177	-0.00029	0.00024	0.260	NS	10
Wilmington Dry								
As	0.148	NS	4.156	-0.00021	0.00013	0.142	NS	11
Cu	0.418	NS	4.812	0.00019	0.00014	0.194	NS	11
Pb	0.054	NS	8.700	-0.00031	0.00021	0.166	NS	11
Zn	0.251	NS	4.093	0.00036	0.00016	0.043	*	10

NS = Not significant at $\alpha = 0.05$; * = Significant with $0.01 < p \leq 0.05$.

Table 3-35. The estimated number of days until a given percentage decrease from the intercept for each sediment and holding condition for heavy metals (MHT=182 days) by sediment and holding condition.

Metal	5% Decrease	10% Decrease	20% Decrease
Sinclair Wet			
As	399	799	1598
Cu	458	916	1833
Pb	377	754	1508
Zn	990	1980	3961
Sinclair Dry			
As	177	354	709
Cu	494	989	1978
Pb	1053	2107	4215
Zn	556	1113	2227
Wilmington Wet			
As	695	1390	2781
Cu	840	1680	3360
Pb	444	888	1776
Zn	253	507	1014
Wilmington Dry			
As	414	828	1656
Cu	2190	4381	8763
Pb	563	1127	2254
Zn	NA[a]	NA	NA

[a] NA = not applicable because the slope and lower 95% confidence limit were positive.

Figures 3-61 to 3-65 show the observed concentration through time and the nonparametric upper and lower boundaries of the Day 0 concentration for the Wilmington soil As, Cu, Pb, and Zn, and the Sinclair sediment Cu. All observations fell within the Day 0 nonparametric boundaries. Thus, the concentration of metals in the two sediments held either wet or dry did not decline significantly over the 12 month life of the study.

3.3.2 Metal Extraction Holding Time Study – Conclusions

The objective of the metal hot acid extraction study was to determine if the concentrations of As, Cu, Pb, and Zn exhibited significant decreases when stored at either 4°C in either an air-dried or field moist state for a period of 12 months. None of the metals exhibited a statistically significant decrease in extractable concentration over the 392 day test period. In addition, none of the metal concentration data, as a function of time, exhibited a slope statistically different from zero. Hence, none of the metal concentrations, regardless of matrix or storage condition decreased during the life of the study. Estimates of stability suggest that a 20% decrease in concentration would occur most rapidly for As but would require 709 days or about 3.9 times longer than the current MHT.

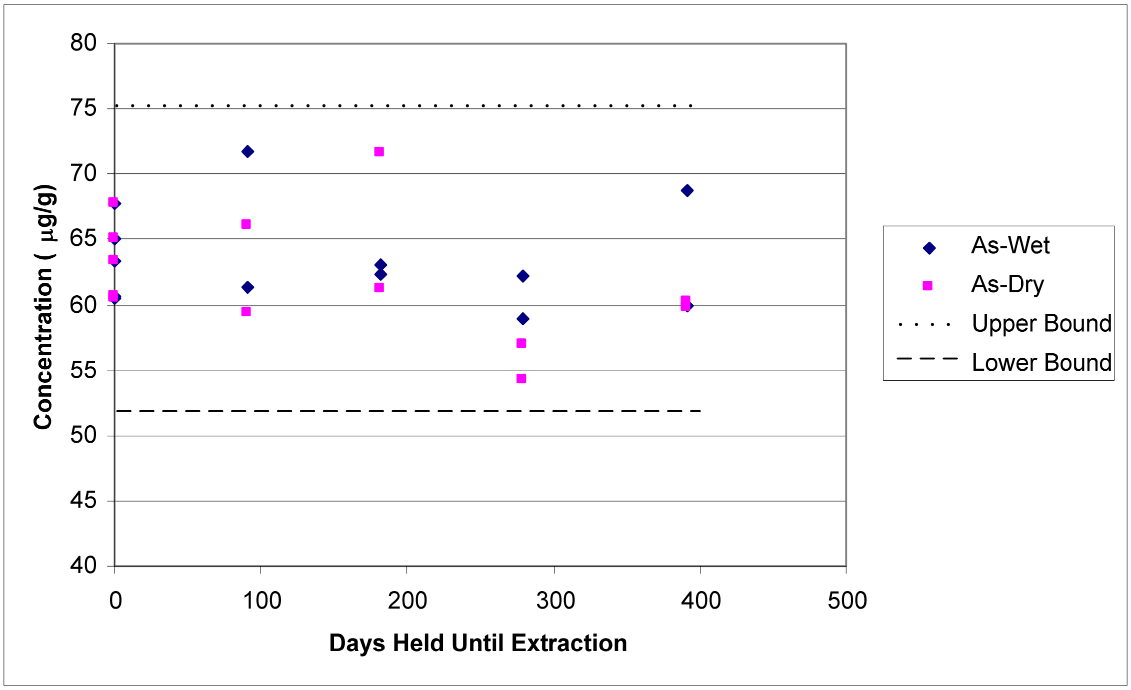

Figure 3-61. Observed As concentration for Wilmington soil for both the wet and dry holding condition over holding time and associated Day 0 nonparametric bounds.

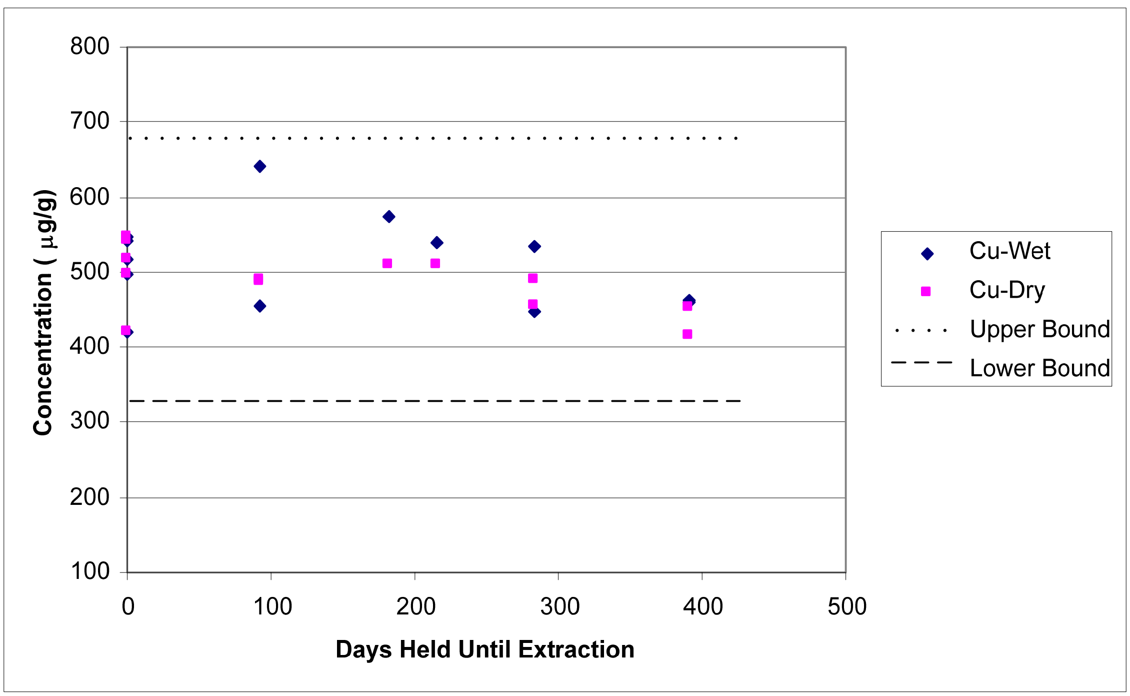

Figure 3-62. Observed Cu concentration for Sinclair River sediment for both the wet and dry holding condition over holding time and associated Day 0 nonparametric bounds.

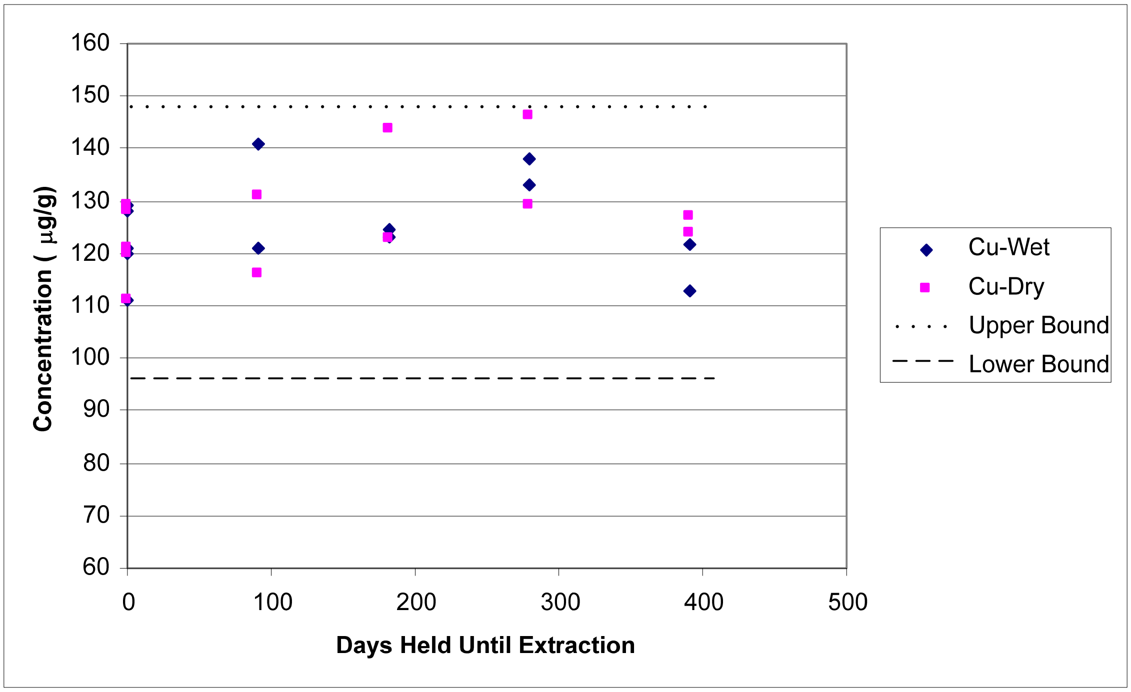

Figure 3-63. Observed Cu concentration for Wilmington soil for both the wet and dry holding condition over holding time and associated Day 0 nonparametric bounds.

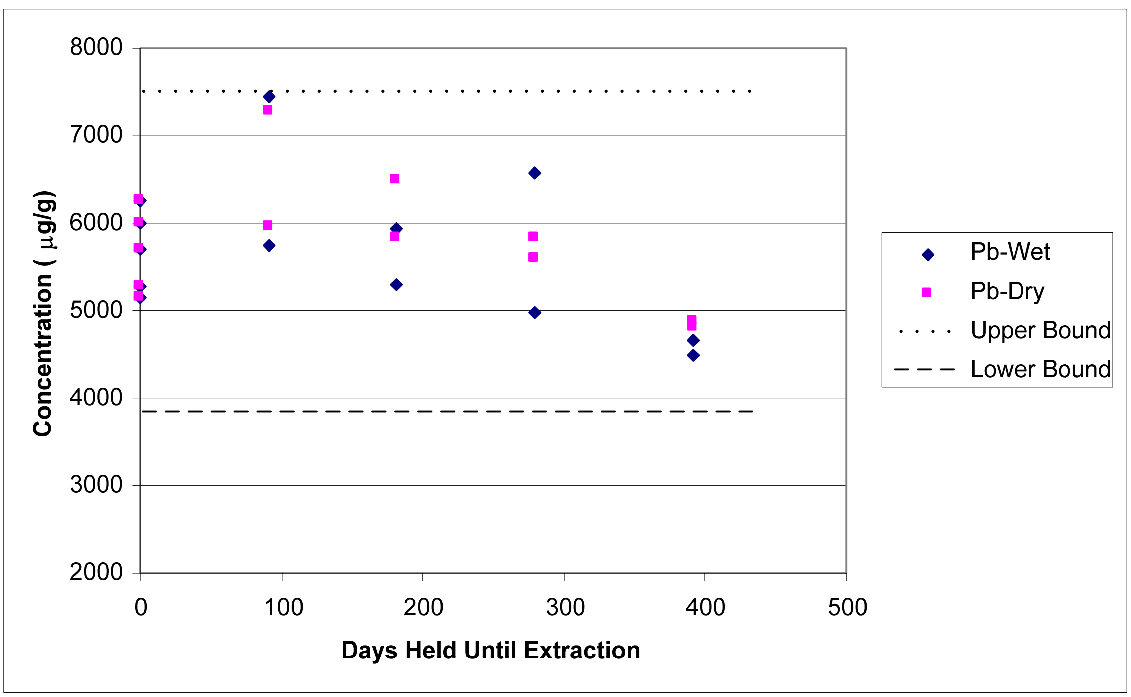

Figure 3-64. Observed Pb concentration for Wilmington soil for both the wet and dry holding condition over holding time and associated Day 0 nonparametric bounds.

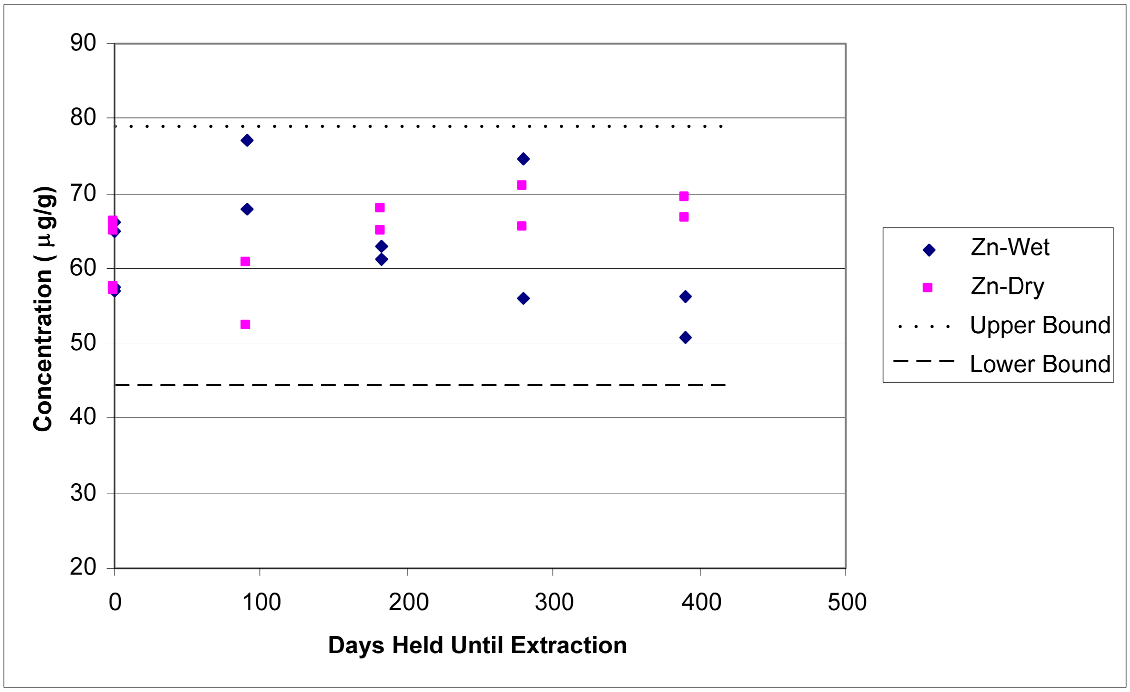

Figure 3-65. Observed Zn concentration for Wilmington soil for both the wet and dry holding condition over holding time and associated Day 0 nonparametric bounds.

Section 4

Conclusions

The extractable concentration of Cr(VI) was investigated in six soils/sediments. Of the six soils studied, five exhibited no or only limited influence of holding time prior to extraction for the 224 days of this study regardless of the holding condition (4°C or -20°). The estimated number of days until a 5% decrease in natural log concentration from the estimated intercept would be observed was greater than 140 days for all sediment/soils tested.

The sixth Cr(VI) contaminated soil exhibited poor recovery (<5%) of the matrix spikes from the outset of the study. Standard additions of Cr(VI) added to the extract solutions after filtration and pH adjustment were not detectable by SW-846 Method 7196A, Chromium, Hexavalent (colorimetric). Regardless of the Cr(VI) standard addition, a constant, low UV/Vis absorbance (~0.25 au) was measured at the prescribed 540 nm wavelength. However, the same low absorbance was observed whether the extract absorbance was measured directly without pH adjustment and addition of diphenylcarbazide with pH adjustment only, or as prescribed in SW-846 Method 7196A. These results were directly related to the high DOC content of the extracts, which was high enough that its absorbance was significantly above background (~0.02 au). Reduction by the dissolved Fe^{2+} and/or the quinine character of the DOC reduced the Cr(VI) added to the system to Cr(III). It is likely that Cr(VI) was not associated with this soil and the prescreen positive Cr(VI) results were the result of high levels of extracted DOC.

The stability of the Cr(VI) soils/sediment extracts over the 56 day holding period was far beyond the MHT of 24 hrs specified in SW-846. Even with the noted variability between replicates, the CV across time was low with the extracts stored at 4°C exhibiting a maximum CV of 3%. When extracts were stored at 20°C, the maximum CV was substantially greater (8%). These data demonstrate that for the soil/sediment extracts investigated, there was no or only very limited change in Cr(VI) concentration within the 56-day time frame. While we can not definitively demonstrate or delineate the cause of observed differences between the two storage regimes, it is well known that lower temperatures slow both microbial and chemical processes. While these studies strongly demonstrate that when extract stability is present at “Day 0” (that is, the matrix and laboratory control samples are within the specified range), it is likely that the stability of the extract will last considerably longer than the SW-846 specified MHT. However, because of the chemical nature of the extract and the analysis, it advisable that sample analysis be completed as soon as possible.

The results of the Cr(VI) study suggest that the recoveries of the control and matrix spikes are key to determining stability of Cr(VI) in the solid materials to be extracted and the extracts themselves. In all cases, when the recovery of the matrix spike and control samples was good (within acceptable parameters), the stability of Cr(VI) in the sediment/soil and extract solutions (stored under proper conditions) appear to be longer than the current SW-846 specified MHT.

For the 17 PAH compounds that were quantified in three different soils/sediments, a holding time of 100 days at either 4^{o}C or -20^{o}C would result in not more than a 20% decrease in PAH concentration. Importantly, there is considerable variability in the estimated holding times for different compounds and in different soils/sediments. The major consideration in sediment holding time appears, from these studies, to be the ring number (or molecular weight) of the PAH of interest.

The Eagle Harbor soil was collected from a creosote treatment site and contained the greatest number of PAHs. This was the only soil/sediment that appeared to have significant loss to PAHs for samples stored at 4^{o}C refrigerated compared to frozen at -20^{o}C. Compounds with relatively low molecular weights, acenaphthene, fluorene, dibenzothiophene, phenanthrene, and anthracene extracted from the soil held at 4°C were estimated to lose 5% of their concentration in as little as 23 days and 20% in as few as 92 days. The minimum calculated number of days for a 5% and 20% loss in concentration of these same five PAHs was 106 days and 424 days, respectively, when the soil was held at -20°C. Our work is supported by studies of the stability of PAHs in contaminated soil by Rost et al. (2002) who also observed significant losses of the lower molecular weight compounds stored refrigerated compared to no significant losses for soil stored frozen for a six week period. Their conclusion was that microbiological degradation was the cause for the loss because PAH concentrations in samples treated with sodium azide (a preservative biocide) did not change for the entire 3 month experiment.

The PAH results for the SQ-1 sediment and Bedford-1 soil exhibited none of the holding temperature versus molecular weight results seen in the Eagle Harbor soil. However, the minimum holding times for a 5% and 20% decrease in PAH concentrations for the SQ-1 sediment was 24 days and 99 days, respectively. The Bedford-1 soil minimum calculated holding times for 5% and 20% PAH concentration decreases was 48 days and 195 days, respectively. Given the SW-846 prescribed replicate precision metric of CV<25%, the shortest number of days estimated for a 20% decrease (92 days) is 6.6 times longer than the current SW-846 MHT (14 days). Also, the results of the Eagle Harbor soil and those of Rost et al., (2002) suggest that a holding temperature of -20°C seems appropriate regardless of the PAH under investigation.

For the three PCB Aroclor mixtures and the seven congener concentrations that were quantified in three different soils/sediments remained fairly stable throughout the study. The minimum estimated number of days required for Aroclors to decrease by 20% was 630 days (Aroclor 1254) and 260 days for PCB 153 stored at 4°C (Table 3-26). Both of these time estimates are well beyond the currently prescribed SW-846 MHT of 14 days.

An indication of the stability of the PCBs in the three soil/sediments was the very small difference in the mean concentration for all data across time at the two different storage temperatures. In almost every case, the mean concentrations for the -20°C samples were slightly greater, about 10% or less, than for the 4°C mean concentrations. This could be interpreted that about 10% more PCBs are lost during 168 day storage at 4^{o}C than at -20^{o}C. The difference between the “overall means” for two different temperatures similarly showed that storage for 168 day in a refrigerator resulted in not more than about 10% loss compared to freezer storage. Given the 25% CV precision metric prescribed in SW-846, it is unlikely that this difference could be accurately quantified.

The pesticides sampled from the Housatonic River, Tri-Cities, and Bedford-1 sediments/soils had a minimum holding time of 108 days and 217 days until a 10% or 20%, respectively, decrease in the concentration would be expected. The estimated time required for concentration decreases of 10% and 20% were 7.7 and 15.5 times longer than the current SW-846 prescribed MHT for pesticides (14 days). Due to the wide variability in the slope estimate for many of the pesticides measured in the SQ-1 sediment [also observed for PCB Aroclors], the estimated numbers of days until a 10% decrease in natural log concentration from the best-fit intercept was estimated as 0 to 24 days. While the SQ-1 sediment pesticide holding time estimates were not calculated because of the Day 0 data required surrogate correction, it can not be ignored that 14 out of 20 pooled SQ-1 pesticide data exhibited corrected CVs≤25%, which implies no significant change occurred for these analytes over the 168 day study. For the 10 pesticides that were quantified in four different soil/sediments, a holding time of 217 days at 4^{o}C and 299 days at -20^{o}C would result in not more than a 20% decrease in concentration, which is far greater than the currently prescribed SW-846 MHT (14 days). There was no observable, consistent pattern between the sediments/soils, storage temperature, and the pesticide concentrations.

Extractable metal concentrations were not affected significantly by a holding time of up to 392 days or by air drying of the soils. Only one pooled data set exhibited a CV>20%, which is the current SW-846 precision metric for hot acid extraction of metals. However, CV>20% was found to be the result of one holding time data set that was well outside the Day 0 mean. The remaining data sets exhibited fairly tight CVs across time ranging from 5.6 to 15.8%. The CV data suggests that no chemically significant change in concentration occurred during the holding time sequence and the pooled data exhibited no clear cut difference between moist or dry sample handling. These results suggest that it would take a minimum of 709 days before the acid-extractable As, Cu, Pb, or Zn concentration would be reduced by 20%.

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Appendix A

Descriptive Statistics for All Sediment Holding Time Studies

Table A-1. Chrome (VI) descriptive statistics by day for each sediment and holding temperature

Sediment and Holding Temperature	Day	N	Mean (mg/kg)	Median (mg/kg)	Standard Deviation	Minimum (mg/kg)	Maximum (mg/kg)	First Quartile (mg/kg)	Third Quartile (mg/kg)
125A 4°C	0	5	91.6	95.7	11.7	74.0	102	80.0	101
	14	2	61.5	61.5	2.67	59.6	63.4	*	*
	28	2	104	104	50.2	68.1	139	*	*
	56	2	82.4	82.4	3.14	80.2	84.6	*	*
	112	2	80.4	80.4	10.1	73.2	87.5	*	*
	224	2	140	140	61.7	96.8	184	*	*
125A -20°C	0	5	91.6	95.7	11.7	74.0	102	80.0	101
	14	2	90.2	90.2	19.5	76.3	104	*	*
	28	2	107	107	24.5	89.4	124	*	*
	56	2	93.3	93.3	4.36	90.2	96.4	*	*
	112	2	124	124	20.0	110	138	*	*
	224	2	80.5	80.5	3.98	77.7	83.3	*	*
125B 4°C	0	5	328	344	39.4	272	362	287	361
	14	2	331	331	58.3	290	372	*	*
	28	2	355	355	2.43	353	356	*	*
	56	2	378	378	14.2	368	388	*	*
	112	2	344	344	36.5	318	369	*	*
	224	2	315	315	7.93	310	321	*	*
125B -20°C	0	5	328	344	39.4	272	362	287	361
	14	2	339	339	31.7	317	361	*	*
	28	2	383	383	79.8	327	440	*	*
	56	2	391	391	80.5	334	447	*	*
	112	2	333	333	25.5	315	351	*	*
	224	2	310	310	22.8	293	326	*	*
125C 4°C	0	5	62.5	61.4	7.14	56.1	74.0	56.7	69.0
	14	2	64.3	64.3	6.26	59.9	68.8	*	*
	28	2	76.6	76.6	12.4	67.8	85.3	*	*
	56	2	62.5	62.5	0.27	62.3	62.7	*	*
	112	2	62.1	62.1	0.99	61.4	62.8	*	*
	224	2	60.4	60.4	0.25	60.2	60.6	*	*
125C -20°C	0	5	62.5	61.4	7.14	56.1	74.0	56.7	69.0
	14	2	58.2	58.2	0.76	57.7	58.8	*	*
	28	2	65.5	65.5	2.90	63.5	67.6	*	*
	56	2	71.7	71.7	2.97	69.6	73.8	*	*
	112	2	65.1	65.1	2.16	63.5	66.6	*	*
	224	2	59.4	59.4	2.96	57.3	61.5	*	*
126D 4°C	0	5	815	828	30.6	770	840	784	840
	14	2	771	771	0.43	770	771	*	*
	28	2	868	867	18.3	855	881	*	*
	56	2	802	802	13.4	793	812	*	*
	112	2	833	833	8.66	827	839	*	*
	224	1	846	846	*	846	846	*	*
126D -20°C	0	5	815	828	30.6	770	840	784	840
	14	2	820	820	20.5	805	834	*	*
	28	2	874	874	27.0	855	893	*	*
	56	2	844	844	6.52	840	849	*	*
	112	2	799	799	9.13	792	805	*	*

Sediment and Holding Temperature	Day	N	Mean (mg/kg)	Median (mg/kg)	Standard Deviation	Minimum (mg/kg)	Maximum (mg/kg)	First Quartile (mg/kg)	Third Quartile (mg/kg)
	224	2	846	846	28.7	825	866	*	*
123 4°C	0	5	330	332	5.60	322	336	325	335
	14	2	326	326	7.86	321	332	*	*
	28	2	379	379	10.6	372	387	*	*
	56	2	368	368	29.3	347	388	*	*
	112	2	273	273	15.4	262	284	*	*
	224	2	268	268	42.4	238	298	*	*
123 -20°C	0	5	330	332	5.60	322	336	325	335
	14	2	339	339	5.86	335	344	*	*
	28	2	366	366	8.81	360	373	*	*
	56	2	375	375	3.20	372	377	*	*
	112	2	352	352	6.57	347	357	*	*
	224	2	365	365	8.60	359	371	*	*

* = Not calculable

Table A-2. PAH descriptive statistics for Eagle Harbor sediment held at 4°C

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Naphthalene	0	4	489	478	97.4	401	601	404	586
	7	2	467	467	144	365	568	*	*
	14	1	507	507	*	507	507	*	*
	28	2	624	624	169	505	744	*	*
	42	2	442	442	0.00	442	442	*	*
	84	2	206	206	51.2	170	242	*	*
	168	2	401	401	85.2	341	461	*	*
1Methyl Naphthalene	0	3	490	503	90.8	394	574	394	574
	28	2	359	359	13.5	349	368	*	*
	42	2	319	319	0.00	319	319	*	*
	84	2	152	152	33.5	128	176	*	*
	168	2	269	269	44.7	238	301	*	*
2 Methyl Naphthalene	0	3	119	110	20.3	106	143	106	143
	7	2	105	105	25.6	86.7	123	*	*
	14	1	99.1	99.1	*	99.1	99.1	*	*
	28	2	81.8	81.8	3.58	79.3	84.3	*	*
	42	2	70.0	70.0	0.00	70.0	70.0	*	*
	84	2	39.2	39.2	10.0	32.2	46.3	*	*
	168	2	63.7	63.7	10.8	56.0	71.3	*	*
Acenaphthalene	0	3	97.3	96.3	10.5	87.5	108.3	87.5	108.3
	7	2	66.1	66.1	9.48	59.4	72.8	*	*
	14	1	92.1	92.1	*	92.1	92.1	*	*
	28	2	58.4	58.4	6.53	53.8	63.0	*	*
	42	2	70.0	70.0	0.00	70.0	70.0	*	*
	84	2	82.1	82.1	8.01	76.5	87.8	*	*
	168	2	39.9	39.9	9.21	33.3	46.4	*	*
Acenaphthene	0	3	1021	944	186	885	1233	885	1233
	7	2	913	913	179	786	1039	*	*
	14	1	977	977	*	977	977	*	*
	28	2	1010	1010	140	911	1108	*	*
	42	2	866	866	0.00	866	866	*	*
	84	2	649	649	175	525	772	*	*
	168	2	220	220	18.8	206	233	*	*
Fluorene	0	3	1270	1133	247	1122	1555	1122	1555
	7	2	1162	1162	250	986	1339	*	*
	14	1	1185	1185	*	1185	1185	*	*
	28	2	1054	1054	145	952	1157	*	*
	42	2	797	797	0.00	797	797	*	*
	84	2	671	671	144	570	773	*	*
	168	2	224	224	30.7	203	246	*	*
Dibenzothiophene	0	3	410	374	67.9	368	488	368	488
	7	2	380	380	80.4	324	437	*	*
	14	1	274	274	*	274	274	*	*
	28	2	257	257	50.9	221	293	*	*
	42	2	210	210	0.00	210	210	*	*
	84	2	112	112	39.1	84.5	140	*	*
	168	2	77.8	77.8	10.1	70.6	84.9	*	*

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Phenanthrene	0	3	4530	4190	771	3988	5413	3988	5413
	7	2	4217	4217	956	3541	4893	*	*
	14	1	3414	3414	*	3414	3414	*	*
	28	2	2843	2843	877	2223	3462	*	*
	42	2	2194	2194	0.00	2194	2194	*	*
	84	2	1430	1430	467	1100	1761	*	*
	168	2	911	911	135	816	1006	*	*
Anthracene	0	3	1559	1687	283	1234	1756	1234	1756
	7	2	1525	1525	12.0	1516	1533	*	*
	14	1	1630	1630	*	1630	1630	*	*
	28	2	1334	1334	39.6	1306	1362	*	*
	42	2	1254	1254	0.00	1254	1254	*	*
	84	2	1520	1520	437	1211	1829	*	*
	168	2	511	511	27.2	492	531	*	*
1 Methyl Phenanthrene	0	3	420	412	53.9	371	478	371	478
	7	2	426	426	68.5	377	474	*	*
	14	1	472	472	*	472	472	*	*
	28	2	397	397	29.4	376	418	*	*
	42	2	374	374	0.00	374	374	*	*
	84	2	390	390	64.6	344	436	*	*
	168	2	292	292	8.04	286	298	*	*
Fluoranthene	0	3	6504	6462	793	5733	7318	5733	7318
	7	2	6661	6661	746	6134	7189	*	*
	14	1	6926	6926	*	6926	6926	*	*
	28	2	6744	6744	757	6209	7279	*	*
	42	2	6443	6443	0.00	6443	6443	*	*
	84	2	6100	6100	656	5636	6564	*	*
	168	2	2758	2758	143	2657	2859	*	*
Pyrene	0	3	4807	4887	542	4229	5304	4229	5304
	7	2	4842	4842	479	4503	5181	*	*
	14	1	5019	5019	*	5019	5019	*	*
	28	2	4905	4905	508	4546	5265	*	*
	42	2	4601	4601	0.00	4601	4601	*	*
	84	2	4497	4497	507	4139	4856	*	*
	168	2	4343	4343	258	4161	4525	*	*
Benzo[a] Anthracene	0	3	1605	1627	122	1473	1714	1473	1714
	7	2	1489	1489	88.2	1427	1552	*	*
	14	1	1617	1617	*	1617	1617	*	*
	28	2	1495	1495	187	1363	1628	*	*
	42	2	1347	1347	0.00	1347	1347	*	*
	84	2	1367	1367	90.6	1303	1431	*	*
	168	2	1242	1242	204	1098	1386	*	*
Chrysene	0	3	2026	2041	193	1825	2211	1825	2211
	7	2	2057	2057	175	1934	2181	*	*
	14	1	1918	1918	*	1918	1918	*	*
	28	2	1814	1814	184	1684	1944	*	*
	42	2	1704	1704	0.00	1704	1704	*	*
	84	2	1968	1968	174	1845	2091	*	*
	168	2	1623	1623	330	1389	1856	*	*

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Benzo [b] Fluoranthene	0	4	2469	2381	348	2180	2934	2191	2835
	7	2	2023	2023	171	1903	2144	*	*
	28	2	2130	2130	240	1961	2300	*	*
	42	2	1929	1929	0.00	1929	1929	*	*
	84	2	1998	1998	36.4	1973	2024	*	*
	168	2	1359	1359	254	1180	1539	*	*
Benzo [k] Fluoranthene	0	4	2433	2347	342	2148	2889	2159	2792
	7	2	1995	1995	167	1877	2113	*	*
	28	2	1816	1816	207	1670	1963	*	*
	42	2	1640	1640	0.00	1640	1640	*	*
	84	2	1990	1990	41.8	1960	2019	*	*
	168	2	456	456	87.8	394	518	*	*
Benzo [a] Pyrene	0	4	965	911	145	862	1177	867	1119
	7	2	810	810	55.0	771	849	*	*
	28	2	741	741	79.9	685	798	*	*
	42	2	667	667	0.00	667	667	*	*
	84	2	799	799	9.9	792	806	*	*
	168	2	687	687	105	612	761	*	*
Indeno [1,2,3-c,d] Pyrene	0	1	672	672	*	672	672	*	*
	7	1	684	684	*	684	684	*	*
	28	2	417	417	33.7	393	441	*	*
	42	2	368	368	0.00	368	368	*	*
	84	2	408	408	13.2	399	417	*	*
	168	2	454	454	108	378	531	*	*
Dibenzo [a,h] Anthracene	0	1	330	330	*	330	330	*	*
	7	1	309	309	*	309	309	*	*
	28	2	163	163	12.2	154	171	*	*
	42	2	148	148	0.00	148	148	*	*
	84	2	139	139	5.98	134	143	*	*
	168	2	102	102	27.9	81.8	121	*	*
Benzo[g,h,i] Perylene	0	1	651	651	*	651	651	*	*
	7	1	674	674	*	674	674	*	*
	28	2	439	439	31.8	417	462	*	*
	42	2	392	392	0.00	392	392	*	*
	84	2	444	444	9.40	438	451	*	*
	168	2	331	331	81.4	273	388	*	*

* = Not calculable, too few observations

Table A-3. PAH descriptive statistics for Eagle Harbor sediment held at -20°C

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Naphthalene	0	4	489	478	97.4	401	601	404	586
	7	1	548	548	*	548	548	*	*
	14	2	475	475	2.90	472	477	*	*
	28	2	970	970	530	595	1344	*	*
	42	2	505	505	55.9	466	545	*	*
	84	2	254	254	2.42	252	255	*	*
	168	2	521	521	58.2	480	562	*	*
1Methyl Naphthalene	0	3	490	503	90.8	394	574	394	574
	28	2	681	681	377	414	948	*	*
	42	2	433	433	47.4	399	466	*	*
	84	2	200	200	8.56	194	206	*	*
	168	2	444	444	37.2	418	470	*	*
2 Methyl Naphthalene	0	3	119	110	20.3	106	143	106	143
	7	1	130	130	*	130	130	*	*
	14	2	133	133	4.64	129	136	*	*
	28	2	173	173	71.9	123	224	*	*
	42	2	119	119	14.5	109	130	*	*
	84	2	62.8	62.8	2.72	60.8	64.7	*	*
	168	2	132	132	2.47	130	133	*	*
Acenaphthalene	0	3	97.3	96.3	10.5	87.5	108	87.5	108
	7	1	91.8	91.8	*	91.8	91.8	*	*
	14	2	114	114	7.75	108	119	*	*
	28	2	63.0	63.0	14.3	52.9	73.1	*	*
	42	2	52.0	52.0	6.83	47.1	56.8	*	*
	84	2	71.6	71.6	4.57	68.4	74.8	*	*
	168	2	45.3	45.3	1.12	44.5	46.1	*	*
Acenaphthene	0	3	1021	944	186	885	1233	885	1233
	7	1	1127	1127	*	1127	1127	*	*
	14	2	1172	1172	28.0	1152	1192	*	*
	28	2	1246	1246	302	1032	1460	*	*
	42	2	949	949	114	868	1030	*	*
	84	2	639	639	78.1	584	694	*	*
	168	2	1115	1115	4.00	1112	1118	*	*
Fluorene	0	3	1270	1133	247	1122	1555	1122	1555
	7	1	1421	1421	*	1421	1421	*	*
	14	2	1448	1448	10.8	1440	1456	*	*
	28	2	1528	1528	477	1190	1865	*	*
	42	2	1146	1146	80.7	1088	1203	*	*
	84	2	1023	1023	139	925	1121	*	*
	168	2	1308	1308	72.5	1257	1359	*	*
Dibenzothiophene	0	3	410	374	67.9	368	488	368	488
	7	1	446	446	*	446	446	*	*
	14	2	450	450	6.01	446	455	*	*
	28	2	476	476	129	385	567	*	*
	42	2	349	349	1.24	348	350	*	*
	84	2	288	288	34.3	264	312	*	*
	168	2	389	389	15.2	379	400	*	*

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Phenanthrene	0	3	4530	4190	771	3988	5413	3988	5413
	7	1	4961	4961	*	4961	4961	*	*
	14	2	5081	5081	125	4992	5169	*	*
	28	2	5360	5360	1540	4271	6449	*	*
	42	2	4160	4160	335	3923	4397	*	*
	84	2	3641	3641	501	3287	3995	*	*
	168	2	4707	4707	455	4386	5029	*	*
Anthracene	0	3	1559	1687	283	1234	1756	1234	1756
	7	1	1595	1595	*	1595	1595	*	*
	14	2	1721	1721	16.1	1709	1732	*	*
	28	2	2925	2925	2379	1243	4608	*	*
	42	2	1219	1219	47.2	1185	1252	*	*
	84	2	1117	1117	105	1043	1191	*	*
	168	2	1614	1614	471	1281	1947	*	*
1 Methyl Phenanthrene	0	3	420	412	53.9	371	478	371	478
	7	1	422	422	*	422	422	*	*
	14	2	461	461	5.24	457	465	*	*
	28	2	416	416	117	334	499	*	*
	42	2	360	360	17.7	347	372	*	*
	84	2	326	326	30.4	304	347	*	*
	168	2	422	422	45.8	389	454	*	*
Fluoranthene	0	3	6504	6462	793	5733	7318	5733	7318
	7	1	6334	6334	*	6334	6334	*	*
	14	2	6596	6596	324	6367	6825	*	*
	28	2	6802	6802	973	6114	7490	*	*
	42	2	5919	5919	766	5377	6460	*	*
	84	2	5362	5362	456	5040	5685	*	*
	168	2	6295	6295	574	5889	6701	*	*
Pyrene	0	3	4807	4887	542	4229	5304	4229	5304
	7	1	4593	4593	*	4593	4593	*	*
	14	2	4800	4800	237	4632	4968	*	*
	28	2	4813	4813	711	4310	5316	*	*
	42	2	4278	4278	576	3871	4686	*	*
	84	2	3735	3735	331	3501	3970	*	*
	168	2	4593	4593	372	4330	4856	*	*
Benzo[a] Anthracene	0	3	1605	1627	122	1473	1714	1473	1714
	7	1	1357	1357	*	1357	1357	*	*
	14	2	1537	1537	107	1461	1612	*	*
	28	2	1405	1405	86.3	1344	1466	*	*
	42	2	1277	1277	182	1149	1406	*	*
	84	2	1249	1249	89.6	1186	1312	*	*
	168	2	1299	1299	162	1184	1413	*	*
Chrysene	0	3	2026	2041	193	1825	2211	1825	2211
	7	1	1736	1736	*	1736	1736	*	*
	14	2	1907	1907	121	1821	1993	*	*
	28	2	1845	1845	102	1773	1917	*	*
	42	2	1595	1595	230	1433	1757	*	*
	84	2	1601	1601	80.2	1544	1658	*	*
	168	2	1788	1788	16.9	1776	1800	*	*

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Benzo [b] Fluoranthene	0	4	2469	2381	348	2180	2934	2191	2835
	7	1	1776	1776	*	1776	1776	*	*
	28	2	1969	1969	78.4	1913	2024	*	*
	42	2	1888	1888	343	1646	2130	*	*
	84	2	1872	1872	24.4	1855	1889	*	*
	168	2	1400	1400	118	1317	1484	*	*
Benzo [k] Fluoranthene	0	4	2433	2347	342	2148	2889	2159	2792
	7	1	1751	1751	*	1751	1751	*	*
	28	2	1678	1678	69.3	1629	1727	*	*
	42	2	1608	1608	294	1400	1816	*	*
	84	2	1865	1865	26.2	1847	1884	*	*
	168	2	466	466	38.3	439	493	*	*
Benzo [a] Pyrene	0	4	965	911	145	862	1177	867	1119
	7	1	720	720	*	720	720	*	*
	28	2	689	689	24.8	672	707	*	*
	42	2	655	655	89.2	592	718	*	*
	84	2	712	712	89.0	649	775	*	*
	168	2	747	747	3.80	744	749	*	*
Indeno [1,2,3-c,d] Pyrene	0	1	672	672	*	672	672	*	*
	28	2	368	368	15.7	357	379	*	*
	42	2	372	372	65.1	326	418	*	*
	84	2	441	441	74.0	389	493	*	*
	168	2	561	561	136	465	657	*	*
Dibenzo [a,h] Anthracene	0	1	330	330	*	330	330	*	*
	28	2	142	142	6.90	137	147	*	*
	42	2	141	141	28.9	120	161	*	*
	84	2	135	135	12.3	126	144	*	*
	168	2	118	118	20.8	104	133	*	*
Benzo[g,h,i] Perylene	0	1	651	651	*	651	651	*	*
	28	2	384	384	24.5	366	401	*	*
	42	2	398	398	71.3	348	449	*	*
	84	2	489	489	121	404	574	*	*
	168	2	457	457	141	357	557	*	*

* = Not calculable, too few observations

Table A-4. PAH descriptive statistics for SQ-1 sediment by day for sediment held at 4°C

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Naphthalene	0	3	94.12	91.32	8.08	87.8	103.2	87.8	103.22
	7	2	66.49	66.49	1.72	65.3	67.7	*	*
	14	2	67.50	67.50	15.2	56.7	78.3	*	*
	28	2	79.53	79.53	7.75	74.1	85.0	*	*
	42	2	80.70	80.70	20.4	66	95	*	*
	84	2	65.66	65.66	5.37	61.86	69.46	*	*
Acenaphthalene	0	3	9.43	9.2	1.221	8.34	10.75	8.34	10.75
	7	2	9	9	0.58	8.92	9.74	*	*
	14	2	10	10	0.962	9.03	10.39	*	*
	28	2	8	8	0.658	7.54	8.47	*	*
	42	2	8	8	2.24	6.55	9.72	*	*
	84	2	9	9	0.29	8	9	*	*
Acenaphthene	0	3	114.0	113.9	5.3	109	119	109	119.29
	7	2	90.1	90.1	4.96	87	94	*	*
	14	2	95.7	95.7	7.3	91	101	*	*
	28	2	89.9	89.9	1.82	89	91	*	*
	42	2	92.6	92.6	24.6	75	110	*	*
	84	2	94.2	94.2	0.382	93.94	94.48	*	*
Fluorene	0	3	105	101	9.38	99.2	116.1	99.2	116.11
	7	2	89	89	5.73	85	93	*	*
	14	2	92	92	2.55	90.6	94.2	*	*
	28	2	84	84	7.57	78.6	89.3	*	*
	42	2	94	94	27	74.5	112.6	*	*
	84	2	101	101	0.81	100	102	*	*
Dibenzothiophene	0	3	7	7	0.451	6	7	6	7.08
	7	2	6	6	0.0071	6	6	*	*
	14	2	5	5	0.163	5	6	*	*
	28	2	5	5	0.1344	5	5	*	*
	42	2	6	6	1.78	5	7	*	*
	84	2	6	6	0.0778	6	6	*	*
Phenanthrene	0	3	189.12	191.49	12.54	176	200	176	200.3
	7	2	147	147	4.93	144	151	*	*
	14	2	152	152	3.82	149	155	*	*
	28	2	142	142	2.05	141	144	*	*
	42	2	152	152	43.6	122	183	*	*
	84	2	144	144	2.2	142.11	145.22	*	*
Anthracene	0	3	82	79	13.87	70	97	70	97.22
	7	2	92	92	4.59	89	95	*	*
	14	2	91	91	4.27	88	94	*	*
	28	2	84	84	2.12	82	85	*	*
	42	2	89	89	27.6	70	109	*	*
	84	2	80	80	0.891	79	81	*	*
Fluoranthene	0	3	173.59	171.33	10.62	164	185	164	185.16
	7	2	183	183	5.63	179	187	*	*
	14	2	192	192	0.88	191	192	*	*
	28	2	179	179	8.04	173	184	*	*
	42	2	180	180	52.3	143	217	*	*
	84	2	201	201	5.64	196.88	204.85	*	*

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Pyrene	0	3	156.91	156.29	4.26	153	161	153	161.45
	7	2	158	158	5.55	154	162	*	*
	14	2	168	168	0.48	167.9	168.6	*	*
	28	2	154.2	154.2	3.2	152.0	156.5	*	*
	42	2	155.3	155.3	45.7	123	188	*	*
	84	2	160	160	4.73	156.57	163.3	*	*
Benzo[a] Anthracene	0	3	105.31	102.27	13.7	93.4	120.3	93.4	120.27
	7	2	141.09	141.09	10.57	133.61	148.56	*	*
	14	2	140.16	140.16	12.98	131.0	149.3	*	*
	28	2	120.89	120.89	4.37	117.8	124.0	*	*
	42	2	122.2	122.2	40.3	94	151	*	*
	84	2	152.98	152.98	5.23	149.28	156.67	*	*
Chrysene	0	3	125.62	119.1	13.49	116.67	141.14	116.67	141.14
	7	2	149.1	149.1	11.62	140.85	157.29	*	*
	14	2	151.3	151.3	11.93	142.86	159.73	*	*
	28	2	131.5	131.5	5.29	127.78	135.26	*	*
	42	2	132.6	132.6	42.8	102.3	162.9	*	*
	84	2	131	131	2.87	128.79	132.9	*	*
Benzo [b] Fluoranthene	0	3	108.3	108.52	8.72	99.47	116.91	99.47	116.91
	7	2	119.5	119.5	6.79	115	124	*	*
	14	2	123.9	123.9	14.9	113.4	134.4	*	*
	28	2	102.1	102.1	4.51	98.9	105.2	*	*
	42	2	102.1	102.1	32.3	79.3	124.9	*	*
	84	2	179.1	179.1	23.9	162.2	196.0	*	*
Benzo [a] Pyrene	0	3	82	81.96	2.02	80.0	84.0	80.0	84.04
	7	2	101.27	101.27	4.26	98.3	104.3	*	*
	14	2	100.8	100.8	16	89.5	112.1	*	*
	28	2	83.875	83.875	1.28	83.0	84.8	*	*
	42	2	85.3	85.3	32	62.6	107.9	*	*
	84	2	118.48	118.48	13.51	108.92	128.03	*	*
Indeno [1,2,3-c,d] Pyrene	0	3	4.453	4.33	0.487	4.04	4.99	4.04	4.99
	7	2	4.425	4.425	0.375	4.16	4.69	*	*
	14	2	4.6	4.6	0.608	4.18	5.04	*	*
	28	2	3.6	3.6	0.424	3.33	3.93	*	*
	42	2	4.2	4.2	2.03	2.79	5.66	*	*
	84	2	8.4	8.4	0.933	7.75	9.07	*	*
Dibenzo [a,h] Anthracene	0	3	74.2	70.9	11.16	65.08	86.64	65.08	86.64
	7	2	98.84	98.84	0.396	98.56	99.12	*	*
	14	2	84.9	84.9	18.8	71.6	98.2	*	*
	28	2	64.8	64.8	2.79	62.87	66.81	*	*
	42	2	75.4	75.4	32.1	52.7	98.1	*	*
	84	2	100.35	100.35	9.19	93.85	106.84	*	*
Benzo[g,h,i] Perylene	0	3	90.96	95.38	7.69	82.08	95.43	82.08	95.43
	7	2	95.3	95	0.269	95.06	95.44	*	*
	14	2	66.2	66.2	16	54.9	77.5	*	*
	28	2	57	57	6.51	52.64	61.85	*	*
	42	2	75.4	75.4	32.4	52.6	98.4	*	*
	84	2	92.9	92.9	5.23	89.21	96.6	*	*

* = Not calculable, too few observations

Table A-5. PAH descriptive statistics for SQ-1 sediment by day for sediment held at -20°C

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Naphthalene	0	3	94.12	91.32	8.08	87.81	103.22	87.81	103.22
	7	1	71.01	71.01	*	71.01	71.01	*	*
	14	2	90.71	90.71	5.83	86.59	94.83	*	*
	28	2	58.35	58.35	6.46	53.78	62.91	*	*
	42	2	79.605	79.605	1.096	78.83	80.38	*	*
	84	2	65.1	65.1	25.9	46.8	83.4	*	*
Acenaphthalene	0	3	9.43	9.2	1.221	8.34	10.75	8.34	10.75
	7	2	10.06	10.06	0.198	9.92	10.2	*	*
	14	2	13.56	13.56	0.735	13.04	14.08	*	*
	28	2	8.89	8.89	1.287	7.98	9.8	*	*
	42	2	9.755	9.755	1.322	8.82	10.69	*	*
	84	2	9.66	9.66	1.56	8.56	10.77	*	*
Acenaphthene	0	3	113.98	113.94	5.3	108.7	119.29	108.7	119.29
	7	2	91.85	91.85	6.12	87.52	96.18	*	*
	14	2	103.23	103.23	5.51	99.33	107.12	*	*
	28	2	74.87	74.87	4.28	71.84	77.89	*	*
	42	2	93.93	93.93	1.97	92.54	95.32	*	*
	84	2	94	94	14.5	83.7	104.3	*	*
Fluorene	0	3	105.31	100.68	9.38	99.15	116.11	99.15	116.11
	7	2	92.44	92.44	5.73	88.39	96.49	*	*
	14	2	99.24	99.24	10.82	91.59	106.89	*	*
	28	2	75.1	75.1	5.65	71.1	79.09	*	*
	42	2	94.22	94.22	4.48	91.05	97.39	*	*
	84	2	102.15	102.15	8.05	96.46	107.84	*	*
Dibenzothiophene	0	3	6.697	6.81	0.451	6.2	7.08	6.2	7.08
	7	2	5.84	5.84	0.594	5.42	6.26	*	*
	14	2	6.23	6.23	0.17	6.11	6.35	*	*
	28	2	4.535	4.535	0.318	4.31	4.76	*	*
	42	2	5.62	5.62	0.0849	5.56	5.68	*	*
	84	2	6.34	6.34	0.0707	6.29	6.39	*	*
Phenanthrene	0	3	189.12	191.49	12.54	175.56	200.3	175.56	200.3
	7	2	158.7	158.7	16	147.4	170	*	*
	14	2	163.42	163.42	2.09	161.94	164.9	*	*
	28	2	123.97	123.97	6.65	119.27	128.67	*	*
	42	2	151.22	151.22	0.85	150.62	151.82	*	*
	84	2	147.6	147.6	9.81	140.67	154.54	*	*
Anthracene	0	3	82.12	79.18	13.87	69.96	97.22	69.96	97.22
	7	2	96.96	96.96	10.01	89.88	104.03	*	*
	14	2	108.09	108.09	5.64	104.1	112.08	*	*
	28	2	76.08	76.08	4.96	72.57	79.59	*	*
	42	2	91.71	91.71	6.2	87.32	96.09	*	*
	84	2	82.66	82.66	1.77	81.4	83.91	*	*
Fluoranthene	0	3	173.59	171.33	10.62	164.29	185.16	164.29	185.16
	7	2	180.09	180.09	12.45	171.29	188.89	*	*
	14	2	206.35	206.35	5.16	202.7	210	*	*
	28	2	159.98	159.98	7.87	154.41	165.54	*	*
	42	2	177.52	177.52	3.21	175.25	179.79	*	*

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
	84	2	203.1	203.1	17.9	190.5	215.8	*	*
Pyrene	0	3	156.91	156.29	4.26	152.99	161.45	152.99	161.45
	7	2	155.77	155.77	12.28	147.09	164.45	*	*
	14	2	180.09	180.09	5.3	176.34	183.83	*	*
	28	2	137.95	137.95	7.26	132.82	143.09	*	*
	42	2	153.46	153.46	2.14	151.95	154.98	*	*
	84	2	160.35	160.35	13.51	150.79	169.9	*	*
Benzo[a] Anthracene	0	3	105.31	102.27	13.7	93.38	120.27	93.38	120.27
	7	2	136.54	136.54	9.75	129.64	143.43	*	*
	14	2	157.81	157.81	6.82	152.98	162.63	*	*
	28	2	113.8	113.8	12.13	105.22	122.38	*	*
	42	2	127.48	127.48	0.76	126.94	128.02	*	*
	84	2	156.25	156.25	4.65	152.96	159.54	*	*
Chrysene	0	3	125.62	119.05	13.49	116.67	141.14	116.67	141.14
	7	2	145.59	145.59	10.52	138.15	153.03	*	*
	14	2	173.27	173.27	6.03	169	177.53	*	*
	28	2	120.76	120.76	13.48	111.22	130.29	*	*
	42	2	135.38	135.38	2.57	133.56	137.2	*	*
	84	2	133.66	133.66	4.68	130.35	136.97	*	*
Benzo [b] Fluoranthene	0	3	108.3	108.52	8.72	99.47	116.91	99.47	116.91
	7	2	110.04	110.04	2.41	108.33	111.74	*	*
	14	2	138.22	138.22	0.47	137.88	138.55	*	*
	28	2	98.51	98.51	11.42	90.43	106.58	*	*
	42	2	98.73	98.73	0.948	98.06	99.4	*	*
	84	2	166.8	166.8	26	148.4	185.1	*	*
Benzo [a] Pyrene	0	3	82	81.96	2.02	80	84.04	80	84.04
	7	2	94.82	94.82	5.66	90.82	98.83	*	*
	14	2	123.77	123.77	1.24	122.89	124.65	*	*
	28	2	83.56	83.56	11.38	75.51	91.61	*	*
	42	2	89.68	89.68	1.87	88.35	91	*	*
	84	2	109.48	109.48	12.05	100.96	118	*	*
Indeno [1,2,3-c,d] Pyrene	0	3	4.453	4.33	0.487	4.04	4.99	4.04	4.99
	7	2	4.185	4.185	0.177	4.06	4.31	*	*
	14	2	5.14	5.14	0.0424	5.11	5.17	*	*
	28	2	3.56	3.56	0.792	3	4.12	*	*
	42	2	4.405	4.405	0.148	4.3	4.51	*	*
	84	2	7.265	7.265	0.587	6.85	7.68	*	*
Dibenzo [a,h] Anthracene	0	3	74.19	70.86	11.16	65.08	86.64	65.08	86.64
	7	2	88.9	88.9	2.82	86.9	90.89	*	*
	14	2	117.15	117.15	9.83	110.2	124.1	*	*
	28	2	63.26	63.26	12.28	54.57	71.94	*	*
	42	2	87.66	87.66	2.38	85.98	89.34	*	*
	84	2	88.65	88.65	8.95	82.32	94.98	*	*
Benzo[g,h,i] Perylene	0	3	90.96	95.38	7.69	82.08	95.43	82.08	95.43
	7	2	86.45	86.45	3.51	83.97	88.93	*	*
	14	2	97.18	97.18	7.98	91.53	102.82	*	*
	28	2	56.54	56.54	12.7	47.56	65.52	*	*
	42	2	85.24	85.24	1.58	84.12	86.36	*	*
	84	2	81.49	81.49	7.74	76.01	86.96	*	*

* = Not calculable, too few observations

Table A-6. PAH descriptive statistics for Bedford -1 sediment by day for sediment held at 4°C

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Naphthalene	0	4	283	282	72.1	210	357	216	350
	7	2	221	221	90.9	157	285	*	*
	14	2	374	374	76.0	320	428	*	*
	168	2	503	503	24.5	486	521	*	*
Acenaphthalene	0	4	346	336	48.4	302	412	306	397
	7	2	309	309	0.610	308	309	*	*
	14	2	420	420	137	323	517	*	*
	168	2	476	476	37.0	450	502	*	*
Acenaphthene	0	4	74.6	73.1	5.67	69.7	82.4	70.1	80.6
	7	2	72.8	72.8	0.997	72.1	73.5	*	*
	14	2	88.2	88.2	7.87	82.6	93.8	*	*
	168	1	92.3	92.3	*	92.3	92.3	*	*
Fluorene	0	3	78.6	79.2	18.4	59.9	96.8	59.9	96.8
	7	2	57.5	57.5	14.8	47.0	67.9	*	*
	14	2	65.2	65.2	16.0	53.9	76.5	*	*
	168	2	95.3	95.3	7.44	90.1	101	*	*
Dibenzothiophene	0	4	108	109	17.2	86.5	126	90.6	124
	7	2	47.7	47.7	47.6	14.0	81.4	*	*
	14	2	150	150	30.9	128	172	*	*
	168	2	155	155	8.61	149	161	*	*
Phenanthrene	0	4	1435	1506	345	1005	1724	1081	1719
	7	2	1219	1219	84.4	1159	1278	*	*
	14	2	1860	1860	403	1575	2145	*	*
	168	2	2267	2267	74.3	2215	2320	*	*
Anthracene	0	4	343	341	62.2	270	417	283	403
	7	2	274	274	14.1	264	284	*	*
	14	2	410	410	80.5	353	467	*	*
	168	2	518	518	35.7	493	543	*	*
Fluoranthene	0	4	6639	6846	1376	5001	7863	5252	7819
	7	2	5681	5681	505	5323	6038	*	*
	14	2	8330	8330	1723	7112	9548	*	*
	168	2	8102	8102	17.5	8090	8115	*	*
Pyrene	0	4	6851	7001	1359	5261	8143	5495	8059
	7	2	6072	6072	569	5670	6474	*	*
	14	2	8809	8809	1746	7574	10044	*	*
	168	2	8315	8315	71.0	8265	8365	*	*
Benzo[a] Anthracene	0	4	4837	5006	794	3850	5488	4022	5484
	7	2	4293	4293	544	3908	4678	*	*
	14	2	6135	6135	1097	5360	6911	*	*
	168	2	6380	6380	11.7	6371	6388	*	*
Chrysene	0	4	5278	5437	867	4190	6047	4386	6010
	7	2	4730	4730	624	4289	5171	*	*
	14	2	6661	6661	1235	5788	7534	*	*
	168	2	7129	7129	73.2	7077	7181	*	*
Benzo [b] Fluoranthene	0	4	6903	6989	1151	5509	8124	5751	7968
	7	2	6108	6108	912	5463	6753	*	*
	14	2	8521	8521	1555	7421	9621	*	*

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
	168	2	7078	7078	27.1	7059	7097	*	*
Benzo [k] Fluoranthene	0	4	2762	2819	460	2199	3211	2295	3172
	7	2	2501	2501	316	2277	2725	*	*
	14	2	3436	3436	555	3044	3828	*	*
	0	4	5793	5897	937	4644	6733	4845	6637
Benzo [a] Pyrene	7	2	5157	5157	761	4619	5695	*	*
	14	2	7282	7282	1317	6350	8214	*	*
	168	1	9936	9936	*	9936	9936	*	*
	0	4	4454	4540	686	3599	5137	3756	5067
Indeno [1,2,3-c,d] Pyrene	7	2	3953	3953	547	3566	4340	*	*
	14	2	5563	5563	1067	4809	6317	*	*
	0	4	949	969	130	781	1077	815	1063
Dibenzo [a,h] Anthracene	7	2	827	827	110	749	904	*	*
	14	2	1184	1184	234	1018	1350	*	*
	168	1	1444	1444	*	1444	1444	*	*
	0	4	4088	4154	638	3304	4739	3443	4667
Benzo[g,h,i] Perylene	7	2	3660	3660	507	3302	4018	*	*
	14	2	5110	5110	955	4435	5786	*	*
	0	4	2762	2819	460	2199	3211	2295	3172

* = Not calculable, too few observations

Table A-7. PAH descriptive statistics for Bedford -1 sediment by day for sediment held at -20°C

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Naphthalene	0	4	283	282	72.1	210	357	216	350
	7	2	337	337	15.3	326	348	*	*
	14	2	418	418	75.3	365	471	*	*
	168	2	526	526	23.6	509	543	*	*
Acenaphthalene	0	4	346	336	48.4	302	412	306	397
	7	2	377	377	37.4	350	403	*	*
	14	1	367	367	*	367	367	*	*
	168	2	506	506	23.2	490	522	*	*
Acenaphthene	0	4	74.6	73.1	5.67	69.7	82.4	70.1	80.6
	7	2	84.9	84.9	4.93	81.4	88.4	*	*
	14	1	78.2	78.2	*	78.2	78.2	*	*
	168	2	92.4	92.4	2.97	90.3	94.5	*	*
Fluorene	0	3	78.6	79.2	18.4	59.9	96.8	59.9	96.8
	7	2	78.7	78.7	0.346	78.5	79.0	*	*
	14	2	90.2	90.2	55.4	51	129	*	*
	168	2	106	106	10.1	99.2	113	*	*
Dibenzothiophene	0	4	108	109	17.2	86.5	126	90.6	124
	7	2	107	107	18.8	93.7	120	*	*
	14	1	137	137	*	137	137	*	*
	168	1	139	139	*	139	139	*	*
Phenanthrene	0	4	1435	1506	345	1005	1724	1081	1719
	7	2	1550	1550	315	1327	1772	*	*
	14	2	1913	1913	515	1548	2277	*	*
	168	2	2274	2274	110	2196	2351	*	*
Anthracene	0	4	343	341	62.2	270	417	283	403
	7	2	342	342	47.9	309	376	*	*
	14	2	433	433	128	342	524	*	*
	168	1	524	524	*	524	524	*	*
Fluoranthene	0	4	6639	6846	1376	5001	7863	5252	7819
	7	2	6656	6656	1543	5565	7746	*	*
	14	2	8349	8349	1802	7075	9623	*	*
	168	2	8309	8309	226	8149	8468	*	*
Pyrene	0	4	6851	7001	1359	5261	8143	5495	8059
	7	2	7120	7120	1658	5948	8293	*	*
	14	2	8817	8817	1710	7608	10026	*	*
	168	2	8643	8643	215	8491	8795	*	*
Benzo[a] Anthracene	0	4	4837	5006	794	3850	5488	4022	5484
	7	2	4965	4965	1200	4116	5813	*	*
	14	2	6216	6216	1239	5339	7092	*	*
	168	2	6824	6824	378	6558	7091	*	*
Chrysene	0	4	5278	5437	867	4190	6047	4386	6010
	7	2	5389	5389	1287	4479	6299	*	*
	14	2	6688	6688	1327	5749	7626	*	*
	168	2	7468	7468	291	7262	7674	*	*
Benzo [b] Fluoranthene	0	4	6903	6989	1151	5509	8124	5751	7968
	7	2	6881	6881	1544	5790	7973	*	*
	14	2	8415	8415	1652	7247	9584	*	*

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
	168	2	7571	7571	376	7305	7837	*	*
Benzo [k] Fluoranthene	0	4	2762	2819	460	2199	3211	2295	3172
	7	2	2793	2793	617	2357	3230	*	*
	14	2	3389	3389	734	2870	3908	*	*
Benzo [a] Pyrene	0	4	5793	5897	937	4644	6733	4845	6637
	7	2	5837	5837	1385	4857	6817	*	*
	14	2	7120	7120	1387	6140	8101	*	*
Indeno [1,2,3-c,d] Pyrene	0	4	4454	4540	686	3599	5137	3756	5067
	7	2	4465	4465	988	3767	5164	*	*
	14	2	5404	5404	1051	4661	6147	*	*
Dibenzo [a,h] Anthracene	0	4	949	969	130	781	1077	815	1063
	7	2	944	944	208	797	1091	*	*
	14	2	1177	1177	251	1000	1355	*	*
Benzo[g,h,i] Perylene	0	4	4088	4154	638	3304	4739	3443	4667
	7	2	4133	4133	931	3474	4791	*	*
	14	2	4978	4978	934	4318	5639	*	*

* = Not calculable, too few observations

Table A-8. PCB descriptive statistics for Housatonic River sediment by day and holding condition.

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Housatonic River 4°C									
Arochlor 1254	0	4	6955	7014	342	6510	7283	6602	7250
	7	2	6672	6672	121	6587	6758	*	*
	14	2	5250	5250	312	5030	5471	*	*
	28	2	5864	5864	63	5820	5909	*	*
	42	2	5616	5616	774	5069	6163	*	*
	84	2	4990	4990	103	4917	5063	*	*
	168	2	5147	5147	444	4833	5461	*	*
Arochlor 1260	0	4	24880	25281	976	23428	25532	23885	25475
	7	2	26736	26736	140	26637	26836	*	*
	14	2	22528	22528	202	22385	22670	*	*
	28	2	23149	23149	696	22658	23641	*	*
	42	2	23659	23659	4672	20355	26963	*	*
	84	2	18426	18426	256	18245	18607	*	*
	168	2	20980	20980	957	20303	21657	*	*
Housatonic River -20°C									
Arochlor 1254	0	4	6955	7014	342	6510	7283	6602	7250
	7	2	7217	7217	737	6696	7738	*	*
	14	2	5784.3	5784	83.2	5726	5843	*	*
	28	2	5663.5	5664	128.7	5572	5755	*	*
	42	1	4882.4	4882	*	4882	4882	*	*
	84	2	5278.1	5278	76.2	5224	5332	*	*
	168	2	5540	5540	579	5131	5949	*	*
Arochlor 1260	0	4	24880	25281	976	23428	25532	23885	25475
	7	2	25896	25896	885	25270	26522	*	*
	14	2	24165	24165	162	24050	24280	*	*
	28	2	24317	24317	2181	22775	25860	*	*
	42	1	21563	21563	*	21563	21563	*	*
	84	2	19728	19728	937	19066	20391	*	*
	168	2	20599	20599	1134	19797	21401	*	*

* = Not calculable, too few observations

Table A-9. PCB descriptive statistics for SQ-1 sediment by day and holding condition. Data has been surrogate corrected, and only extracts held less than 30 days were used in the analysis.

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
SQ-1 4°C									
Arochlor 1254	0	2	135	135	0.810	135	136	*	*
	14	2	117	117	4.00	114	120	*	*
	28	2	89.6	89.6	26.7	70.8	109	*	*
	70	2	117.9	117.9	19.4	104	132	*	*
	154	2	160.1	160.1	15.6	149	171	*	*
SQ-1 -20°C									
Arochlor 1254	0	2	135	135	0.810	135	136	*	*
	14	2	129	129	1.04	128	130	*	*
	28	2	105	105	6.39	101	110	*	*
	70	2	120	120	9.50	113	127	*	*
	154	2	150	150	24.5	132	167	*	*

* = Not calculable, too few observations

Table A-10. PCB descriptive statistics for Tri-Cities NY sediment by day and holding condition.

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Tri-Cities, NY 4°C									
Arochlor 1242	0	4	26239	25467	2598	24178	29846	24263	28988
	7	2	26619	26619	320	26393	26845	*	*
	14	1	25479	25479	*	25479	25479	*	*
	28	1	29211	29211	*	29211	29211	*	*
	42	1	28566	28566	*	28566	28566	*	*
	84	2	32565	32565	3688	29958	35173	*	*
	168	2	21223	21223	427	20921	21525	*	*
Arochlor 1260	0	4	10653	10820	1957	8208	12763	8684	12454
	7	2	12213	12213	2493	10450	13975	*	*
	14	1	10839	10839	*	10839	10839	*	*
	28	1	11775	11775	*	11775	11775	*	*
	42	2	14991	14991	1605	13856	16126	*	*
	84	2	15174	15174	312	14953	15394	*	*
	168	2	11599	11599	4053	8734	14465	*	*
PCB 8	0	4	418	407	103	320	536.2	326	519.8
	7	2	497	497	13.0	488	507	*	*
	14	1	566	566	*	566	566	*	*
	28	1	519	519	*	519	519	*	*
	42	2	837	837	124	749	925	*	*
	84	2	699	699	86.0	638	760	*	*
	168	0	*	*	*	*	*	*	*
PCB 52	0	4	717	683.8	105.4	636	864	638.4	828.6
	7	2	902	902	39.0	875	930	*	*
	14	1	860	860	*	860	860	*	*
	28	1	786	786	*	786	786	*	*
	42	2	883	883	108	806	959	*	*
	84	2	761	761	41.5	731	790	*	*
	168	0	*	*	*	*	*	*	*
PCB 153	0	4	1463	1391	216	1306	1765	1306	1692
	7	2	1900	1900	340	1660	2140	*	*
	14	0	*	*	*	*	*	*	*
	28	1	1923	1923	*	1923	1923	*	*
	42	2	1423	1423	104	1349	1497	*	*
	84	2	918	918	108	842	994	*	*
	168	2	1081	1081	412	790	1373	*	*
PCB 138	0	4	927.1	883.6	150	811	1131	813	1085
	7	2	1146	1146	200	1004	1287	*	*
	14	0	*	*	*	*	*	*	*
	28	1	1161	1161	*	1161	1161	*	*
	42	2	1081	1081	25.9	1062	1099	*	*
	84	2	1156	1156	137	1059	1253	*	*
	168	2	1206	1206	385	934	1478	*	*
PCB 187	0	4	425	403	60.6	379	513	382	488
	7	1	450	450	*	450	450	*	*
	14	0	*	*	*	*	*	*	*
	28	1	524	524	*	524	524	*	*
	42	2	356	356	65.8	309	402	*	*
	84	0	*	*	*	*	*	*	*
	168	1	461	461	*	461	461	*	*

* = Not calculable, too few observations

Table A-10, *Continued*

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
PCB 180	0	4	857	816	140	742	1053	750	1004
	7	2	1094	1094	193	957	1230	*	*
	14	0	*	*	*	*	*	*	*
	28	1	1033	1033	*	1033	1033	*	*
	42	2	873	873	121	787	958	*	*
	84	2	988	988	184	858	1119	*	*
	168	2	1258	1258	640	805	1710	*	*
PCB 170	0	4	544	523	83	474	658	478	632
	7	2	679	679	137	582	776	*	*
	14	0	*	*	*	*	*	*	*
	28	1	683	683	*	683	683	*	*
	42	2	488	488	41.1	459	518	*	*
	84	2	492	492	109	415	569	*	*
	168	2	771	771	195	633	909	*	*
Tri-Cities, NY -20°C									
Arochlor 1242	0	4	26239	25467	2598	24178	29846	24263	28988
	7	2	23878	23878	4031	21027	26728	*	*
	14	1	31722	31722	*	31722	31722	*	*
	28	2	29078	29078	497	28726	29429	*	*
	42	2	29366	29366	5015	25820	32913	*	*
	84	2	31296	31296	1229	30427	32165	*	*
	168	2	22570	22570	3594	20029	25112	*	*
Arochlor 1260	0	4	10653	10820	1957	8208	12763	8684	12454
	7	2	8976	8976	2775	7014	10938	*	*
	14	2	12521	12521	1235	11648	13394	*	*
	28	2	14145	14145	88	14082	14207	*	*
	42	2	14236	14236	3058	12073	16398	*	*
	84	2	14984	14984	317	14760	15208	*	*
	168	2	11960	11960	1221	11097	12823	*	*
PCB 8	0	4	418	407	103	320	536	326	519.8
	7	2	362	362	160	250	475	*	*
	14	2	670	670	126	581	759	*	*
	28	2	561	561	49	526	595	*	*
	42	2	648	648	296	438	857	*	*
	84	2	618	618	19	605	631	*	*
	168	0	*	*	*	*	*	*	*
PCB 52	0	4	717	684	105	636	864	638	829
	7	2	868	868	22.3	853	884	*	*
	14	1	1013	1013	*	1013	1013	*	*
	28	2	1003	1003	36.8	977	1029	*	*
	42	2	968	968	97.3	899	1037	*	*
	84	2	735	735	19.3	722	749	*	*
	168	0	*	*	*	*	*	*	*
PCB 153	0	4	1463	1391	216	1306	1765	1306	1692
	7	2	1472	1472	418	1176	1768	*	*
	14	2	2055	2055	289	1851	2260	*	*
	28	2	2220	2220	5.2	2216	2223.3	*	*
	42	2	1816	1816	214	1665	1967	*	*
	84	2	1011	1011	34.9	986	1035.4	*	*
	168	2	1112	1112	120	1027.5	1197.1	*	*

* = Not calculable, too few observations

Table A-10, *Continued*

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
PCB 138	0	4	927	884	150	810.5	1130.7	813	1085
	7	2	856	856	320	630	1083	*	*
	14	2	1215	1215	164	1099	1330	*	*
	28	2	1348	1348	4	1345	1351	*	*
	42	2	1219	1219	301	1006	1432	*	*
	84	2	1210	1210	43	1180	1241	*	*
	168	2	1228	1228	127	1138	1318	*	*
PCB 187	0	4	425	403	60.6	379	513	382	488
	7	2	388	388	141	288	487	*	*
	14	2	534	534	73.5	482	586	*	*
	28	0	*	*	*	*	*	*	*
	42	2	482	482	18.2	469	495	*	*
	84	0	*	*	*	*	*	*	*
	168	1	586	586	*	586	586	*	*
PCB 180	0	4	857	816	140	742	1053	750	1004
	7	2	854	854	277	658	1050	*	*
	14	2	1060	1060	129	970	1151	*	*
	28	2	1292	1292	24.7	1275	1310	*	*
	42	2	1106	1106	124	1019	1194	*	*
	84	2	974	974	57.4	933	1014	*	*
	168	2	1038	1038	153	930	1146	*	*
PCB 170	0	4	544	523	83.1	474	658	478	632
	7	2	518	518	156	407	628	*	*
	14	2	708	708	77.6	653	763	*	*
	28	2	824	824	28	805	844	*	*
	42	2	623	623	52.2	586	660	*	*
	84	2	490	490	31.8	467	512	*	*
	168	1	750	750	*	750	750	*	*

* = Not calculable, too few observations

Table A-11. Pesticide descriptive statistics for Housatonic River sediment by day and holding condition.

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Housatonic River 4°C									
4,4-DDE	0	4	139	140	3.51	134.47	142.03	135.57	141.97
	7	2	147	147	1.44	146.23	148.27	*	*
	14	2	121	121	3.27	119.16	123.78	*	*
	28	2	131	131	7.57	125.98	136.68	*	*
	42	2	132	132	25.2	113.8	149.5	*	*
	84	2	113	113	1.86	111.72	114.35	*	*
	168	0	*	*	*	*	*	*	*
4,4-DDD	0	4	36.4	37.0	13.0	23.18	48.29	24.2	47.91
	7	2	20.0	20.0	1.63	18.83	21.13	*	*
	14	2	18.4	18.4	0.163	18.3	18.53	*	*
	28	2	21.0	21.0	1.11	20.21	21.777	*	*
	42	2	21.5	21.5	5.58	17.52	25.41	*	*
	84	2	31.8	31.8	0.622	31.34	32.22	*	*
	168	2	26.6	26.6	3.99	23.79	29.43	*	*
2,4-DDT	0	4	197	194	9.43	188.75	209.8	189.33	206.65
	7	2	211	211	0.78	210.81	211.92	*	*
	14	2	169	169	0.38	169.19	169.73	*	*
	28	2	180	180	8.26	174.65	186.33	*	*
	42	2	184	184	43.9	153.3	215.4	*	*
	84	2	155	155	5.25	151.04	158.46	*	*
	168	1	220	220	*	220.21	220.21	*	*
4,4-DDT	0	4	1107	1101	46.7	1059.9	1168	1066.1	1155.2
	7	2	1213	1213	16.4	1201.6	1224.8	*	*
	14	2	990	990	53.9	951.9	1028.2	*	*
	28	2	1055	1055	33	1032	1078.7	*	*
	42	2	1069	1069	225	909	1228	*	*
	84	2	840	840	1.25	838.74	840.51	*	*
	168	2	1200	1200	65.2	1154.3	1246.4	*	*
Housatonic River -20°C									
4,4-DDE	0	4	139.29	140.33	3.51	134.47	142.03	135.57	141.97
	7	2	146.68	146.68	1.15	145.86	147.49	*	*
	14	0	*	*	*	*	*	*	*
	28	2	126.99	126.99	0.3	126.78	127.2	*	*
	42	1	118.59	118.59	*	118.59	118.59	*	*
	84	2	123.59	123.59	1.85	122.28	124.89	*	*
	168	0	*	*	*	*	*	*	*
4,4-DDD	0	4	36.38	37.03	13	23.18	48.29	24.2	47.91
	7	2	35.8	35.8	22.1	20.1	51.4	*	*
	14	0	*	*	*	*	*	*	*
	28	2	18.865	18.865	0.021	18.85	18.88	*	*
	42	1	18.21	18.21	*	18.21	18.21	*	*
	84	2	35.715	35.715	0.488	35.37	36.06	*	*
	168	2	26.34	26.34	0.424	26.04	26.64	*	*

* = Not calculable, too few observations

Table A-11, *Continued*

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
2,4-DDT	0	4	196.7	194.12	9.43	188.75	209.8	189.33	206.65
	7	2	200	200	9.82	193.05	206.94	*	*
	14	0	*	*	*	*	*	*	*
	28	2	177.78	177.78	5.62	173.8	181.75	*	*
	42	1	162.06	162.06	*	162.06	162.06	*	*
	84	2	165.87	165.87	6.27	161.43	170.3	*	*
	168	0	*	*	*	*	*	*	*
4,4-DDT	0	4	1107.3	1100.7	46.7	1059.9	1168	1066.1	1155.2
	7	2	1113.2	1113.2	8.2	1107.4	1119	*	*
	14	0	*	*	*	*	*	*	*
	28	2	1047.4	1047.4	37.1	1021.2	1073.6	*	*
	42	1	963.83	963.83	*	963.83	963.83	*	*
	84	2	933.6	933.6	84.1	874.2	993.1	*	*
	168	1	1250.3	1250.3	*	1250.3	1250.3	*	*

* = Not calculable, too few observations

Table A-12. Pesticide descriptive statistics for SQ-1 sediment by day and holding condition.

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
SQ-1 4°C (Surrogate Corrected)									
α-BHC	0	2	1.37	1.37	0.092	1.30	1.43	*	*
	28	2	1.08	1.08	0.219	0.920	1.23	*	*
	70	2	1.31	1.31	0.035	1.28	1.33	*	*
	154	2	1.55	1.55	0.078	1.49	1.60	*	*
γ-BHC	0	2	1.34	1.34	0.106	1.26	1.41	*	*
	28	2	1.11	1.11	0.141	1.01	1.21	*	*
	70	2	1.02	1.02	0.035	0.990	1.04	*	*
	154	2	1.81	1.81	0.184	1.68	1.94	*	*
2,4-DDE	0	2	3.98	3.98	0.078	3.92	4.03	*	*
	28	2	3.50	3.50	0.092	3.43	3.56	*	*
	70	2	4.37	4.37	1.09	3.60	5.14	*	*
	154	2	7.65	7.65	0.516	7.28	8.01	*	*
α-Chlordane	0	2	10.4	10.4	0.679	9.89	10.9	*	*
	28	2	7.91	7.91	1.80	6.64	9.19	*	*
	70	2	10.1	10.1	1.04	9.32	10.8	*	*
	154	2	15.2	15.2	0.742	14.7	15.7	*	*
Trans Nonachlor	0	2	2.30	2.30	0.099	2.23	2.37	*	*
	28	2	1.70	1.70	0.339	1.46	1.94	*	*
	70	2	2.08	2.08	0.247	1.90	2.25	*	*
	154	2	2.14	2.14	0.141	2.04	2.24	*	*
4,4-DDE	0	2	3.04	3.04	0.191	2.90	3.17	*	*
	28	2	2.37	2.37	0.495	2.02	2.72	*	*
	70	2	3.00	3.00	0.431	2.69	3.3	*	*
	154	2	4.33	4.33	0.304	4.11	4.54	*	*
2,4-DDD	0	2	0.735	0.735	0.021	0.720	0.750	*	*
	28	2	2.04	2.04	0.417	1.74	2.33	*	*
	70	2	2.39	2.39	0.283	2.19	2.59	*	*
	154	2	3.31	3.31	0.325	3.08	3.54	*	*
4,4-DDD	0	2	2.85	2.85	0.141	2.75	2.95	*	*
	14	2	2.52	2.52	0.156	2.41	2.63	*	*
	28	2	1.60	1.60	0.184	1.47	1.73	*	*
	70	2	3.19	3.19	0.297	2.98	3.40	*	*
	154	2	2.76	2.76	0.071	2.71	2.81	*	*
2,4-DDT	0	2	0.915	0.915	0.148	0.810	1.02	*	*
	14	2	0.985	0.985	0.219	0.830	1.14	*	*
	28	2	0.745	0.745	0.233	0.580	0.910	*	*
	70	2	1.15	1.15	0.205	1.00	1.29	*	*
	154	2	1.24	1.24	0.099	1.17	1.31	*	*
MIREX	0	2	2.02	2.02	0.014	2.01	2.03	*	*
	14	2	1.88	1.88	0.021	1.86	1.89	*	*
	28	2	1.34	1.34	0.354	1.09	1.59	*	*
	70	2	1.80	1.80	0.318	1.57	2.02	*	*
	154	2	2.15	2.15	0.085	2.09	2.21	*	*

* = Not calculable, too few observations

Table A-12, *Continued*

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
SQ-1 -20°C (Surrogate Corrected)									
α-BHC	0	2	1.37	1.37	0.092	1.30	1.43	*	*
	14	2	1.15	1.15	0.106	1.07	1.22	*	*
	28	2	1.26	1.26	0.035	1.23	1.28	*	*
	70	2	1.36	1.36	0.156	1.25	1.47	*	*
	154	2	1.52	1.52	0.092	1.45	1.58	*	*
γ-BHC	0	2	1.34	1.34	0.106	1.26	1.41	*	*
	14	2	1.11	1.11	0.163	0.990	1.22	*	*
	28	2	1.26	1.26	0.050	1.22	1.29	*	*
	70	2	0.940	0.940	0.255	0.760	1.12	*	*
	154	2	1.68	1.68	0.134	1.58	1.77	*	*
2,4-DDE	0	2	3.98	3.98	0.078	3.92	4.03	*	*
	14	2	5.35	5.35	1.63	4.19	6.50	*	*
	28	2	3.89	3.89	0.481	3.55	4.23	*	*
	70	2	3.37	3.37	0.064	3.32	3.41	*	*
	154	2	6.73	6.73	1.308	5.80	7.65	*	*
α-Chlordane	0	2	10.4	10.4	0.679	9.89	10.9	*	*
	14	2	10.1	10.1	0.304	9.86	10.3	*	*
	28	2	8.80	8.80	0.028	8.78	8.82	*	*
	70	2	9.86	9.86	0.078	9.80	9.91	*	*
	154	2	13.8	13.8	2.73	11.9	15.7	*	*
Trans Nonachlor	0	2	2.30	2.30	0.099	2.23	2.37	*	*
	14	2	2.22	2.22	0.099	2.15	2.29	*	*
	28	2	1.96	1.96	0.014	1.95	1.97	*	*
	70	2	2.01	2.01	0.050	1.97	2.04	*	*
	154	2	2.09	2.09	0.382	1.82	2.36	*	*
4,4-DDE	0	2	3.04	3.04	0.191	2.90	3.17	*	*
	14	2	2.76	2.76	0.035	2.73	2.78	*	*
	28	2	2.58	2.58	0.028	2.56	2.60	*	*
	70	2	2.83	2.83	0.191	2.69	2.96	*	*
	154	2	3.94	3.94	0.834	3.35	4.53	*	*
2,4-DDD	0	2	0.735	0.735	0.021	0.720	0.750	*	*
	14	2	0.605	0.605	0.106	0.530	0.680	*	*
	28	2	2.39	2.39	0.064	2.34	2.43	*	*
	70	2	2.38	2.38	0.050	2.34	2.41	*	*
	154	2	3.17	3.17	0.658	2.70	3.63	*	*
4,4-DDD	0	2	2.85	2.85	0.141	2.75	2.95	*	*
	14	1	2.69	2.69	*	2.69	2.69	*	*
	28	2	2.09	2.09	0.099	2.02	2.16	*	*
	70	2	2.90	2.90	0.304	2.68	3.11	*	*
	154	2	2.55	2.55	0.396	2.27	2.83	*	*
2,4-DDT	0	2	0.915	0.915	0.148	0.810	1.02	*	*
	14	1	1.00	1.00	*	1.00	1.00	*	*
	28	2	0.795	0.795	0.021	0.780	0.810	*	*
	70	2	0.815	0.815	0.050	0.780	0.850	*	*
	154	2	0.920	0.920	0.071	0.870	0.970	*	*

* = Not calculable, too few observations

Table A-12, *Continued*

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
SQ-1 -20°C (Surrogate Corrected)									
MIREX	0	2	2.02	2.02	0.014	2.01	2.03	*	*
	14	1	2.04	2.04	*	2.04	2.04	*	*
	28	2	1.63	1.63	0.085	1.57	1.69	*	*
	70	2	1.78	1.78	0.057	1.74	1.82	*	*
	154	2	2.03	2.03	0.247	1.85	2.20	*	*

* = Not calculable, too few observations

Table A-13. Pesticide descriptive statistics for Tri-Cities NY sediment by day and holding condition

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Tri-Cities, NY 4°C									
γ-Chlordane	0	4	5326	5248	1191	4154	6656	4242	6489
	7	2	5253	5253	205	5108	5398	*	*
	14	1	5375	5375	*	5375	5375	*	*
	28	1	4947	4947	*	4947	4947	*	*
	42	2	6432	6432	606	6003	6860	*	*
	84	2	7866	7866	384	7594	8137	*	*
	168	2	5682	5682	210	5534	5831	*	*
α-Chlordane	0	4	5971	5853	1304	4685	7493	4792	7269
	7	2	5869	5869	217	5716	6022	*	*
	14	1	6065	6065	*	6065	6065	*	*
	28	1	5556	5556	*	5556	5556	*	*
	42	2	6679	6679	551	6290	7069	*	*
	84	2	8227	8227	377	7960	8493	*	*
Trans Nonachlor	0	4	3678	3571	867	2865	4706	2915	4549
	7	2	3669	3669	141	3570	3769	*	*
	14	1	3773	3773	*	3773	3773	*	*
	28	1	3475	3475	*	3475	3475	*	*
	42	2	4227	4227	367	3968	4486	*	*
	84	2	5387	5387	191	5252	5522	*	*
Tri-Cities, NY -20°C									
γ-Chlordane	0	4	5326	5248	1191	4154	6656	4242	6489
	7	2	3784	3784	2030	2348	5219	*	*
	14	2	6397	6397	1221	5534	7260	*	*
	28	2	6595	6595	1086	5827	7363	*	*
	42	2	6834	6834	1149	6021	7646	*	*
	84	2	7762	7762	47	7729	7795	*	*
α-Chlordane	0	4	5971	5853	1304	4685	7493	4792	7269
	7	2	4333	4333	2137	2822	5845	*	*
	14	2	7086	7086	1286	6176	7995	*	*
	28	2	7309	7309	1107	6526	8091	*	*
	42	2	7250	7250	915	6603	7897	*	*
	84	2	8117	8117	92.4	8052	8183	*	*
Trans Nonachlor	0	4	3678	3571	867	2865	4706	2915	4549
	7	2	2670	2670	1385	1690	3649	*	*
	14	2	4395	4395	835	3805	4985	*	*
	28	2	4611	4611	804	4043	5180	*	*
	42	2	4600	4600	643	4146	5054	*	*
	84	2	5279	5279	45.6	5246	5311	*	*
	0	4	5326	5248	1191	4154	6656	4242	6489

* = Not calculable, too few observations

Table A-14. Pesticide descriptive statistics for Bedford-1 sediment by day and holding condition

Analyte	Day	N	Mean (ng/g)	Median (ng/g)	Standard Deviation	Minimum (ng/g)	Maximum (ng/g)	First Quartile (ng/g)	Third Quartile (ng/g)
Bedford-1 4°C (Surrogate Corrected)									
2,4-DDD	0	4	109	112	109	9.14	4.57	95.6	116
	7	2	102	102	102	3.00	2.12	100	104
	14	2	116	116	116	20.9	14.8	102	131
	29	2	96.2	96.2	96.2	1.29	0.910	95.3	97.1
	43	2	117	117	117	32.6	23.1	94.3	140
	84	2	113	113	113	3.12	2.20	111	115
	168	2	101	101	101	0.010	0.010	101	101
4,4-DDD	0	4	352	359	352	16.9	8.46	327	363
	7	2	356	356	356	9.60	6.79	349	363
	14	2	384	384	384	1.80	1.28	383	385
	29	2	389	389	389	4.53	3.20	385	392
	43	2	332	332	332	4.83	3.41	329	336
	84	2	333	333	333	13.2	9.34	324	343
	168	2	284	284	284	0.870	0.62	284	285
4,4-DDT	0	4	63.3	63.1	63.3	3.97	1.98	59.0	68.0
	7	2	59.7	59.7	59.7	3.07	2.17	57.5	61.9
	14	2	85.5	85.5	85.5	24.0	17.0	68.5	103
	29	2	103	103	103	8.82	6.24	96.8	109
	43	2	98.5	98.5	98.5	9.79	6.92	91.6	105
	84	2	86.9	86.9	86.9	3.51	2.48	84.4	89.4
	168	2	49.3	49.3	49.3	1.98	1.40	47.9	50.7
Bedford-1 -20°C (Surrogate Corrected)									
2,4-DDD	0	4	109	112	109	9.14	4.57	95.6	116
	7	2	111	111	111	1.99	1.41	110	113
	14	2	111	111	111	2.64	1.87	109	113
	29	2	94.0	94.0	94.0	3.29	2.33	91.7	96.3
	43	2	120	120	120	25.3	17.9	102	138
	84	2	107	107	107	2.76	1.95	105	109
	168	2	111	111	111	6.27	4.43	107	116
4,4-DDD	0	4	352	359	352	16.9	8.46	327	363
	7	2	387	387	387	7.93	5.61	381	392
	14	2	379	379	379	2.53	1.79	377	381
	29	2	375	375	375	11.4	8.07	367	383
	43	2	346	346	346	26.8	19.0	327	365
	84	2	308	308	308	13.2	9.31	298	317
	168	2	320	320	320	13.6	9.62	311	330
4,4-DDT	0	4	63.3	63.1	63.3	3.96	1.98	59.0	68.0
	7	2	63	63	63	2.79	1.98	61.0	65.0
	14	2	68.1	68.1	68.1	3.53	2.50	65.6	70.6
	29	2	101	101	101	3.61	2.55	98.5	104
	43	2	85.8	85.8	85.8	2.24	1.58	84.3	87.4
	84	2	80.4	80.4	80.4	3.32	2.35	78.1	82.8
	168	2	71.4	71.4	71.4	16.8	11.9	59.5	83.3

* = Not calculable, too few observations

Table A-15. Heavy metal descriptive statistics for Sinclair sediment by day and holding condition

Metal	Days	N	Mean (μg/g)	Median (μg/g)	Standard Deviation	Minimum (μg/g)	Maximum (μg/g)	First Quartile (μg/g)	Third Quartile (μg/g)
					WET				
As	0	5	22.5	22.1	1.44	20.8	24.4	21.2	23.9
	90	2	21.7	21.7	0.85	21.1	22.3	*	*
	183	1	23.6	23.6	*	23.6	23.6	*	*
	217	1	17.9	17.9	*	17.9	17.9	*	*
	284	2	25.3	25.3	1.06	24.5	26.0	*	*
	392	2	22.1	22.1	2.74	20.2	24.0	*	*
Cu	0	5	504	517	52.1	419	548	458	545
	90	2	548	548	133	454	642	*	*
	183	1	574	574	*	574	574	*	*
	217	1	538	538	*	538	538	*	*
	284	2	491	491	62.2	447	535	*	*
	392	2	461	461	1.90	460	462	*	*
Pb	0	4	164	165	26.1	135	191	139	188
	90	2	155	155	17.7	142	167	*	*
	183	1	179	179	*	179	179	*	*
	217	1	156	156	*	156	156	*	*
	284	2	191	191	52.3	154	228	*	*
	392	2	149	149	2.83	147	151	*	*
Zn	0	5	470	469	28.8	437	515	447	494
	90	2	465	465	27.6	445	484	*	*
	183	1	512	512	*	512	512	*	*
	217	1	456	456	*	456	456	*	*
	284	2	481	481	6.36	476	485	*	*
	392	2	442	442	18.6	429	455	*	*

Metal	Days	N	Mean	Median	Standard Deviation	Minimum	Maximum	First Quartile	Third Quartile
					DRY				
As	0	5	22.5	22.1	1.44	20.8	24.4	21.2	23.9
	90	2	20.1	20.1	3.68	17.5	22.7	*	*
	183	1	19.3	19.3	*	19.3	19.3	*	*
	217	1	16.2	16.2	*	16.2	16.2	*	*
	284	2	22.1	22.1	1.56	21.0	23.2	*	*
	392	2	18.6	18.6	0.40	18.3	18.9	*	*
Cu	0	5	504	517	52.1	419	548	458	545
	90	2	489	489	2.12	487	490	*	*
	183	1	508	508	*	508	508	*	*
	217	1	511	511	*	511	511	*	*
	284	2	472	472	25.5	454	490	*	*
	392	2	434	434	27.8	414	453	*	*
Pb	0	4	164	165	26.1	135	191	139	188
	90	2	159	159	11.3	151	167	*	*
	183	1	151	151	*	151	151	*	*
	217	1	134	134	*	134	134	*	*
	284	2	254	254	6.36	249	258	*	*
	392	2	196	196	50.8	160	232	*	*

Metal	Days	N	Mean (µg/g)	Median (µg/g)	Standard Deviation	Minimum (µg/g)	Maximum (µg/g)	First Quartile (µg/g)	Third Quartile (µg/g)
Zn	0	5	470	469	28.8	437	515	447	494
	90	2	452	452	41.7	422	481	*	*
	183	1	448	448	*	448	448	*	*
	217	1	414	414	*	414	414	*	*
	284	2	453	453	17.7	440	465	*	*
	392	2	405	405	2.80	403	407	*	*

* = Not calculable

Table A-16. Heavy metal descriptive statistics for Wilmington sediment by day and holding condition

Metal	Days	N	Mean (μg/g)	Median (μg/g)	Standard Deviation	Minimum (μg/g)	Maximum (μg/g)	First Quartile (μg/g)	Third Quartile (μg/g)
					WET				
As	0	5	63.4	63.4	3.05	60.5	67.7	60.6	66.4
	91	2	66.6	66.6	7.35	61.4	71.8	*	*
	182	2	62.7	62.7	0.508	62.3	63.0	*	*
	279	2	60.6	60.6	2.33	58.9	62.2	*	*
	391	2	64.3	64.3	6.29	59.9	68.8	*	*
Cu	0	5	122	121	7.26	111	129	116	129
	91	2	131	131	14.1	121	141	*	*
	182	2	124	124	0.980	123	125	*	*
	279	2	136	136	3.54	133	138	*	*
	391	2	117	117	6.32	113	122	*	*
Pb	0	5	5676	5700	471	5140	6250	5210	6130
	91	2	6595	6595	1195	5750	7440	*	*
	182	2	5615	5615	445	5300	5930	*	*
	279	2	5775	5775	1124	4980	6570	*	*
	391	2	4572	4572	124	4484	4660	*	*
Zn	0	4	61.5	61.3	4.82	57.1	66.2	57.2	65.9
	91	2	72.6	72.6	6.58	67.9	77.2	*	*
	182	2	62.1	62.1	1.32	61.1	63.0	*	*
	279	2	65.3	65.3	13.2	55.9	74.6	*	*
	391	2	53.6	53.6	3.83	50.9	56.3	*	*

Metal	Days	N	Mean	Median	Standard Deviation	Minimum	Maximum	First Quartile	Third Quartile
					DRY				
As	0	5	63.4	63.4	3.05	60.5	67.7	60.6	66.4
	91	2	62.7	62.7	4.74	59.3	66.0	*	*
	182	2	66.4	66.4	7.36	61.2	71.6	*	*
	279	2	55.6	55.6	1.91	54.2	56.9	*	*
	391	2	60.0	60.0	0.268	59.9	60.2	*	*
Cu	0	5	122	121	7.26	111	129	116	129
	91	2	124	124	10.6	116	131	*	*
	182	2	133	133	14.7	123	144	*	*
	279	2	138	138	12.0	129	146	*	*
	391	2	125	125	2.33	124	127	*	*
Pb	0	5	5676	5700	471	5140	6250	5210	6130
	91	2	6615	6615	926	5960	7270	*	*
	182	2	6160	6160	467	5830	6490	*	*
	279	2	5710	5710	156	5600	5820	*	*
	391	2	4839	4839	49.3	4804	4874	*	*
Zn	0	4	61.5	61.3	4.82	57.1	66.2	57.2	65.9
	91	2	56.4	56.4	5.94	52.2	60.6	*	*
	182	2	66.5	66.5	2.12	65.0	68.0	*	*
	279	2	68.2	68.2	3.89	65.4	70.9	*	*

Metal	Days	N	Mean (μg/g)	Median (μg/g)	Standard Deviation	Minimum (μg/g)	Maximum (μg/g)	First Quartile (μg/g)	Third Quartile (μg/g)
	391	2	68.0	68.0	2.04	66.6	69.4	*	*

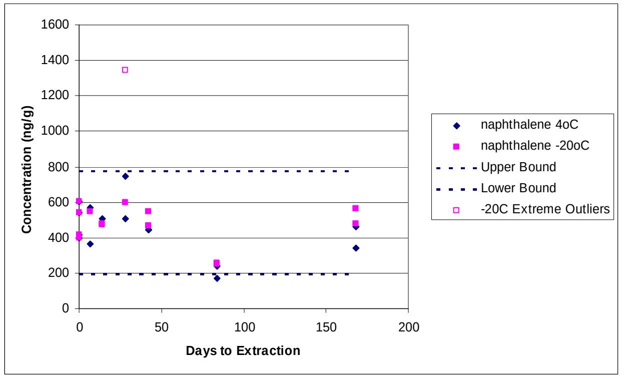
* = Not calculable, too few observations

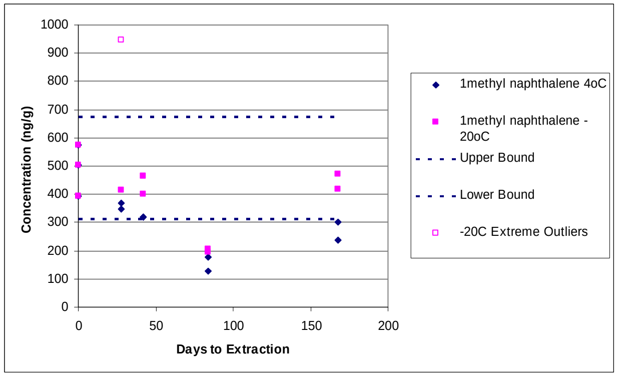
Appendix B

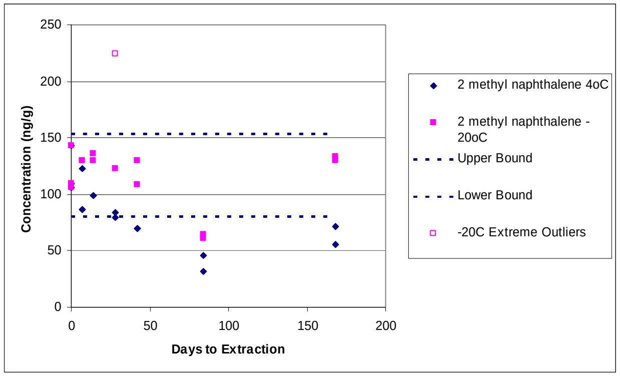
Plots of Concentration vs. Time for All Sediment/Soil Extraction Holding Time Studies

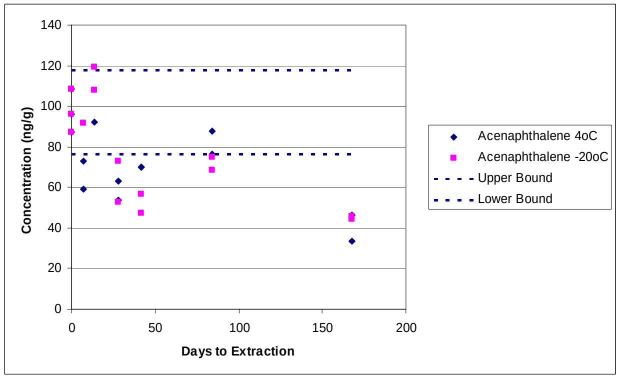
PAHs

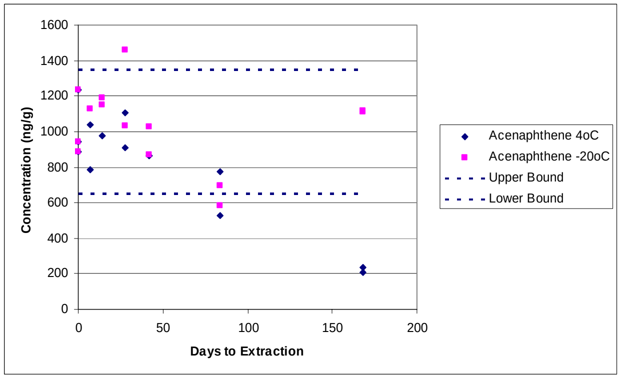
Eagle Harbor:

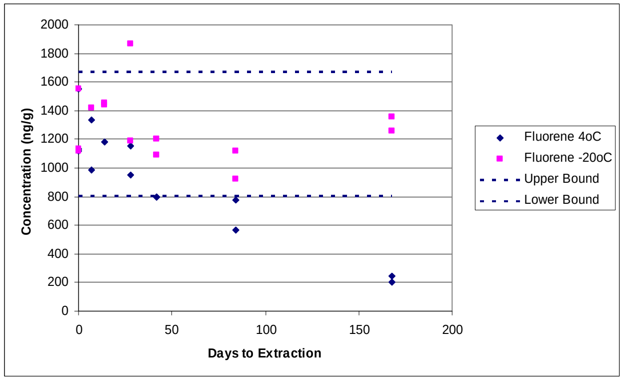


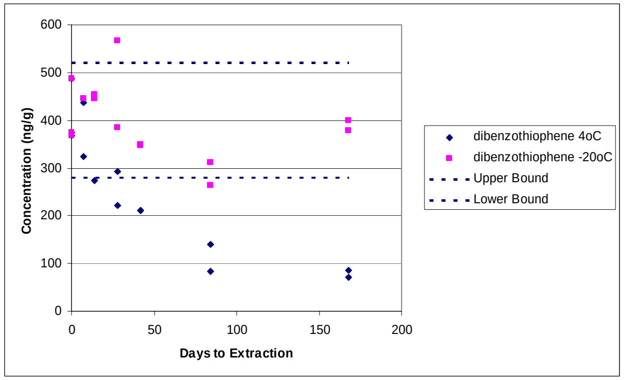


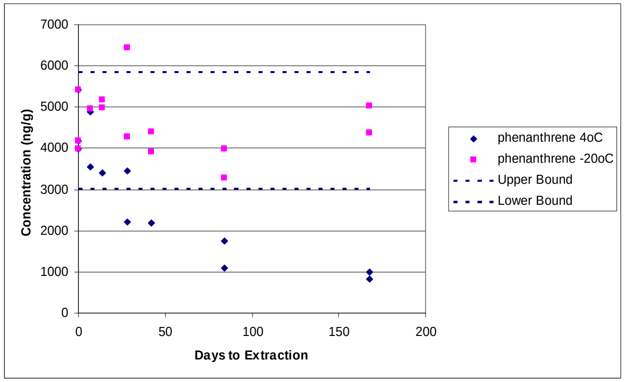


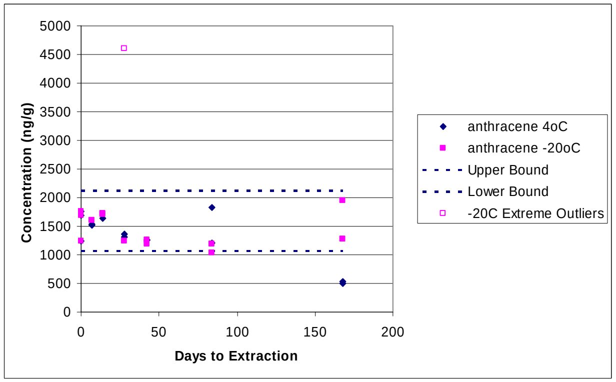


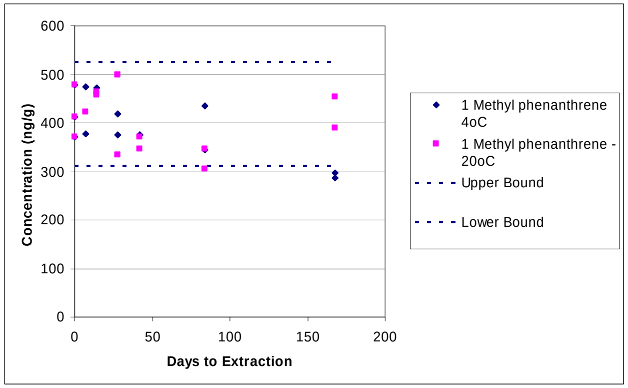


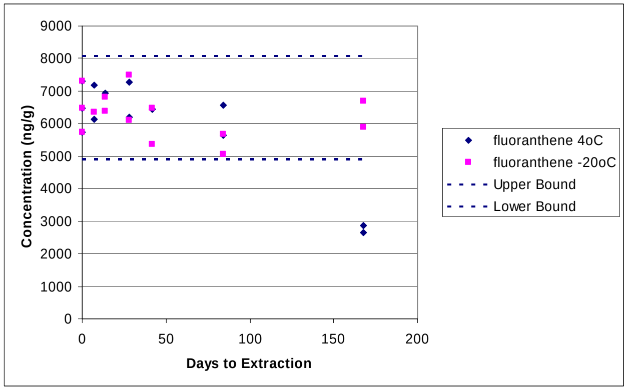


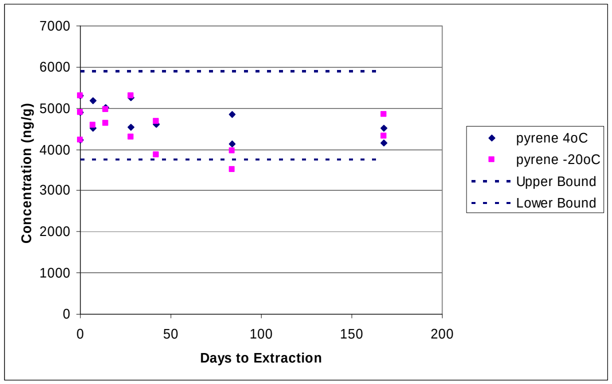


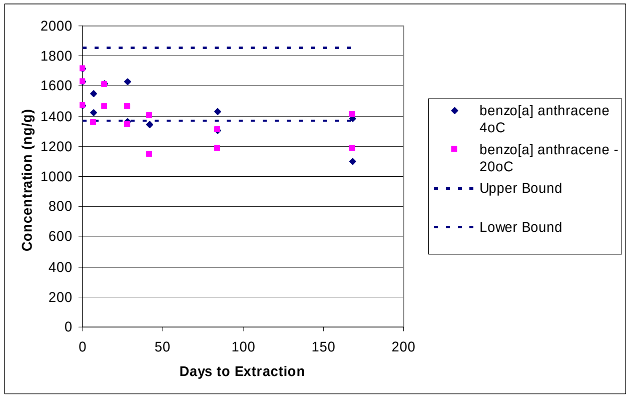


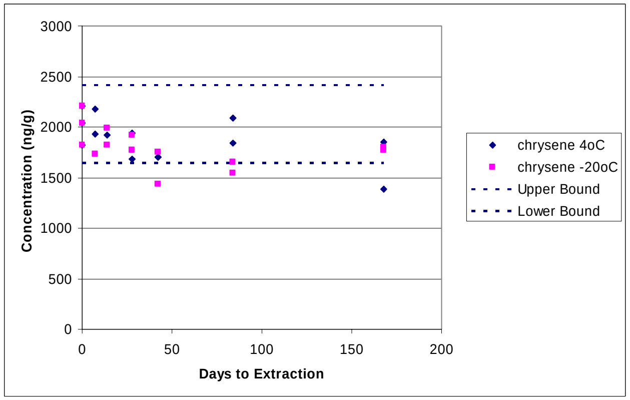


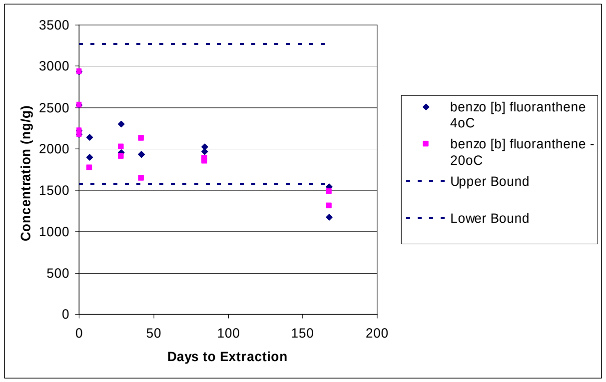

Concentration (ng/g)
Days to Extraction
1 Methyl phenanthrene 4oC
1 Methyl phenanthrene -20oC
Upper Bound
Lower Bound

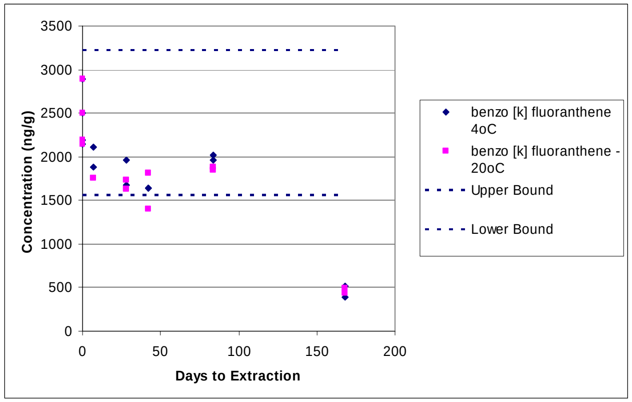

Concentration (ng/g)
Days to Extraction
fluoranthene 4oC
fluoranthene -20oC
Upper Bound
Lower Bound

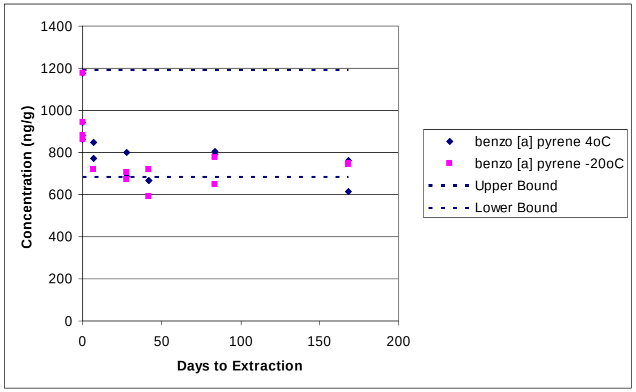

Concentration (ng/g)
Days to Extraction
pyrene 4oC
pyrene -20oC
Upper Bound
Lower Bound

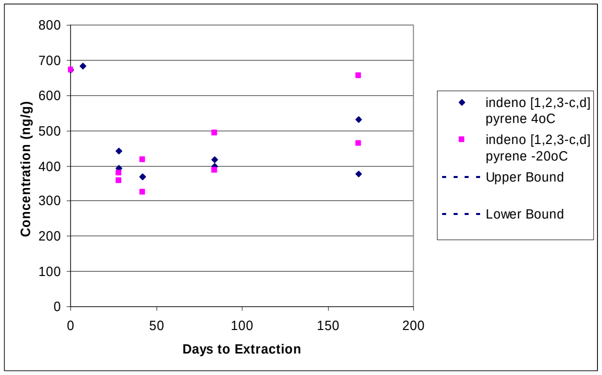

Concentration (ng/g)
Days to Extraction
benzo[a] anthracene 4oC
benzo[a] anthracene -20oC
Upper Bound
Lower Bound

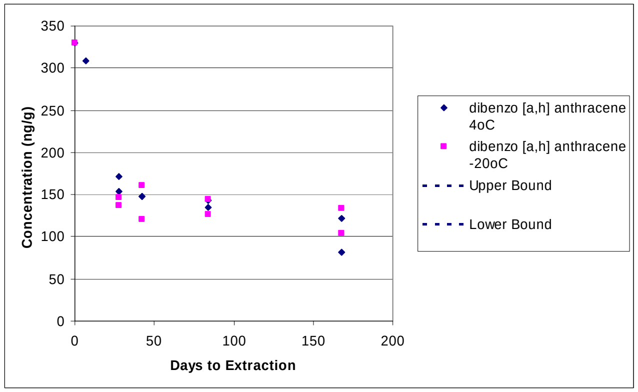

Concentration (ng/g)
Days to Extraction
chrysene 4oC
chrysene -20oC
Upper Bound
Lower Bound

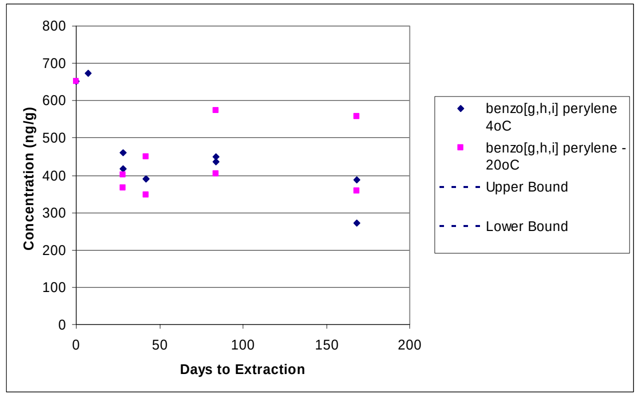

Concentration (ng/g)
Days to Extraction
benzo [b] fluoranthene 4oC
benzo [b] fluoranthene -20oC
Upper Bound
Lower Bound


Concentration (ng/g)
Days to Extraction
benzo [k] fluoranthene 4oC
benzo [k] fluoranthene -20oC
Upper Bound
Lower Bound

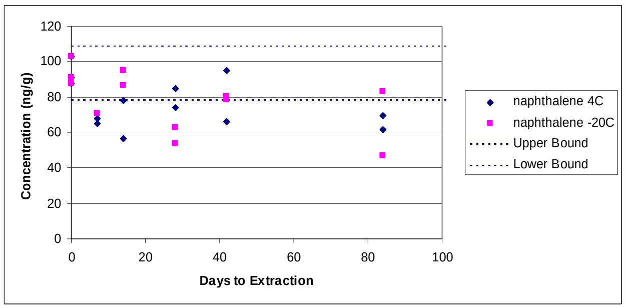

Concentration (ng/g)
Days to Extraction
benzo [a] pyrene 4oC
benzo [a] pyrene -20oC
Upper Bound
Lower Bound

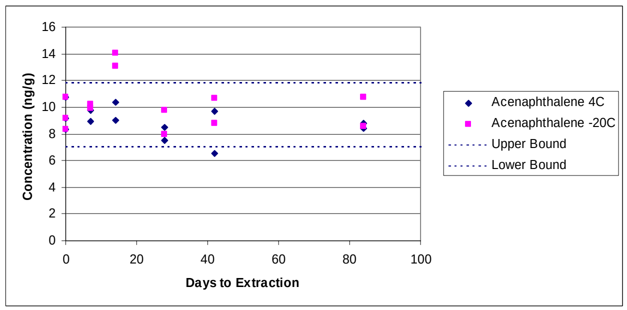

Concentration (ng/g)
Days to Extraction
indeno [1,2,3-c,d] pyrene 4oC
indeno [1,2,3-c,d] pyrene -20oC
Upper Bound
Lower Bound

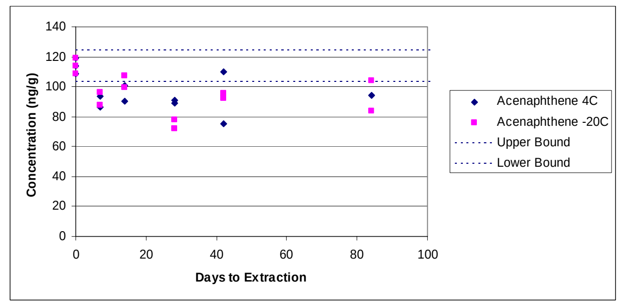

Concentration (ng/g)
Days to Extraction
dibenzo [a,h] anthracene 4oC
dibenzo [a,h] anthracene -20oC
Upper Bound
Lower Bound

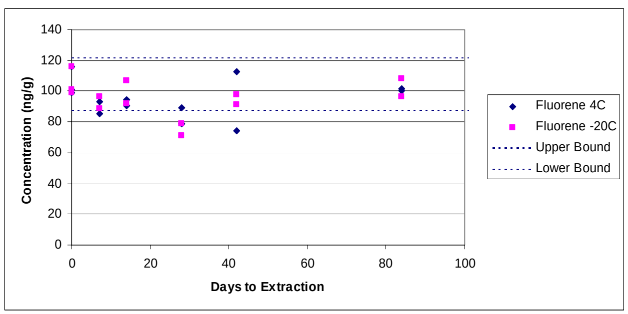

Concentration (ng/g)
Days to Extraction
benzo[g,h,i] perylene 4oC
benzo[g,h,i] perylene -20oC
Upper Bound
Lower Bound

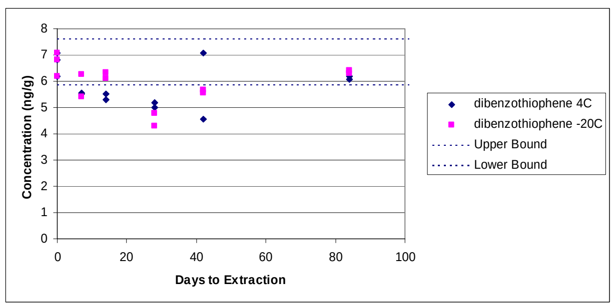
Sequim Bay:

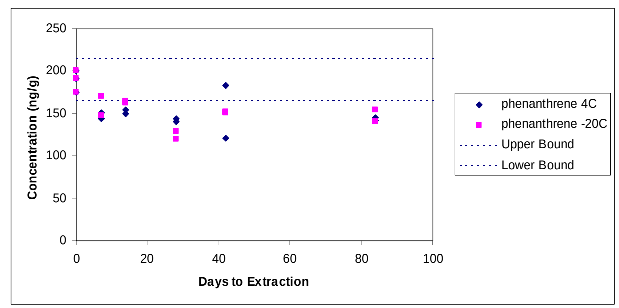

Concentration (ng/g)
Days to Extraction
naphthalene 4C
naphthalene -20C
Upper Bound
Lower Bound

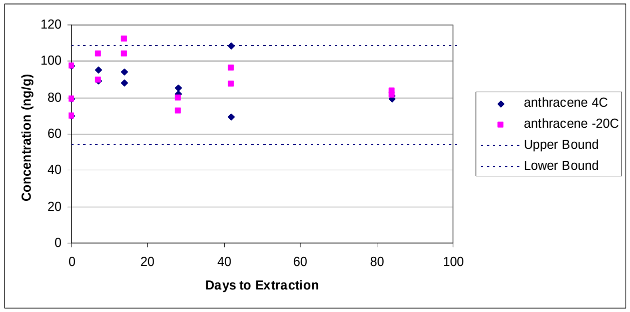

Concentration (ng/g)
Days to Extraction
Acenaphthalene 4C
Acenaphthalene -20C
Upper Bound
Lower Bound

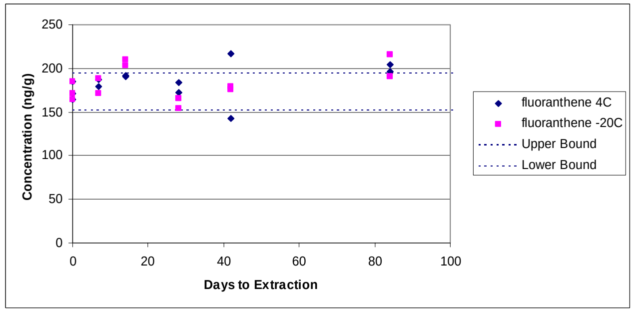

Concentration (ng/g)
Days to Extraction
Acenaphthene 4C
Acenaphthene -20C
Upper Bound
Lower Bound

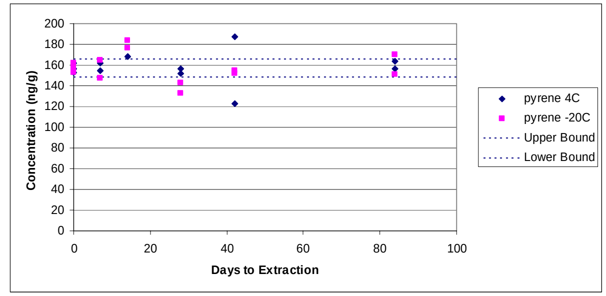

Concentration (ng/g)
Days to Extraction
Fluorene 4C
Fluorene -20C
Upper Bound
Lower Bound

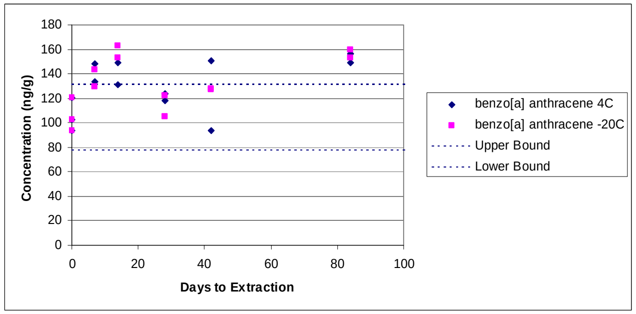

Concentration (ng/g)
Days to Extraction
dibenzothiophene 4C
dibenzothiophene -20C
Upper Bound
Lower Bound

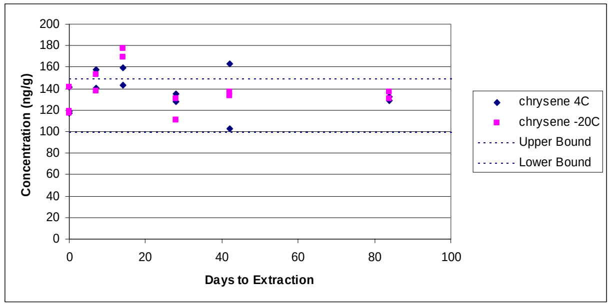

Concentration (ng/g)
Days to Extraction
phenanthrene 4C
phenanthrene -20C
Upper Bound
Lower Bound

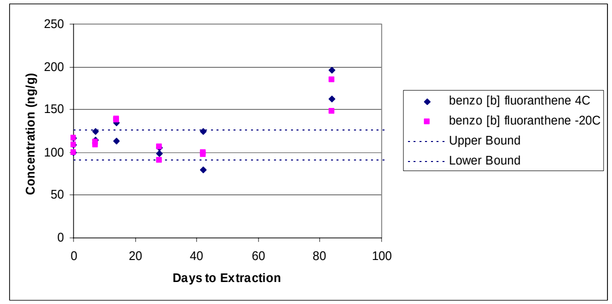

Concentration (ng/g)
0
20
40
60
80
100
120
0
20
40
60
80
100
Days to Extraction
anthracene 4C
anthracene -20C
Upper Bound
Lower Bound

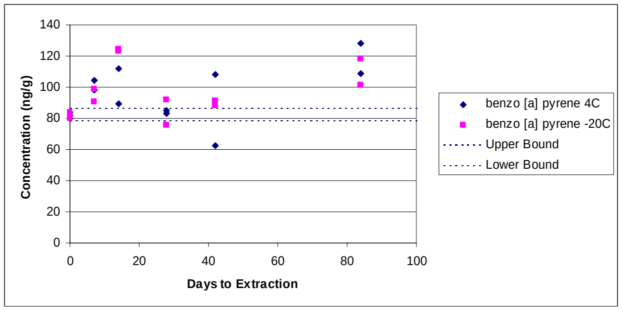

Concentration (ng/g)
0
50
100
150
200
250
0
20
40
60
80
100
Days to Extraction
fluoranthene 4C
fluoranthene -20C
Upper Bound
Lower Bound

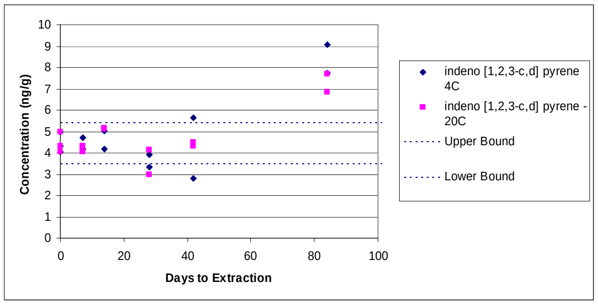

Concentration (ng/g)
0
20
40
60
80
100
120
140
160
180
200
0
20
40
60
80
100
Days to Extraction
pyrene 4C
pyrene -20C
Upper Bound
Lower Bound

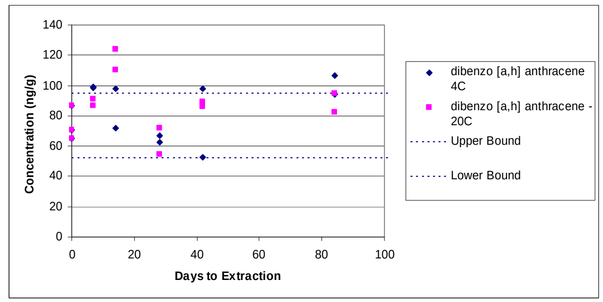

Concentration (ng/g)
0
20
40
60
80
100
120
140
160
180
0
20
40
60
80
100
Days to Extraction
benzo[a] anthracene 4C
benzo[a] anthracene -20C
Upper Bound
Lower Bound

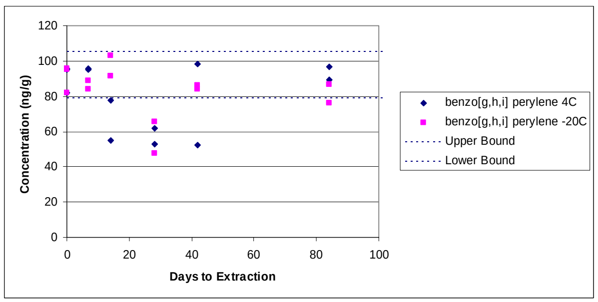

Concentration (ng/g)
0
20
40
60
80
100
120
140
160
180
200
0
20
40
60
80
100
Days to Extraction
chrysene 4C
chrysene -20C
Upper Bound
Lower Bound


Concentration (ng/g)
0
50
100
150
200
250
0
20
40
60
80
100
Days to Extraction
benzo [b] fluoranthene 4C
benzo [b] fluoranthene -20C
Upper Bound
Lower Bound

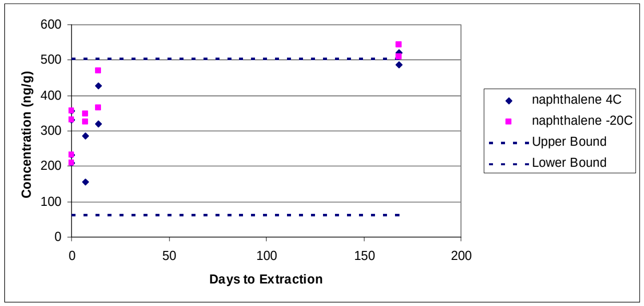

Concentration (ng/g)
0
20
40
60
80
100
120
140
0
20
40
60
80
100
Days to Extraction
benzo [a] pyrene 4C
benzo [a] pyrene -20C
Upper Bound
Lower Bound

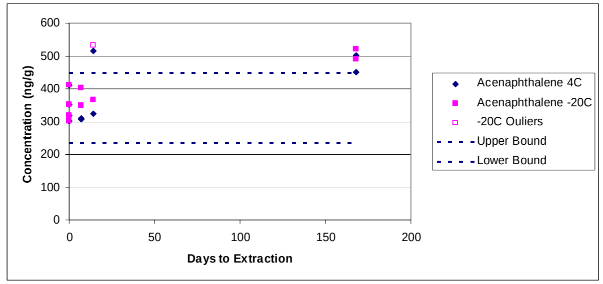

Concentration (ng/g)
0
1
2
3
4
5
6
7
8
9
10
0
20
40
60
80
100
Days to Extraction
indeno [1,2,3-c,d] pyrene 4C
indeno [1,2,3-c,d] pyrene - 20C
Upper Bound
Lower Bound

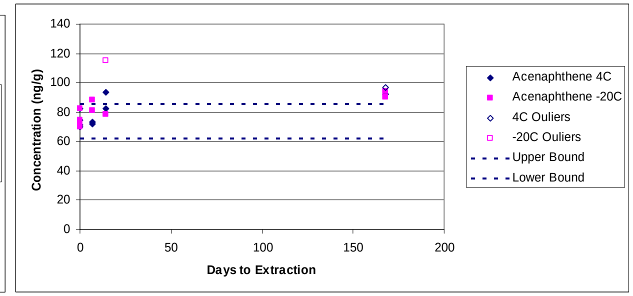

Concentration (ng/g)
0
20
40
60
80
100
120
140
0
20
40
60
80
100
Days to Extraction
dibenzo [a,h] anthracene 4C
dibenzo [a,h] anthracene - 20C
Upper Bound
Lower Bound

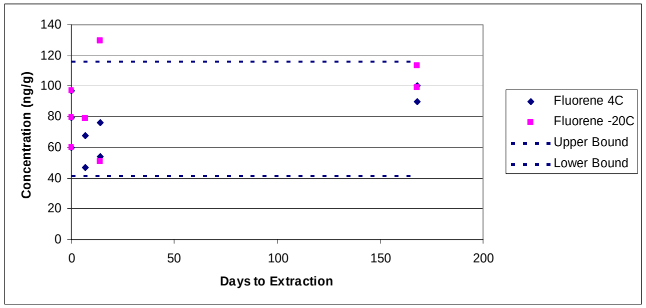

Concentration (ng/g)
0
20
40
60
80
100
120
0
20
40
60
80
100
Days to Extraction
benzo[g,h,i] perylene 4C
benzo[g,h,i] perylene -20C
Upper Bound
Lower Bound

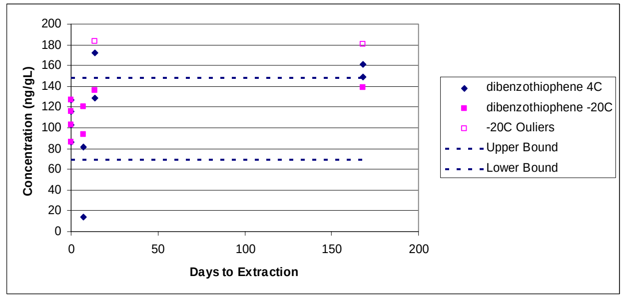
Bedford Harbor:

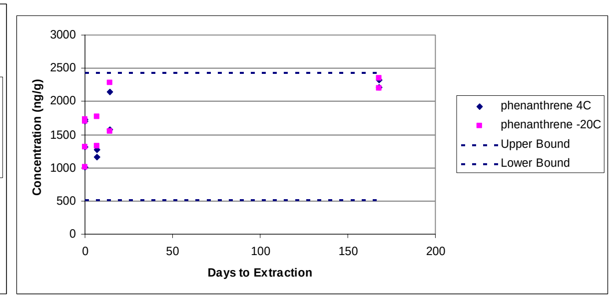


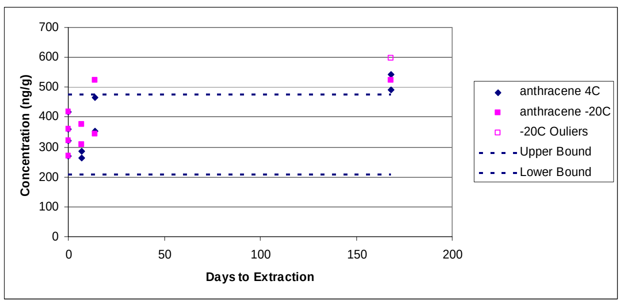


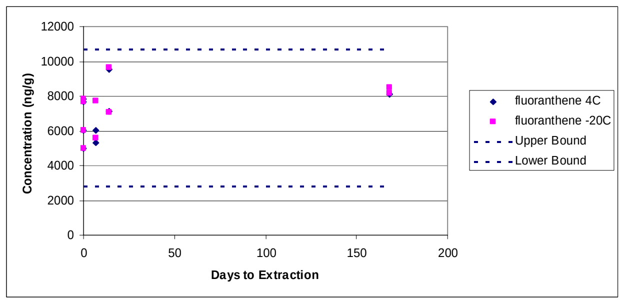


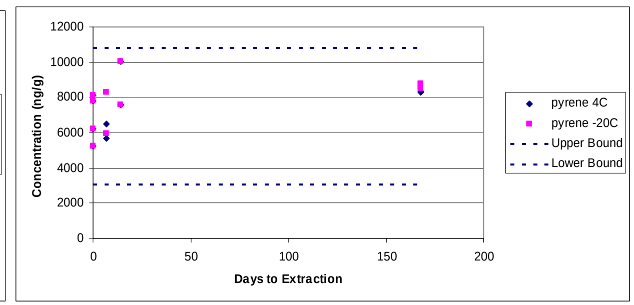


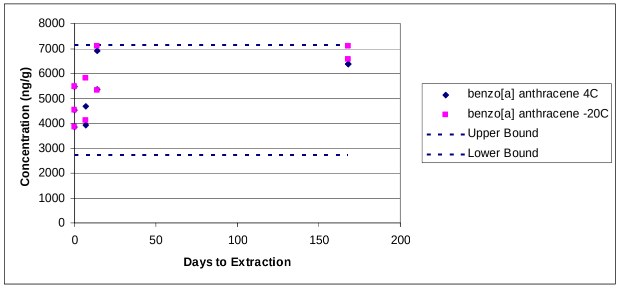


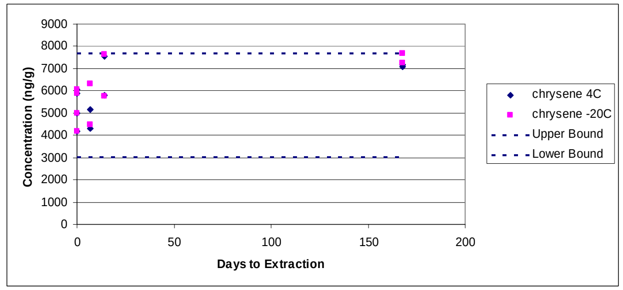


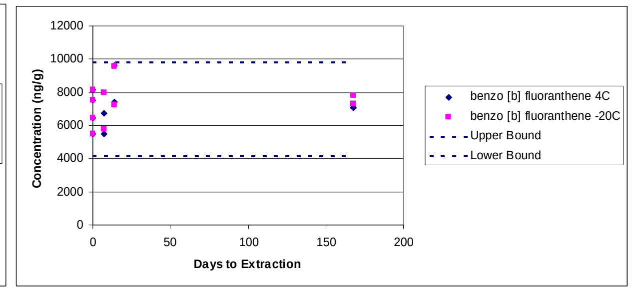


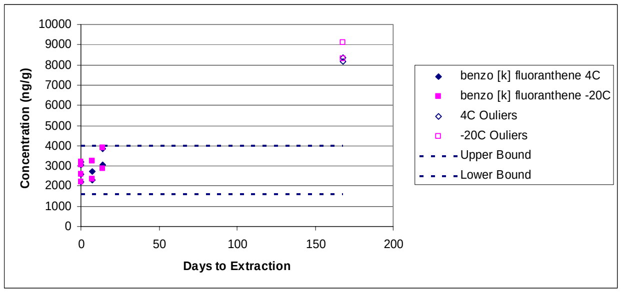


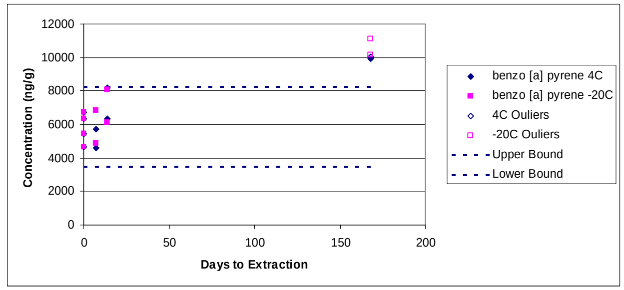


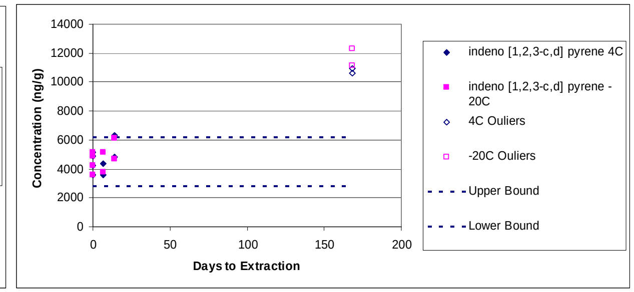

Concentration (ng/g)
Days to Extraction
benzo[a] anthracene 4C
benzo[a] anthracene -20C
Upper Bound
Lower Bound

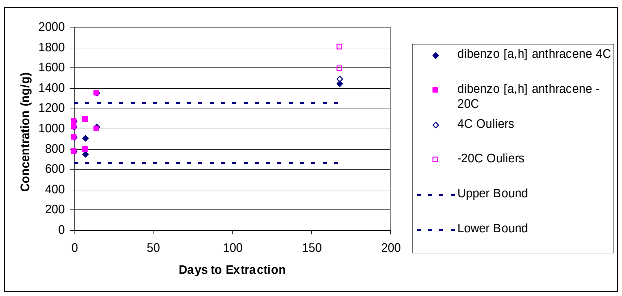

Concentration (ng/g)
Days to Extraction
chrysene 4C
chrysene -20C
Upper Bound
Lower Bound

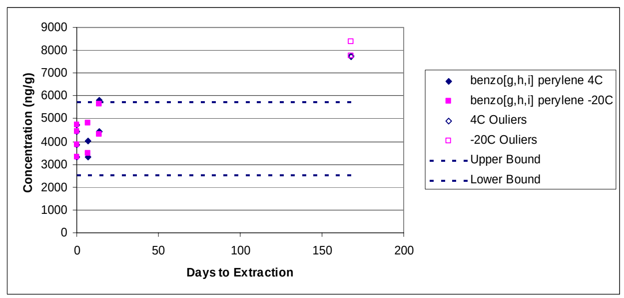

Concentration (ng/g)
Days to Extraction
benzo [b] fluoranthene 4C
benzo [b] fluoranthene -20C
Upper Bound
Lower Bound


Concentration (ng/g)
Days to Extraction
benzo [k] fluoranthene 4C
benzo [k] fluoranthene -20C
4C Ouliers
-20C Ouliers
Upper Bound
Lower Bound


Concentration (ng/g)
Days to Extraction
benzo [a] pyrene 4C
benzo [a] pyrene -20C
4C Ouliers
-20C Ouliers
Upper Bound
Lower Bound

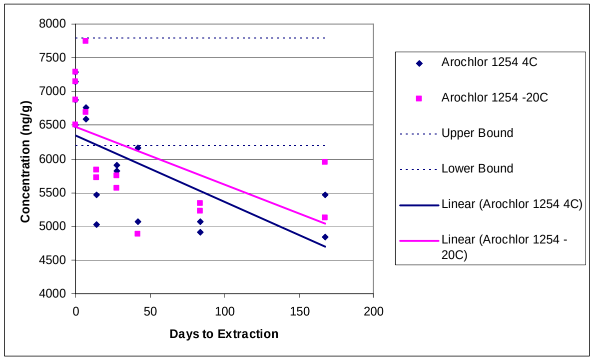

Concentration (ng/g)
Days to Extraction
indeno [1,2,3-c,d] pyrene 4C
indeno [1,2,3-c,d] pyrene -20C
4C Ouliers
-20C Ouliers
Upper Bound
Lower Bound

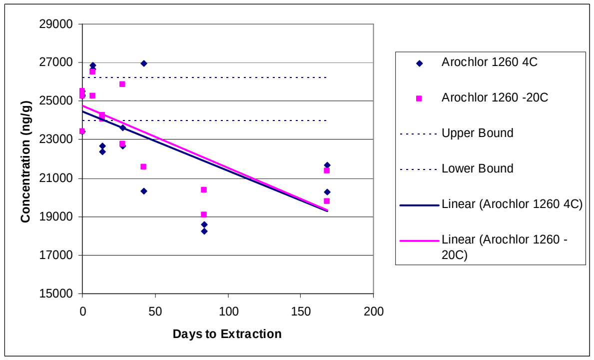

Concentration (ng/g)
Days to Extraction
dibenzo [a,h] anthracene 4C
dibenzo [a,h] anthracene -20C
4C Ouliers
-20C Ouliers
Upper Bound
Lower Bound


Concentration (ng/g)
Days to Extraction
benzo[g,h,i] perylene 4C
benzo[g,h,i] perylene -20C
4C Ouliers
-20C Ouliers
Upper Bound
Lower Bound

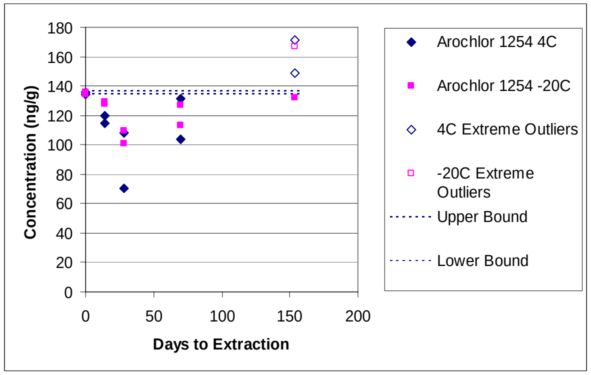
PCBs

Housatonic

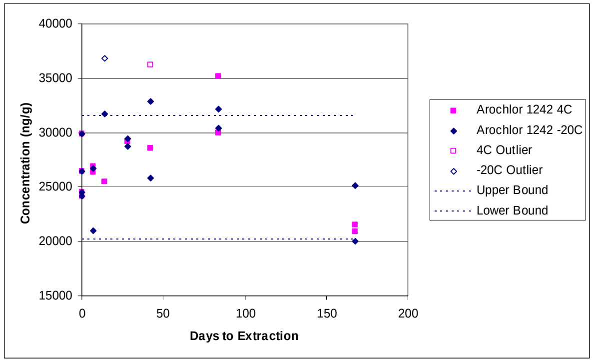


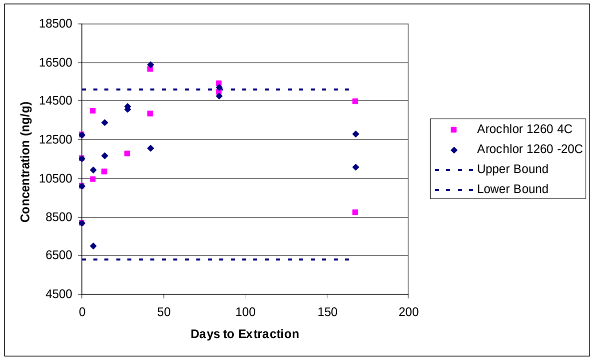


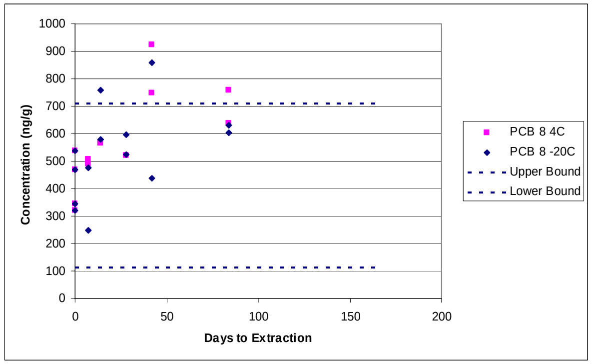
Sequim Bay:

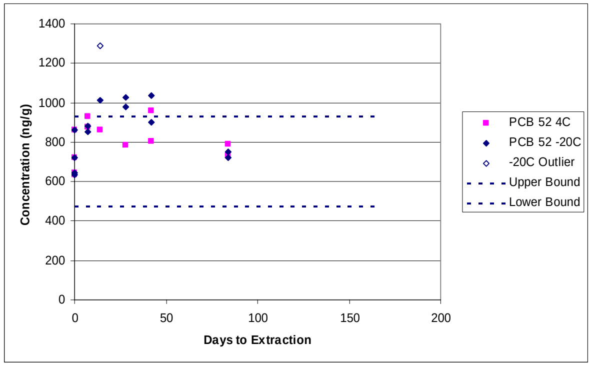


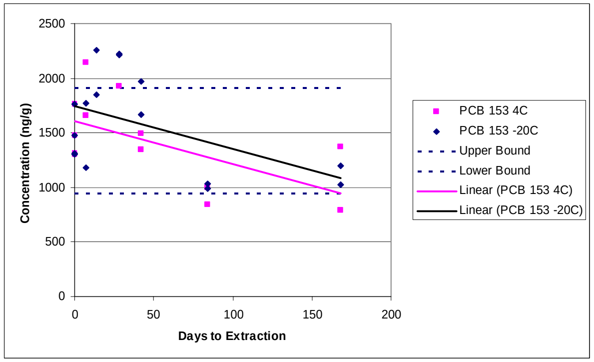
Tri-Cities, NY:

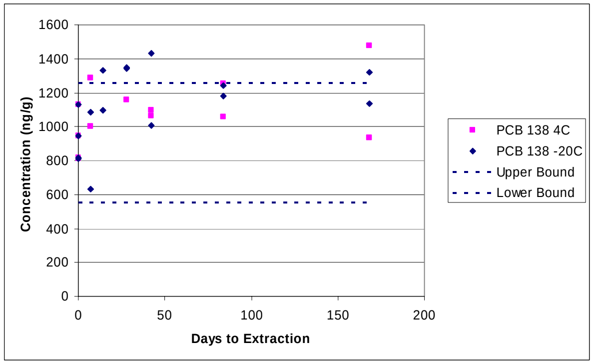


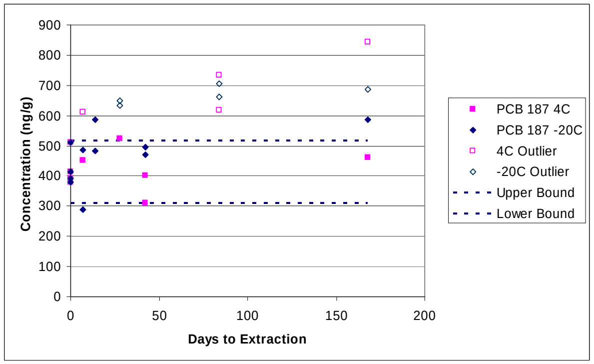


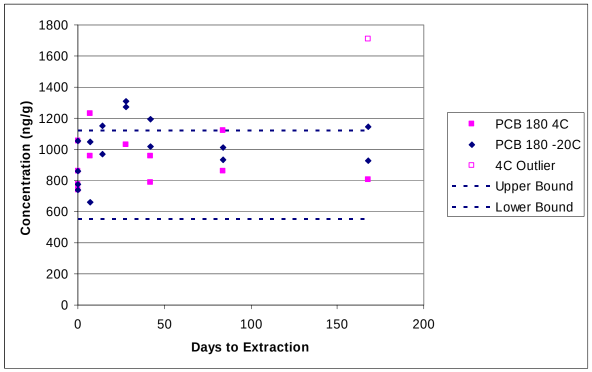


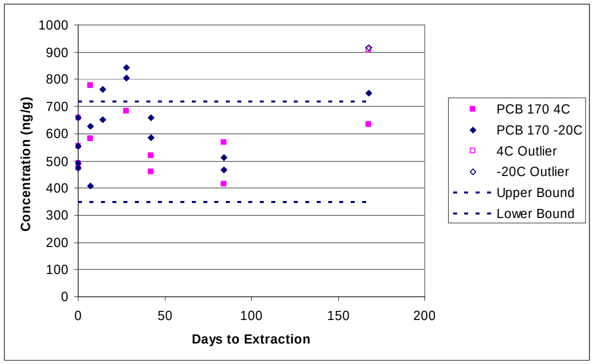






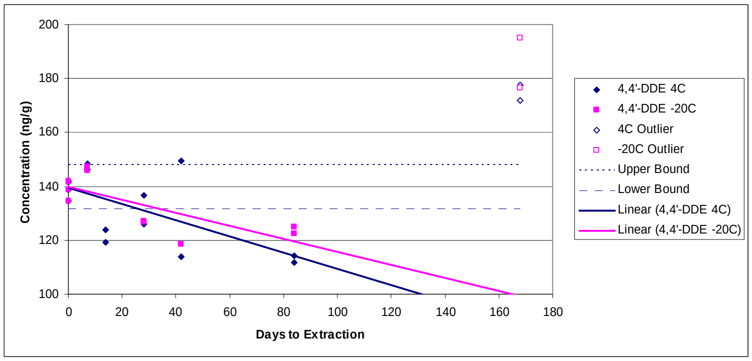




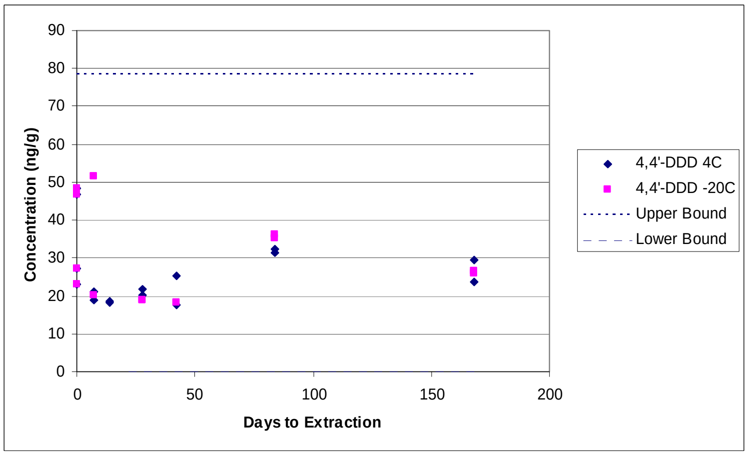


Pesticides

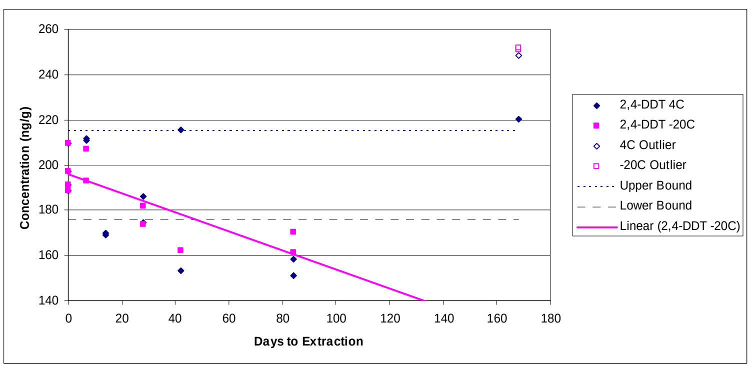
Housatonic:



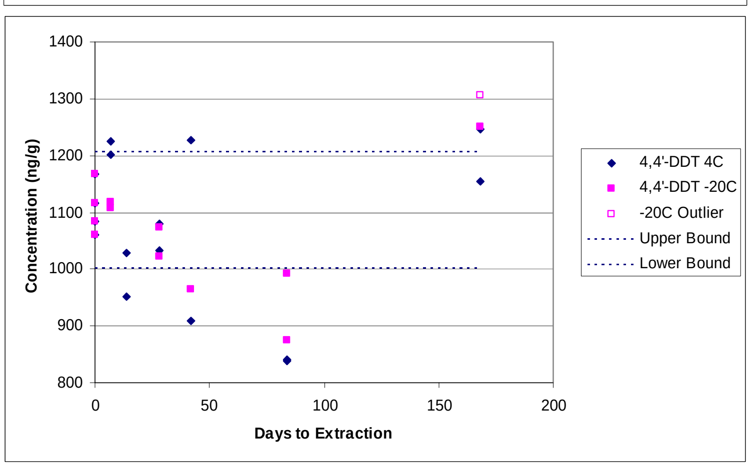
Concentration (ng/g)
Days to Extraction
200
180
160
140
120
100
0
20
40
60
80
100
120
140
160
180
4,4'-DDE 4C
4,4'-DDE -20C
4C Outlier
-20C Outlier
Upper Bound
Lower Bound
Linear (4,4'-DDE 4C)
Linear (4,4'-DDE -20C)



Concentration (ng/g)
Days to Extraction
90
80
70
60
50
40
30
20
10
0
0
50
100
150
200
4,4'-DDD 4C
4,4'-DDD -20C
Upper Bound
Lower Bound

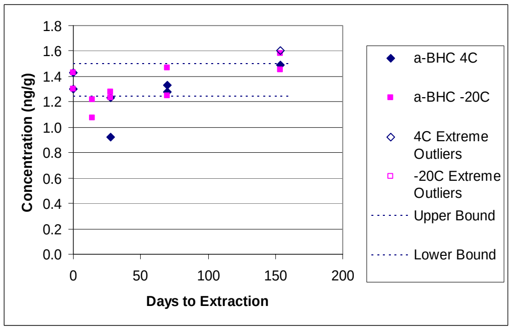


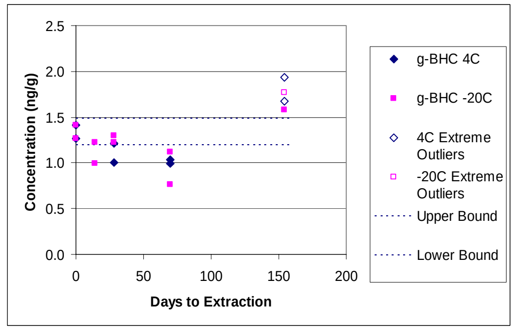
Concentration (ng/g)
Days to Extraction
260
240
220
200
180
160
140
0
20
40
60
80
100
120
140
160
180
2,4-DDT 4C
2,4-DDT -20C
4C Outlier
-20C Outlier
Upper Bound
Lower Bound
Linear (2,4-DDT -20C)

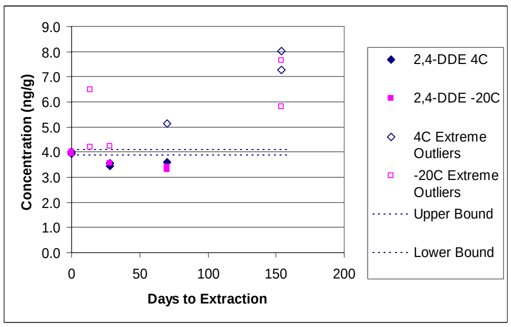


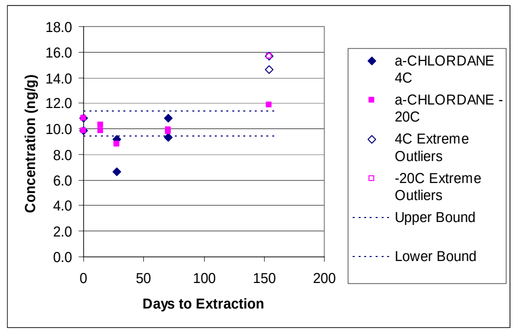
Concentration (ng/g)
Days to Extraction
1400
1300
1200
1100
1000
900
800
0
50
100
150
200
4,4'-DDT 4C
4,4'-DDT -20C
-20C Outlier
Upper Bound
Lower Bound

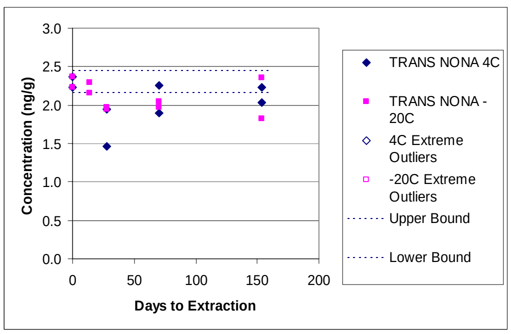
Sequim Bay:

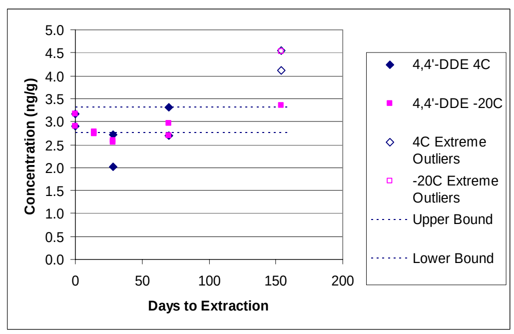

Concentration (ng/g)
Days to Extraction
a-BHC 4C
a-BHC -20C
4C Extreme Outliers
-20C Extreme Outliers
Upper Bound
Lower Bound

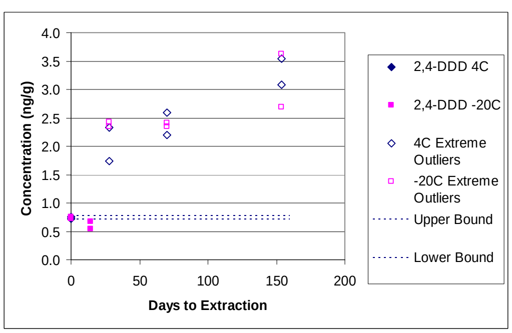

Concentration (ng/g)
Days to Extraction
g-BHC 4C
g-BHC -20C
4C Extreme Outliers
-20C Extreme Outliers
Upper Bound
Lower Bound

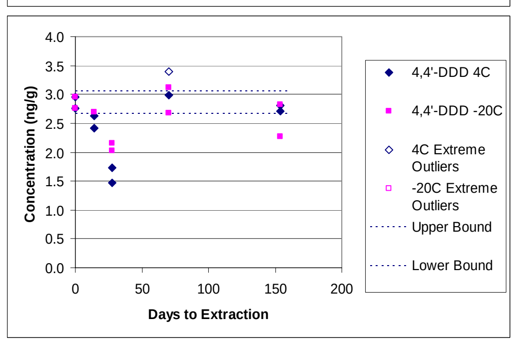

Concentration (ng/g)
Days to Extraction
2,4-DDE 4C
2,4-DDE -20C
4C Extreme Outliers
-20C Extreme Outliers
Upper Bound
Lower Bound

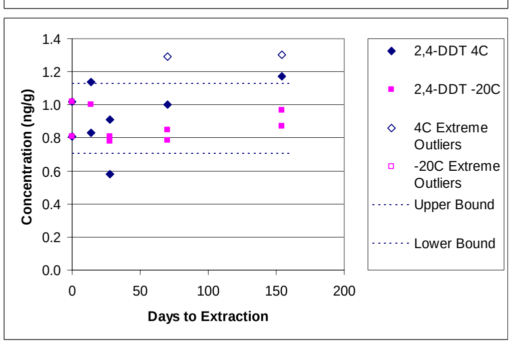

Concentration (ng/g)
Days to Extraction
a-CHLORDANE 4C
a-CHLORDANE -20C
4C Extreme Outliers
-20C Extreme Outliers
Upper Bound
Lower Bound

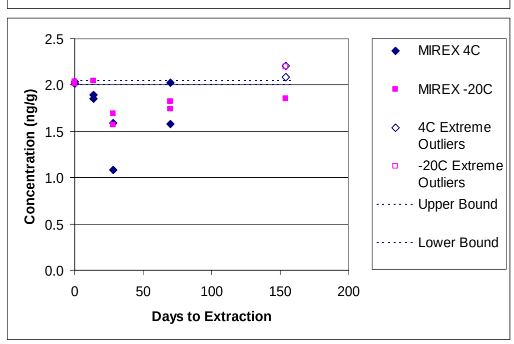

Concentration (ng/g)
Days to Extraction
TRANS NONA 4C
TRANS NONA -20C
4C Extreme Outliers
-20C Extreme Outliers
Upper Bound
Lower Bound


Concentration (ng/g)
Days to Extraction
4,4'-DDE 4C
4,4'-DDE -20C
4C Extreme Outliers
-20C Extreme Outliers
Upper Bound
Lower Bound

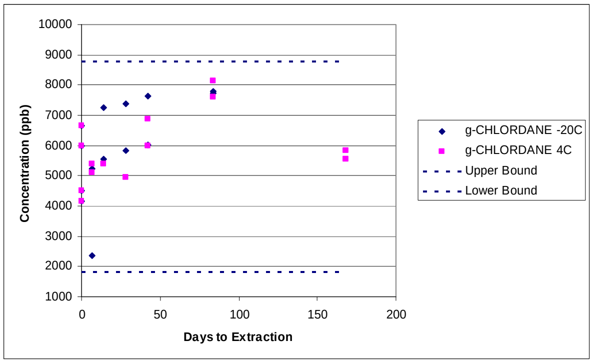

Concentration (ng/g)
Days to Extraction
2,4-DDD 4C
2,4-DDD -20C
4C Extreme Outliers
-20C Extreme Outliers
Upper Bound
Lower Bound

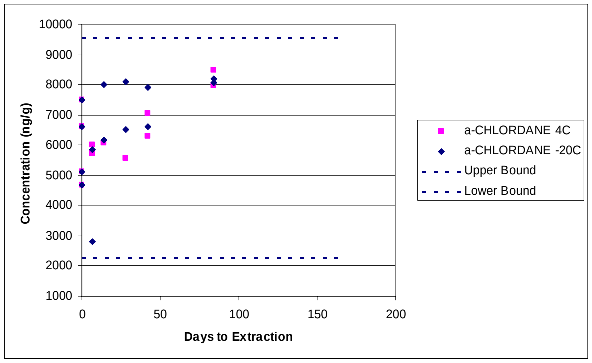

Concentration (ng/g)
Days to Extraction
4,4'-DDD 4C
4,4'-DDD -20C
4C Extreme Outliers
-20C Extreme Outliers
Upper Bound
Lower Bound

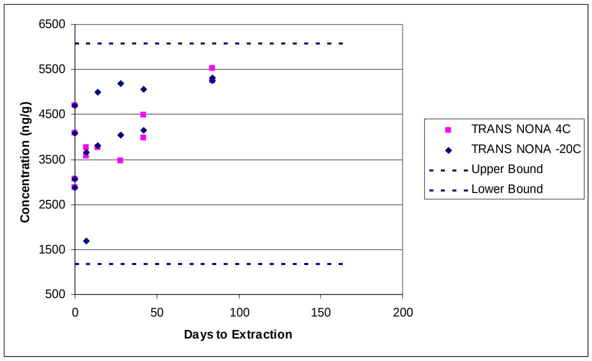

Concentration (ng/g)
Days to Extraction
2,4-DDT 4C
2,4-DDT -20C
4C Extreme Outliers
-20C Extreme Outliers
Upper Bound
Lower Bound


Concentration (ng/g)
Days to Extraction
MIREX 4C
MIREX -20C
4C Extreme Outliers
-20C Extreme Outliers
Upper Bound
Lower Bound

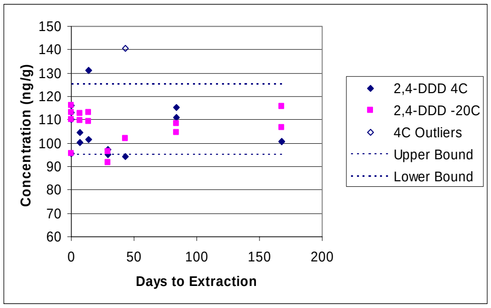
Tri-Cities, NY:

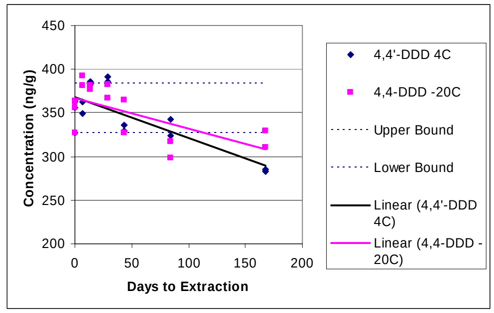


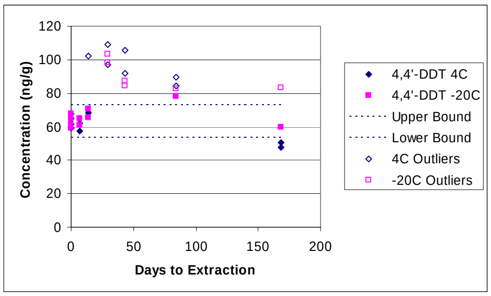




Bedford Harbor







Appendix C

Chromate [Cr(VI)] Soil Extraction

Chromate [Cr(VI)] holding time extraction data for soils 123, 125A, 125B, 125C, 126D, and 138 (Bedford soil)

The laboratory control sample (LCS), soluble ($K_2Cr_2O_7$) and insoluble ($PbCrO_4$) spikes, and the extract ($K_2Cr_2O_7$) spike are listed in red for each extraction along with the permissible QA/QC range.

Cr Soil Extraction

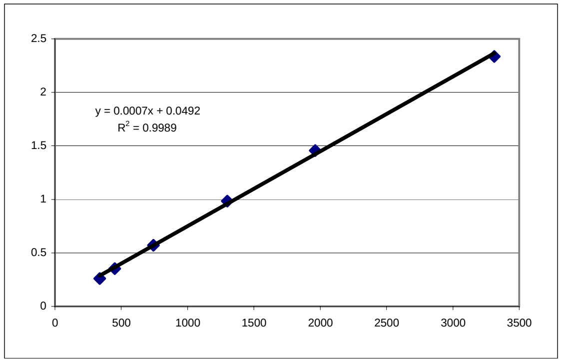
T=0 day **5/8/2003**

12763-123

Stratford Conn.

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0007		
	338	0.2615	303.7	9
	452	0.3530	434.6	10
	742	0.5704	745.5	11
	1300	0.9834	1336.2	12
	1963	1.4575	2014.4	13
	3311	2.3362	3271.2	14



slope	0.000699
intercept	0.049167
RSQ	0.9989

		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.6972	926.9	8	7415.1	7365.9	985.12	2.5503	7.4151	333.3575	330.0	5.6
Sample 2	0.5503	716.8	8	5734.2			2.5069	5.7342	321.8176		
Sample 3	0.7736	1036.2	8	8289.3			2.5320	8.2893	327.2034		
Sample 4	0.6980	928.0	8	7424.3			2.5453	7.4243	336.0315		
Sample 5	0.7454	995.8	8	7966.6			2.5158	7.9666	331.7133		
Sol Spike 6	1.0092	1373.1	32	43940.6			2.5875	43.9406	2561.7972		
Insol Spike 7	0.7451	995.4	16	15926.4	% recovery	Range	2.5835	15.9264	923.9837		
#2 + spike	0.4686	599.9	16	9598.7	96.6	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
5.0043	2159.345	103	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.9099	1231	105.0	80-120%
Blank #8	0.0055	-62		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
9.4	653.6	91	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9848	2.7566	1.7718	2.5717	1.5869	10.436		
Moisture B	0.9873	2.8639	1.8766	2.6655	1.6782	10.572	10.434	89.566
Moisture C	0.9804	3.0794	2.0990	2.8633	1.8829	10.295		

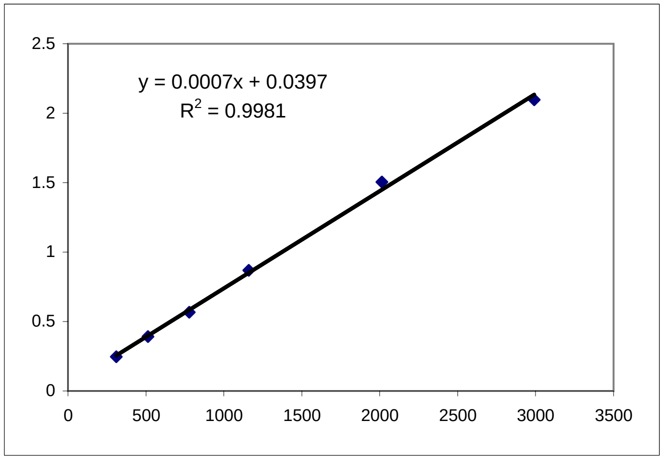
Cr Soil Extraction

T=14 day 5/22/2003

12763-123

Stratford Conn.

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	310	0.2469	296.0	9
	513	0.3908	501.5	10
	778	0.5660	751.8	11
	1159	0.8698	1185.7	12
	2015	1.5037	2091.2	13
	2991	2.0974	2939.2	14

slope	0.0007
intercept	0.039695
RSQ	0.998055

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.6846	921.2	8.0	7369.4	6680.3	974.47	2.5264	7.3694	331.7010	326.1	7.9
4˚C #2	0.5640	748.9	8.0	5991.3			2.5067	5.9913	320.5889		
4˚C #3 sol	0.7978	1082.9	16.0	17325.8			2.5009	17.3258	1041.3090		
4˚C #4 insol	1.0972	1510.5	16.0	24168.3	ave 5&6	STD DEV	2.5406	24.1683	1241.9213	ave 5&6	STD DEV
-20˚C #5	0.6128	818.6	8.0	6548.9	6413.5	191.50	2.5510	6.5489	343.5627	339.4	5.9
-20˚C #6	0.5891	784.8	8.0	6278.1			2.5785	6.2781	335.2768		
-20˚C #7 sol	0.8265	1123.9	16.0	17981.7			2.5175	17.9817	994.3834		
-20˚C #8 insol	0.8349	1135.9	16.0	18173.7	% Recovery	Range	2.5033	18.1737	1063.8254		
Sample 2+spk	0.8657	1179.8	16.0	18877.6	97.6	85-115%	2.5067	18.8776	676.6669		
Sample 6+spk	0.8758	1194.3	16.0	19108.4	97.2	85-115%	2.5785	19.1084	649.2354		

Samples # 1 through 8 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% Recovery	Range
LCS #15	0.9054	1237	103.3	80-120%
Blank #16	0.0189	-30		

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	1.5	661	108	75-125%
-20˚C	1.5	663	99	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9773	2.3273	1.3500	2.1941	1.2168	9.8667		
Moisture B	0.9701	2.7503	1.7802	2.5599	1.5898	10.6954	10.235	89.765
Moisture C	0.9736	2.7206	1.7470	2.5434	1.5698	10.1431		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	13.3	938.3	98	75-125%
-20˚C	10.5	758.4	96	75-125%

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9783	2.6272	1.6489	2.4472	1.4689	10.9164		
Moisture B	0.9809	2.5589	1.5780	2.3890	1.4081	10.7668	11.012	88.988
Moisture C	0.9796	2.6039	1.6243	2.4195	1.4399	11.3526		

Cr Soil Extraction

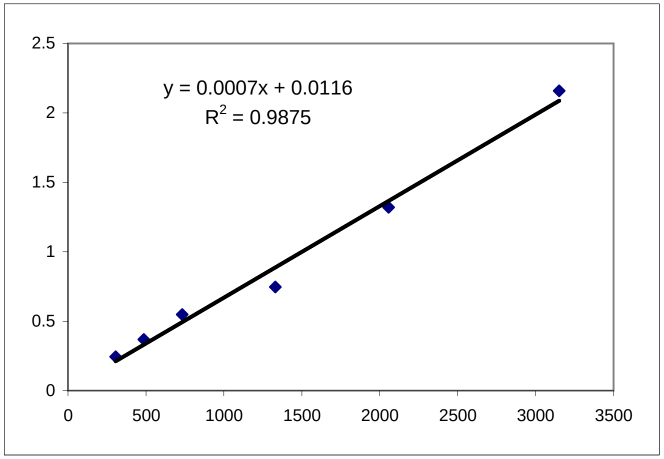
T=28 day 6/6/2003

12763-123

Stratford Conn.

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	306	0.2436	351.9	9
	487	0.3693	542.6	10
	734	0.5485	814.4	11
	1330	0.7460	1114.0	12
	2056	1.3193	1983.6	13
	3150	2.1591	3257.5	14



slope	0.000659
intercept	0.011593
RSQ	0.987509

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.7123	1062.9	8.0	8503.1	7913.4	834.05	2.5952	8.5031	386.4845	379.0	10.6
4˚C #2	0.6151	915.4	8.0	7323.6			2.5160	7.3236	371.4873		
4˚C #3 sol	0.8899	1332.3	16.0	21316.6			2.5481	21.3166	1049.5987		
4˚C #4 insol	0.9129	1367.2	16.0	21874.8	ave 5&6	STD DEV	2.5790	21.8748	1157.9653	ave 5&6	STD DEV
-20˚C #5	0.6185	920.6	8.0	7364.9	6941.9	598.08	2.5844	7.3649	372.5565	366.3	8.8
-20˚C #6	0.5488	814.9	8.0	6519.0			2.4949	6.5190	360.0934		
-20˚C #7 sol	0.7617	1137.8	16.0	18205.2			2.5042	18.2052	1092.8049		
-20˚C #8 insol	1.0616	1592.7	16.0	25483.8	% Recovery	Range	2.5161	25.4838	1213.5254		
Sample 2+spk	0.8840	1323.3	16.0	21173.4	104.9	85-115%	2.5160	21.1734	765.9450		
Sample 6+spk	0.8499	1271.6	16.0	20345.8	104.7	85-115%	2.4949	20.3458	744.2267		

Samples # 1 through 8 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% Recovery	Range	
LCS #15	0.9039	1354	103.5	80-120%	1.354
Blank #16	0.0074	-6			-0.006

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	1.5	645	104	75-125%
-20˚C	1.5	657	111	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9845	2.0520	1.0675	1.9323	0.9478	11.2131		
Moisture B	0.9921	1.9940	1.0019	1.8979	0.9058	9.5918	10.134	89.866
Moisture C	0.9836	2.0067	1.0231	1.9085	0.9249	9.5983		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	12.6	874.7	89	75-125%
-20˚C	12.1	860.5	98	75-125%

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9817	2.0419	1.0602	1.9406	0.9589	9.5548		
Moisture B	0.9761	2.0327	1.0566	1.9239	0.9478	10.2972	10.081	89.919
Moisture C	0.9863	2.0641	1.0778	1.9521	0.9658	10.3915		

Cr Soil Extraction

T=55 day 7/2/2003

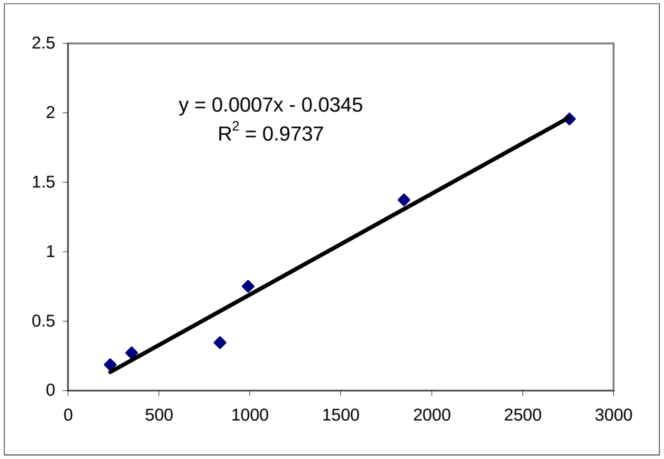
12763-123

Stratford Conn.

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	231	0.1856	303.3	9
	351	0.2726	423.1	10
	836	0.3447	522.5	11
	991	0.7512	1082.5	12
	1847	1.3740	1940.4	13
	2758	1.9558	2741.9	14

slope	0.000726
intercept	-0.034547
RSQ	0.97371



Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.8435	1209.6	8.0	9676.9	8742.3	1321.69	2.5530	9.6769	388.1729	367.5	29.3
4˚C #2	0.6739	976.0	8.0	7807.7			2.5039	7.8077	346.7853		
4˚C #3 sol	0.8176	1173.9	16.0	18782.9			2.5140	18.7829	1014.1085		
4˚C #4 insol	1.1164	1585.6	16.0	25369.0	ave 5&6	STD DEV	2.4947	25.3690	1331.4640	ave 5&6	STD DEV
-20˚C #5	0.5952	867.5	8.0	6940.4	6666.0	388.09	2.5083	6.9404	372.2948	374.6	3.2
-20˚C #6	0.5454	798.9	8.0	6391.6			2.5059	6.3916	376.8242		
-20˚C #7 sol	0.6976	1008.6	16.0	16137.9			2.5190	16.1379	1083.2520		
-20˚C #8 insol	1.1677	1656.2	16.0	26499.8	% Recovery	Range	2.4971	26.4998	1646.9384		
Sample 2+spk	0.9285	1326.7	16.0	21227.4	101.7	85-115%	2.5039	21.2274	1035.7885		
Sample 6+spk	0.872	1248.9	16.0	19982.0	103.0	85-115%	2.5059	19.9820	1019.7824		

Samples # 1 through 8 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% Recovery	Range	
LCS #15	0.9058	1295	108.7	80-120%	1.295
Blank #16	0.0054	55			0.055

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	1.5	670	97	75-125%
-20˚C	1.5	660	107	75-125%

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	13.7	999.2	96	75-125%
-20˚C	18.2	1316.0	97	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9914	2.9230	1.9316	2.6937	1.7023	11.8710		
Moisture B	0.9902	3.0616	2.0714	2.8128	1.8226	12.0112	11.578	88.422
Moisture C	0.9950	2.5220	1.5270	2.3563	1.3613	10.8513		

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9855	2.7371	1.7516	2.5382	1.5527	11.3553		
Moisture B	0.9847	2.4334	1.4487	2.2699	1.2852	11.2860	10.893	89.107
Moisture C	0.9895	2.2766	1.2871	2.1474	1.1579	10.0381		

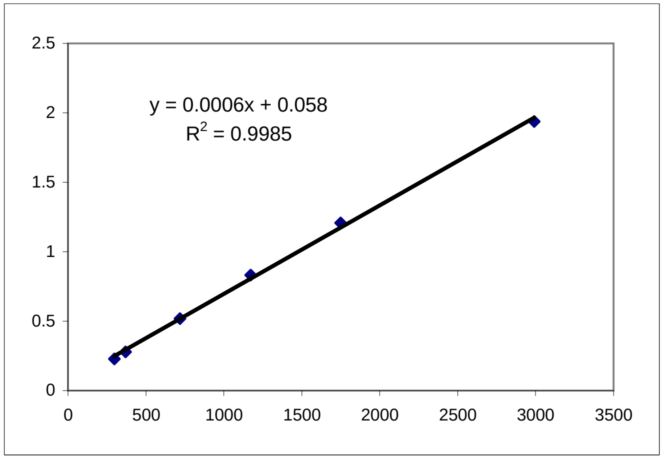
Cr Soil Extraction

T=112 day 8/28/2003

12763-123

Stratford Conn.

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	298	0.2280	266.8	9
	369	0.2777	344.7	10
	719	0.5182	722.1	11
	1172	0.8312	1213.1	12
	1749	1.2064	1801.8	13
	2991	1.9378	2949.3	14

slope	0.000637
intercept	0.057967
RSQ	0.998514

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.4467	609.9	8.0	4879.1	5313.3	614.15	2.4924	4.8791	262.0265	272.9	15.4
4˚C #2	0.5159	718.5	8.0	5747.6			2.5141	5.7476	283.7658		
4˚C #3 sol	1.0061	1487.5	16.0	23800.4			2.5176	23.8004	1023.0533		
4˚C #4 insol	0.4737	652.2	32.0	20871.8	ave 5&6	STD DEV	2.5002	20.8718	1486.8677	ave 5&6	STD DEV
-20˚C #5	0.6159	875.3	8.0	7002.7	6768.6	331.04	2.5757	7.0027	356.6772	352.0	6.6
-20˚C #6	0.5786	816.8	8.0	6534.6			2.5586	6.5346	347.3913		
-20˚C #7 sol	0.6957	1000.5	16.0	16008.6			2.5244	16.0086	1049.8548		
-20˚C #8 insol	0.4245	575.1	32.0	18401.7	% Recovery	Range	2.4903	18.4017	1232.7753		
Sample 2+spk	0.7912	1150.4	16.0	18405.9	95.9	85-115%	2.5141	18.4059	702.7883		
Sample 6+spk	0.8212	1197.4	16.0	19159.0	95.6	85-115%	2.5586	19.1590	930.5193		

Samples # 1 through 8 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% Recovery	Range	
LCS #15	0.7951	1156	103.1	80-120%	1.156
Blank #16	0.0061	-81			-0.081

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	1.5	675	111	75-125%
-20˚C	1.5	674	104	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9919	2.5119	1.5200	2.3275	1.3356	12.1316		
Moisture B	0.9902	2.6505	1.6603	2.4273	1.4371	13.4434	12.553	87.447
Moisture C	0.9960	2.5334	1.5374	2.3476	1.3516	12.0853		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	16.6	1221.6	99	75-125%
-20˚C	12.9	955.1	92	75-125%

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9829	2.5396	1.5567	2.3322	1.3493	13.3231		
Moisture B	0.9883	2.3750	1.3867	2.1966	1.2083	12.8651	12.743	87.257
Moisture C	0.9731	2.6966	1.7235	2.4891	1.5160	12.0395		

Cr Soil Extraction

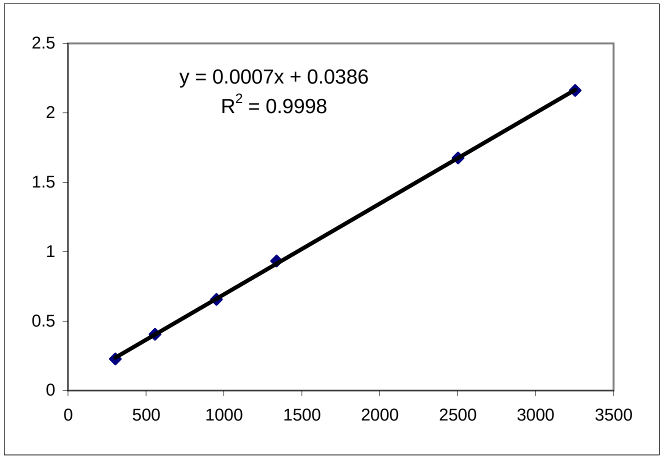
T=223 day 12/17/2003

12763-123

Stratford Conn.

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	305	0.2288	290.8	9
	558	0.4047	559.7	10
	952	0.6557	943.4	11
	1339	0.9342	1369.1	12
	2502	1.6745	2500.8	13
	3253	2.1619	3245.8	14



slope	0.000654
intercept	0.038555
RSQ	0.999817

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.5944	849.7	8.0	6797.5	6008.1	1116.37	2.5051	6.7975	297.9657	268.0	42.4
4˚C #2	0.4653	652.3	8.0	5218.7			2.5176	5.2187	237.9736		
4˚C #3 sol	1.0151	1492.8	16.0	23884.7			2.5001	23.8847	1040.3410		
4˚C #4 insol	0.7589	1101.2	32.0	35236.9	ave 5&6	STD DEV	2.4992	35.2369	1603.7303	ave 5&6	STD DEV
-20˚C #5	0.5363	760.9	8.0	6087.0	6841.5	1067.08	2.4965	6.0870	358.5484	364.6	8.6
-20˚C #6	0.6597	949.5	8.0	7596.1			2.5389	7.5961	370.7039		
-20˚C #7 sol	1.2319	1824.2	16.0	29187.2			2.5496	29.1872	1112.4293		
-20˚C #8 insol	0.6984	1008.7	32.0	32277.4	% Recovery	Range	2.5025	32.2774	1772.2785		
Sample 2+spk	0.8258	1203.4	16.0	19254.7	106.3	85-115%	2.5176	19.2547	710.5829		
Sample 6+spk	0.9061	1326.2	16.0	21218.7	103.2	85-115%	2.5389	21.2187	663.6067		

Samples # 1 through 8 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% Recovery	Range	
LCS #15	0.8756	1280	102.9	80-120%	1.280
Blank #16	0.0063	-49			-0.049

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	1.5	669	116	75-125%
-20˚C	1.5	644	116	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9865	3.7284	2.7419	3.4063	2.4198	11.7473		
Moisture B	0.9884	2.6400	1.6516	2.4479	1.4595	11.6311	11.676	88.324
Moisture C	0.9996	3.3259	2.3263	3.0549	2.0553	11.6494		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	17.1	1246.4	107	75-125%
-20˚C	18.6	1324.6	106	75-125%

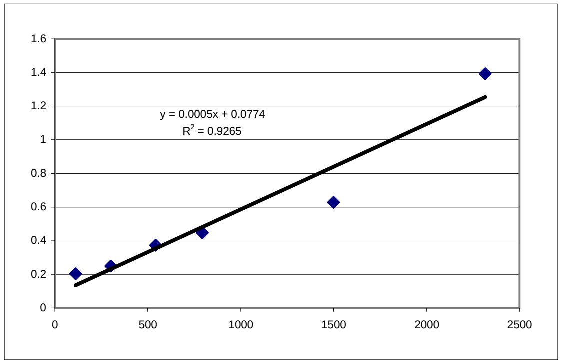
-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9978	3.1838	2.1860	2.9732	1.9754	9.6340		
Moisture B	0.9941	3.2598	2.2657	3.0405	2.0464	9.6791	9.722	90.278
Moisture C	0.9807	3.1161	2.1354	2.9057	1.9250	9.8530		

Cr Soil Extraction

T=0 day	12/2/2002
12763-125A	
Boom Snub 0.5'	

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	112	0.2044	249.8	9
	302	0.2488	337.2	10
	543	0.3723	580.2	11
	793	0.4467	726.6	12
	1500	0.6272	1081.7	13
	2316	1.3933	2589.0	14



slope	0.000508
intercept	0.077423
RSQ	0.926539

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV			
Sample 1	0.4718	775.9	2	1551.9	1917.6	238.12	2.4804	1.5519	73.9567	91.6	11.7			
Sample 2	0.5896	1007.7	2	2015.4			2.4842	2.0154	95.6936					
Sample 3	0.6223	1072.1	2	2144.1			2.4878	2.1441	101.8125					
Sample 4	0.6018	1031.7	2	2063.4			2.4871	2.0634	100.6609					
Sample 5	0.5382	906.6	2	1813.2			2.4927	1.8132	85.9600					
Sol Spike 6	0.6504	1127.3	2	2254.7			2.4918	2.2547	110.7325		K2Cr2O7	Cr added	Spike Recovery %	
Insol Spike 7	0.7911	1404.2	10	14041.7	% recovery	Range	2.4911	14.0417	665.9093		added (mg)	µg/g dry	Solution	Range
#2 + spike	0.6479	1122.4	2	2244.8	11.5	85-115%					0.5	23.724	81	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.4992	830	99.4	80-120%
Blank #8	0.0947	34		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
19.8	1511.9	38	75-125%

NOTE: There was a weighing error for the K2Cr2O7 addition 0.5 mL was amended not .8422mL as stated.
When 0.5 ml is calculated the recovery is:

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution
0.05	23.724	82

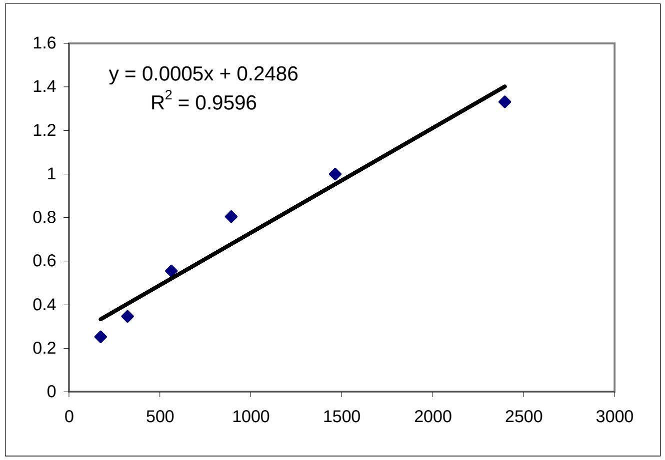
	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8396	21.3177	1.4781	21.0882	1.2486	15.527		
Moisture B	19.7107	21.2067	1.4960	20.9724	1.2617	15.662	15.421	84.579
Moisture C	19.5329	20.6733	1.1404	20.5014	0.9685	15.074		

Cr Soil Extraction

T=14 day
12763-125A
Boom Snub 0.5'

12/16/2002

Chrome VI digestion assay



Sample/STD	A540	ppb calc.	Sample #
Blank	0.0000		
175	0.2518	6.7	9
321	0.3464	203.3	10
564	0.5545	635.8	11
892	0.8040	1154.3	12
1463	0.9994	1560.4	13
2396	1.3314	2250.3	14

slope	0.000481
intercept	0.248554
RSQ	0.95965

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.5454	616.9	2.0	1233.8	1264.1	42.91	2.4710	1.2338	59.5999	61.5	2.7
4˚C #2	0.5600	647.2	2.0	1294.5			2.4851	1.2945	63.3705		
4˚C #3 sol	0.4118	339.3	10.0	3392.5			2.4781	3.3925	163.3472		
4˚C #4 insol	0.7300	1000.5	20.0	20010.5	ave 5&6	STD DEV	2.4827	20.0105	961.6653	ave 5&6	STD DEV
-20˚C #5	0.7708	1085.3	2.0	2170.6	1883.0	406.75	2.4884	2.1706	103.9638	90.2	19.5
-20˚C #6	0.6324	797.7	2.0	1595.4			2.4905	1.5954	76.3421		
-20˚C #7 sol	0.3631	238.0	10.0	2380.5			2.4873	2.3805	118.6261		
-20˚C #8 insol	0.7220	983.9	20.0	19678.0	% Recovery	Range	2.4908	19.6780	941.4566		
Sample 1+spk	0.4258	368.3	10.0	3683.5	61.2	85-115%	2.4851	3.6835	176.8345		
Sample 5+spk	0.5362	597.8	10.0	5977.8	95.2	85-115%	2.4905	5.9778	286.0593		

			% Recovery	Range	
LCS #15	0.8011	1148	127.3	80-120%	1.148
Blank #16	0.1178	-272			-0.272

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.5	222	46	75-125%
-20˚C	0.5	222	13	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.7965	21.2487	1.4522	21.0144	1.2179	16.1341		
Moisture B	19.7361	21.1487	1.4126	20.9173	1.1812	16.3811	16.201	83.799
Moisture C	19.7823	20.7645	0.9822	20.6065	0.8242	16.0863		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	12.2	943.5	95	75-125%
-20˚C	11.4	877.7	97	75-125%

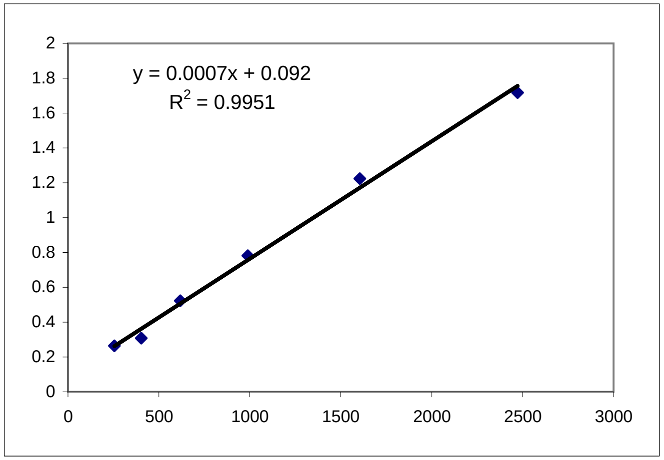
-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8273	22.0406	2.2133	21.6816	1.8543	16.2201		
Moisture B	19.7126	21.4498	1.7372	21.1719	1.4593	15.9970	16.106	83.894
Moisture C	19.6749	21.0493	1.3744	20.8280	1.1531	16.1016		

Cr Soil Extraction

T=28 day
12763-125A
Boom Snub 0.5'

12/30/2002

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0001		
	254	0.2644	256.1	9
	402	0.3081	321.0	10
	617	0.5228	639.8	11
	988	0.7825	1025.5	12
	1605	1.2240	1681.2	13
	2472	1.7179	2414.7	14

slope	0.000673
intercept	0.091988
RSQ	0.995075

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.5871	735.3	2.0	1470.6	2179.9	1003.11	2.5160	1.4706	68.0700	103.6	50.2
4˚C #2	1.0647	1444.6	2.0	2889.2			2.4887	2.8892	139.0523		
4˚C #3 sol	0.5624	698.6	10.0	6986.3			2.4921	6.9863	337.2240		
4˚C #4 insol	0.6940	894.1	20.0	17881.5	ave 5&6	STD DEV	2.4888	17.8815	847.8067	ave 5&6	STD DEV
-20˚C #5	0.6656	851.9	2.0	1703.8	2094.2	552.17	2.4896	1.7038	89.4025	106.7	24.5
-20˚C #6	0.9285	1242.3	2.0	2484.7			2.4999	2.4847	124.0120		
-20˚C #7 sol	0.5091	619.5	10.0	6194.7			2.4985	6.1947	301.2230		
-20˚C #8 insol	0.6782	870.6	20.0	17412.2	% Recovery	Range	2.4976	17.4122	878.8367		
Sample 2+spk	0.5415	667.6	10.0	6675.9	94.7	85-115%	2.4887	6.6759	317.4395		
Sample 6+spk	0.5271	646.2	10.0	6462.0	99.4	85-115%	2.4999	6.4620	307.1200		

			% Recovery	Range	
LCS #15	0.7592	991	100.2	80-120%	0.991
Blank #16	0.0590	-49			-0.049

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.5	238	98	75-125%
-20˚C	0.5	239	81	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.3420	20.8832	1.5412	20.6488	1.3068	15.2089		
Moisture B	19.6076	21.3381	1.7305	21.0736	1.4660	15.2846	15.179	84.821
Moisture C	19.7374	21.4651	1.7277	21.2052	1.4678	15.0431		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	11.8	899.3	83	75-125%
-20˚C	11.5	881.2	88	75-125%

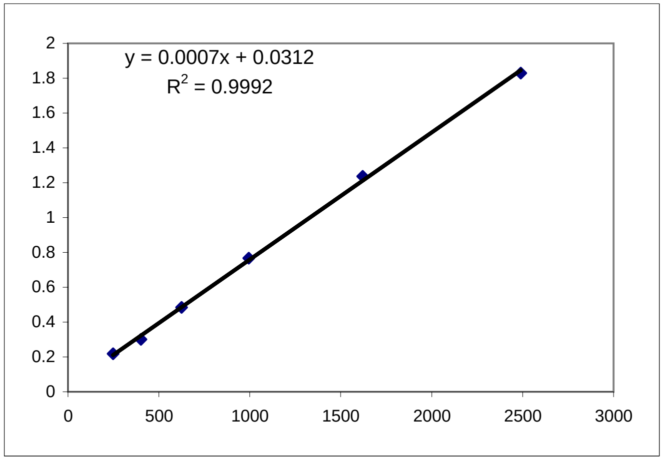
-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.5603	21.4438	1.8835	21.1454	1.5851	15.8428		
Moisture B	19.7100	21.8676	2.1576	21.5215	1.8115	16.0410	15.932	84.068
Moisture C	19.8187	21.4892	1.6705	21.2234	1.4047	15.9114		

Cr Soil Extraction

T=56 day
12763-125A
Boom Snub 0.5'

1/27/2003

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	248	0.2187	257.0	9
	400	0.3005	369.2	10
	624	0.4841	621.0	11
	994	0.7665	1008.2	12
	1621	1.2376	1654.2	13
	2489	1.8300	2466.5	14

slope	0.000729
intercept	0.031248
RSQ	0.999211

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.6732	880.3	2.0	1760.5	1716.1	62.83	2.4781	1.7605	84.6379	82.4	3.1
4˚C #2	0.6408	835.8	2.0	1671.7			2.4841	1.6717	80.1995		
4˚C #3 sol	0.5183	667.9	10.0	6678.6			2.5003	6.6786	318.1752		
4˚C #4 insol	0.6642	867.9	20.0	17358.4	ave 5&6	STD DEV	2.5076	17.3584	824.7940	ave 5&6	STD DEV
-20˚C #5	0.7184	942.2	2.0	1884.5	1861.7	32.19	2.4908	1.8845	96.3698	93.3	4.4
-20˚C #6	0.7018	919.5	2.0	1839.0			2.4894	1.8390	90.2048		
-20˚C #7 sol	0.5153	663.7	10.0	6637.4			2.4899	6.6374	323.8396		
-20˚C #8 insol	0.7164	939.5	20.0	18789.9	% Recovery	Range	2.4943	18.7899	919.7484		
Sample 1+spk	0.4352	553.9	10.0	5539.1	94.5	85-115%	2.4841	5.5391	265.7255		
Sample 5+spk	0.4608	589.0	10.0	5890.1	100.1	85-115%	2.4894	5.8901	281.1931		

			% Recovery	Range	
LCS #15	0.8308	1096	109.9	80-120%	1.096
Blank #16	0.0093	-30			-0.030

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.5	239	99	75-125%
-20˚C	0.5	238	97	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.7954	21.9876	2.1922	21.6310	1.8356	16.2668		
Moisture B	19.7345	21.9862	2.2517	21.6280	1.8935	15.9080	16.066	83.934
Moisture C	19.7810	21.6046	1.8236	21.3124	1.5314	16.0233		

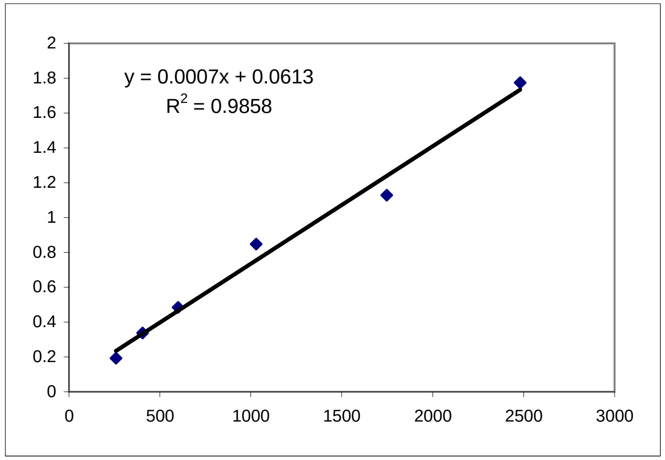
	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	10.7	817.9	91	75-125%
-20˚C	11.1	850.6	97	75-125%

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8261	21.9127	2.0866	21.5824	1.7563	15.8296		
Moisture B	19.7114	22.0397	2.3283	21.6740	1.9626	15.7067	15.829	84.171
Moisture C	19.6735	21.6767	2.0032	21.3572	1.6837	15.9495		

Cr Soil Extraction

T=112 day
12763-125A
Boom Snub 0.5'

3/24/2003



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	258	0.1924	194.4	9
	404	0.3367	408.3	10
	600	0.4852	628.4	11
	1029	0.8483	1166.7	12
	1747	1.1287	1582.4	13
	2481	1.7739	2538.9	14

slope	0.000675
intercept	0.061295
RSQ	0.985812

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.6675	898.7	2.0	1797.3	1672.1	177.16	2.4926	1.7973	87.4911	80.4	10.1
4˚C #2	0.5830	773.4	2.0	1546.8			2.4922	1.5468	73.2129		
4˚C #3 sol	0.5409	711.0	10.0	7109.9			2.4925	7.1099	356.8683		
4˚C #4 insol	0.6529	877.0	20.0	17540.6	ave 5&6	STD DEV	2.4989	17.5406	889.8933	ave 5&6	STD DEV
-20˚C #5	0.7956	1088.6	2.0	2177.2	2551.3	529.16	2.4965	2.1772	109.6109	123.8	20.0
-20˚C #6	1.0480	1462.7	2.0	2925.5			2.5026	2.9255	137.8964		
-20˚C #7 sol	0.5204	680.6	10.0	6806.0			2.4998	6.8060	328.3862		
-20˚C #8 insol	0.6521	875.8	20.0	17516.9	% Recovery	Range	2.4964	17.5169	840.8832		
Sample 1+spk	0.4537	581.7	10.0	5817.2	100.5	85-115%	2.4922	5.8172	266.5535		
Sample 6+spk	0.572	757.1	10.0	7571.0	116.1	85-115%	2.5026	7.5710	354.9008		

			% Recovery	Range	
LCS #15	0.7964	1090	107.8	80-120%	1.090
Blank #16	0.0874	39			0.039

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.5	239	116	75-125%
-20˚C	0.5	237	86	75-125%

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	10.4	789.8	103	75-125%
-20˚C	9.9	752.8	95	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.3417	21.7911	2.4494	21.4151	2.0734	15.3507		
Moisture B	19.6065	21.7224	2.1159	21.4053	1.7988	14.9865	15.218	84.782
Moisture C	19.7358	21.7559	2.0201	21.4465	1.7107	15.3161		

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.5585	22.0631	2.5046	21.6873	2.1288	15.0044		
Moisture B	19.7090	21.5890	1.8800	21.3019	1.5929	15.2713	15.245	84.755
Moisture C	19.8173	23.2279	3.4106	22.7006	2.8833	15.4606		

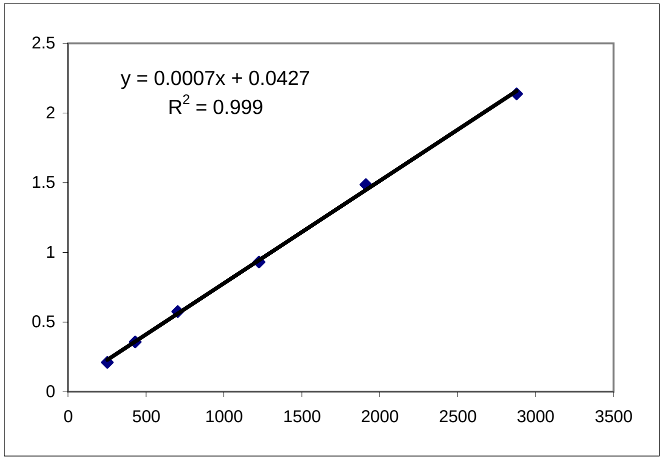
Cr Soil Extraction

T=224 day
12763-125A
Boom Snub 0.5'

7/21/2003

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.2111	228.9	9
	431	0.3578	428.4	10
	705	0.5767	726.0	11
	1225	0.9320	1209.0	12
	1911	1.4859	1962.1	13
	2878	2.1372	2847.6	14



slope	0.000736
intercept	0.04272
RSQ	0.999045

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.5361	670.8	2.0	1341.6	2231.3	1258.22	2.5067	1.3416	96.8490	140.4	61.7
4˚C #2	1.1905	1560.5	2.0	3121.0			2.5124	3.1210	184.0433		
4˚C #3 sol	0.5714	718.8	16.0	11500.4			2.5068	11.5004	712.2022		
4˚C #4 insol	0.6571	835.3	16.0	13364.6	ave 5&6	STD DEV	2.5159	13.3646	857.3423	ave 5&6	STD DEV
-20˚C #5	0.5340	667.9	2.0	1335.9	1278.8	80.75	2.5054	1.3359	83.3069	80.5	4.0
-20˚C #6	0.4920	610.8	2.0	1221.6			2.5629	1.2216	77.6785		
-20˚C #7 sol	0.5544	695.7	16.0	11130.6			2.5430	11.1306	719.4227		
-20˚C #8 insol	0.6351	805.4	16.0	12886.1	% Recovery	Range	2.5765	12.8861	781.6059		
Sample 1+spk	0.7079	904.4	16.0	14469.7	99.5	85-115%	2.5124	14.4697	670.6757		
Sample 6+spk	0.7007	894.6	16.0	14313.1	99.2	85-115%	2.5629	14.3131	601.5596		

			% Recovery	Range	
LCS #15	0.7412	950	103.1	80-120%	0.950
Blank #16	0.0052	-51			-0.051

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	1.5	704	81	75-125%
-20˚C	1.5	687	93	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9951	2.0419	1.0468	1.8698	0.8747	16.4406		
Moisture B	0.9902	2.0265	1.0363	1.8628	0.8726	15.7966	15.739	84.261
Moisture C	0.9890	2.0305	1.0415	1.8745	0.8855	14.9784		

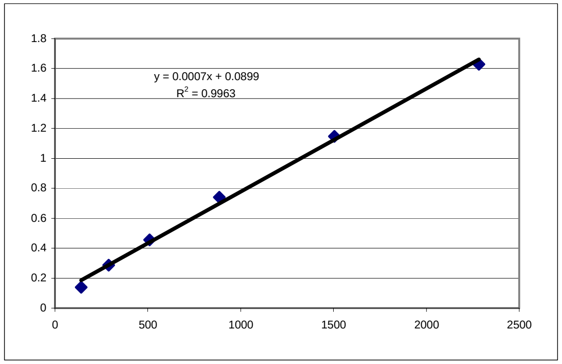
	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	11.9	903.1	79	75-125%
-20˚C	10.7	791.7	89	75-125%

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9742	2.0594	1.0852	1.8880	0.9138	15.7943		
Moisture B	0.9871	2.2308	1.2437	2.0394	1.0523	15.3896	15.608	84.392
Moisture C	0.9809	2.2078	1.2269	2.0159	1.0350	15.6410		

Cr Soil Extraction

T=0 day	12/5/2002
12763-125B	
Boom Snub 3'	

Chrome VI digestion assay



Sample/STD	A540	ppb calc.	Sample #
Blank	0.0000		
141	0.1391	71.5	9
289	0.2876	287.4	10
510	0.4551	530.9	11
885	0.7412	946.9	12
1505	1.1482	1538.6	13
2283	1.6280	2236.2	14

slope	0.000688
intercept	0.089921
RSQ	0.996334

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	1.1091	1481.8	4	5927.0	6488.0	954.14	2.4970	5.9270	302.6969	328.1	39.4
Sample 2	1.2784	1727.9	4	6911.6			2.4877	6.9116	344.0335		
Sample 3	1.3386	1815.4	4	7261.7			2.4971	7.2617	360.2836		
Sample 4	1.3371	1813.2	4	7253.0			2.4854	7.2530	361.5936		
Sample 5	0.9646	1271.7	4	5086.7			2.5000	5.0867	272.0466		
Sol Spike 6	1.9084	2643.8	4	10575.4			2.4920	10.5754	531.2729		
Insol Spike 7	0.9768	1289.4	10	12894.1	% recovery	Range	2.4953	12.8941	663.7368		
#3 + spike	0.9689	1277.9	8	10606.8	83.6	85-115%					
Sol Spike 16	0.8928	1167.3	4	4669.1			2.5050	4.6691	252.6520		
Insol Spike 17	1.2153	1636.2	10	16361.6			2.4970	16.3616	811.7959		

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.6200	771	87.4	80-120%
Blank #8	0.0770	-19		

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.421	209.350	97	75-125%
#16	0.4291	212.270	-36	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8674	20.9254	1.0580	20.7227	0.8553	19.159		
Moisture B	19.5268	20.9358	1.4090	20.6619	1.1351	19.439	19.302	80.698
Moisture C	19.8872	21.7444	1.8572	21.3858	1.4986	19.309		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	11.3	902.9	37	75-125%
#17	11.2	894.3	54	75-125%

Cr Soil Extraction

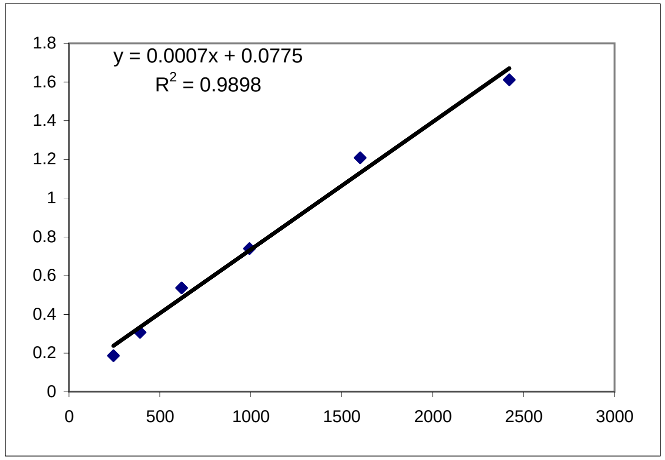
T=14 day
12763-125B
Boom Snub 3'

12/19/2002

Chrome VI digestion assay

Sample/STD	A540	ppb calc.	Sample #
Blank	0.0000		
245	0.1874	167.0	9
390	0.3065	348.0	10
619	0.5360	696.9	11
993	0.7400	1006.9	12
1602	1.2088	1719.5	13
2422	1.6125	2333.1	14

slope	0.000658
intercept	0.077547
RSQ	0.989792



Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4°C #1	0.8461	1168.2	5.0	5841.0	6671.7	1174.77	2.4885	5.8410	289.5714	330.8	58.3
4°C #2	1.0647	1500.5	5.0	7502.4			2.4867	7.5024	372.0790		
4°C #3 sol	0.8030	1102.7	10.0	11027.0			2.4809	11.0270	546.6162		
4°C #4 insol	0.9230	1285.1	20.0	25701.9	ave 5&6	STD DEV	2.4941	25.7019	1274.9069	ave 5&6	STD DEV
-20°C #5	1.0153	1425.4	5.0	7127.0	6652.3	671.22	2.4897	7.1270	361.3973	339.0	31.7
-20°C #6	0.8904	1235.5	5.0	6177.7			2.4898	6.1777	316.5294		
-20°C #7 sol	0.8755	1212.9	10.0	12129.0			2.4929	12.1290	601.6692		
-20°C #8 insol	0.8495	1173.4	20.0	23467.5	% Recovery	Range	2.4952	23.4675	1191.2400		
Sample 2+spk	0.8172	1124.3	10.0	11242.8	93.5	85-115%	2.4867	11.2428	577.7701		
Sample 5+spk	0.8153	1121.4	10.0	11213.9	102.2	85-115%	2.4898	11.2139	572.7093		

			% Recovery	Range	
LCS #15	0.7139	967	99.6	80-120%	0.967
Blank #16	0.0291	-74			-0.074

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4°C	0.5	249	87	75-125%
-20°C	0.5	249	105	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.9482	21.8158	1.8676	21.4670	1.5188	18.6764		
Moisture B	19.7961	21.2893	1.4932	21.0096	1.2135	18.7316	18.828	81.172
Moisture C	19.8302	21.1847	1.3545	20.9263	1.0961	19.0772		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4°C	11.7	929.8	102	75-125%
-20°C	10.8	860.8	99	75-125%

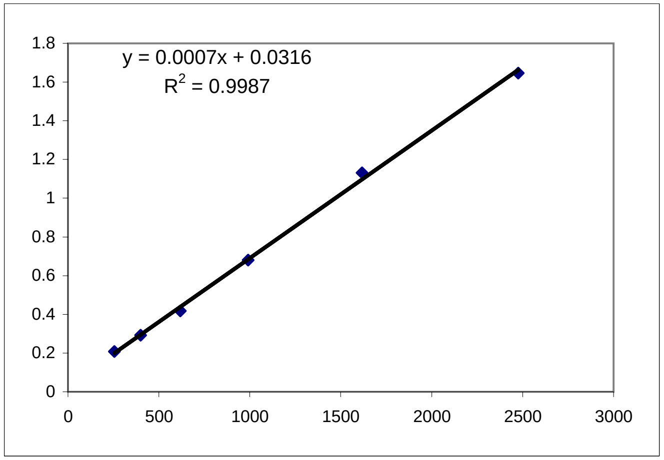
-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.7848	21.1949	1.4101	20.9254	1.1406	19.1121		
Moisture B	19.8764	21.6101	1.7337	21.2782	1.4018	19.1440	19.106	80.894
Moisture C	19.8000	21.6226	1.8226	21.2752	1.4752	19.0607		

Cr Soil Extraction

T=28 day	1/2/2003
12763-125B	
Boom Snub 3'	

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	255	0.2088	269.0	9
	399	0.2915	394.6	10
	617	0.4170	585.1	11
	990	0.6798	984.0	12
	1616	1.1309	1668.7	13
	2476	1.6462	2450.9	14



slope	0.000659
intercept	0.03157
RSQ	0.998709

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	0.9789	1438.0	5.0	7189.9	7031.3	288.06	2.4946	7.1899	352.9911	348.2	12.8
4˚C #2	0.9847	1446.8	5.0	7234.0			2.4841	7.2340	356.4302		
4˚C #3 sol	0.7246	1052.0	10.0	10519.8			2.4863	10.5198	519.4723		
4˚C #4 insol	0.9075	1329.6	20.0	26592.2	ave 5&6	STD DEV	2.4839	26.5922	1314.3654	ave 5&6	STD DEV
-20˚C #5	1.2002	1773.9	5.0	8869.5	7723.5	1620.75	2.4950	8.8695	439.7822	383.4	79.8
-20˚C #6	0.8982	1315.5	5.0	6577.5			2.4895	6.5775	326.9493		
-20˚C #7 sol	0.9215	1350.9	10.0	13508.6			2.4957	13.5086	683.1715		
-20˚C #8 insol	0.8547	1249.5	20.0	24989.2	% Recovery	Range	2.4931	24.9892	1256.8633		
4˚C #17	0.9743	1431.0	5.0	7155.0			2.4979	7.1550	355.2661		
4˚C #18	0.9600	1409.3	5.0	7046.5			2.4925	7.0465	350.6994		
4˚C #19	0.8921	1306.2	5.0	6531.2			2.4876	6.5312	325.7016		
Sample 1+spk	0.7722	1124.2	10.0	11242.3	101.3	85-115%	2.4841	11.2423	555.7706		
Sample 6+spk	0.7112	1031.6	10.0	10316.4	93.5	85-115%	2.4895	10.3164	514.0572		

			% Recovery	Range	
LCS #15	0.7436	1081	109.2	80-120%	1.081
Blank #16	-0.0080	-60			-0.060

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.5	248	69	75-125%
-20˚C	0.5	249	120	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8156	22.3381	2.5225	21.8636	2.0480	18.8107		
Moisture B	19.7542	21.6220	1.8678	21.2778	1.5236	18.4281	18.580	81.420
Moisture C	19.7419	21.9278	2.1859	21.5234	1.7815	18.5004		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	11.8	938.7	103	75-125%
-20˚C	11	880.6	99	75-125%

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.7585	22.0399	2.2814	21.6130	1.8545	18.7122		
Moisture B	19.8378	22.5071	2.6693	21.9966	2.1588	19.1249	19.383	80.617
Moisture C	19.6286	21.6145	1.9859	21.2111	1.5825	20.3132		

Cr Soil Extraction

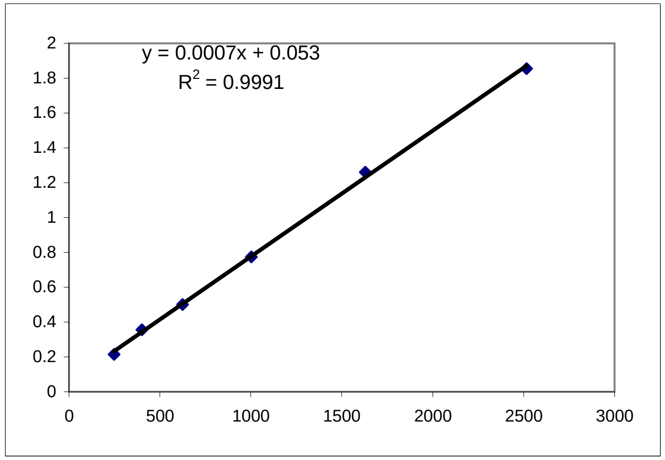
T=56 day
12763-125B
Boom Snub 3'

1/31/2003

Color assay on 2/1/03

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	248	0.2142	223.0	10
	400	0.3558	418.9	11
	625	0.5007	619.3	12
	1003	0.7740	997.3	13
	1630	1.2613	1671.4	14
	2517	1.8551	2492.8	15



slope	0.000723
intercept	0.052994
RSQ	0.999112

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	1.0392	1364.2	5.0	6820.9	6903.9	117.37	2.4321	6.8209	388.1973	378.2	14.2
4˚C #2	1.0632	1397.4	5.0	6986.9			2.5008	6.9869	368.1854		
4˚C #3 sol	1.2606	1670.4	10.0	16704.4			2.4983	16.7044	864.1665		
4˚C #4 insol	1.2462	1650.5	20.0	33010.5	ave 5&6	STD DEV	2.5361	33.0105	1665.0452	ave 5&6	STD DEV
-20˚C #5	1.2428	1645.8	5.0	8229.1	7317.5	1289.16	2.5222	8.2291	447.4099	390.5	80.5
-20˚C #6	0.9792	1281.2	5.0	6406.0			2.5511	6.4060	333.5261		
-20˚C #7 sol	0.9547	1247.3	10.0	12473.0			2.5153	12.4730	693.8972		
-20˚C #8 insol	1.0297	1351.0	20.0	27020.9	% Recovery	Range	2.5042	27.0209	1439.0825		
Sample 2+spk	0.8074	1043.5	10.0	10435.5	86.2	85-115%	2.5008	10.4355	506.5668		
Sample 6+spk	0.7848	1012.3	10.0	10122.8	92.9	85-115%	2.5511	10.1228	485.4914		

			% Recovery	Range	
LCS #16	0.7797	1005	99.9	80-120%	1.005
Blank #9	0.0198	-46			-0.046

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.503	245	199	75-125%
-20˚C	0.505	246	124	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.9465	20.9998	1.0533	20.8149	0.8684	17.5544		
Moisture B	19.7953	20.7902	0.9949	20.6108	0.8155	18.0320	17.725	82.275
Moisture C	19.8289	20.8278	0.9989	20.6521	0.8232	17.5893		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	18.6	1434.2	90	75-125%
-20˚C	14.3	1124.7	93	75-125%

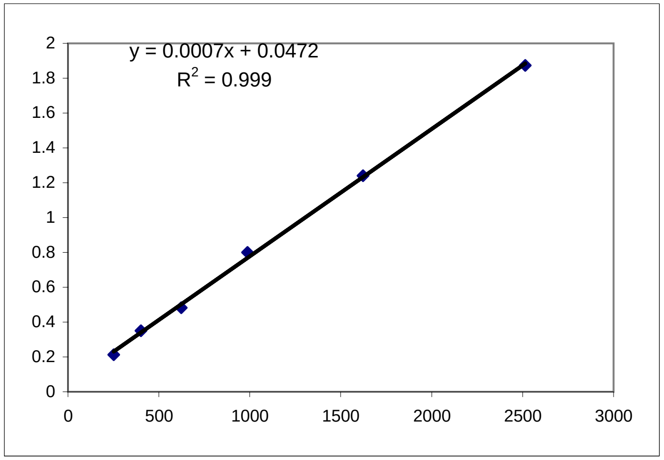
-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.7832	20.7949	1.0117	20.6030	0.8198	18.9681		
Moisture B	19.8742	20.8810	1.0068	20.6906	0.8164	18.9114	18.310	81.690
Moisture C	19.7982	20.8427	1.0445	20.6646	0.8664	17.0512		

Cr Soil Extraction

T=112 day	3/27/2003
12763-125B	
Boom Snub 3'	

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	251	0.2136	227.5	9
	400	0.3503	414.5	10
	623	0.4829	595.9	11
	987	0.8008	1030.7	12
	1623	1.2406	1632.3	13
	2514	1.8730	2497.3	14



slope	0.000731
intercept	0.047243
RSQ	0.998983

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	1.1383	1492.4	5.0	7461.8	6971.8	692.99	2.4963	7.4618	369.3629	343.6	36.5
4˚C #2	0.9950	1296.4	5.0	6481.8			2.4958	6.4818	317.7386		
4˚C #3 sol	0.9500	1234.8	10.0	12348.0			2.4964	12.3480	605.1111		
4˚C #4 insol	0.8886	1150.8	20.0	23016.3	ave 5&6	STD DEV	2.5080	23.0163	1145.3535	ave 5&6	STD DEV
-20˚C #5	1.0832	1417.0	5.0	7085.0	6720.8	515.03	2.4955	7.0850	350.7880	332.7	25.5
-20˚C #6	0.9767	1271.3	5.0	6356.6			2.4960	6.3566	314.6842		
-20˚C #7 sol	0.8504	1098.6	10.0	10985.6			2.4983	10.9856	538.5446		
-20˚C #8 insol	0.8704	1125.9	20.0	22518.4	% Recovery	Range	2.4986	22.5184	1119.4296		
Sample 1+spk	0.8621	1114.6	10.0	11145.7	92.1	85-115%	2.4958	11.1457	546.3363		
Sample 6+spk	0.7957	1023.7	10.0	10237.5	97.0	85-115%	2.4960	10.2375	502.2555		

			% Recovery	Range	
LCS #15	0.7741	994	99.2	80-120%	0.994
Blank #16	0.0234	-33			-0.033

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.5	247	106	75-125%
-20˚C	0.5	247	83	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8664	23.4526	3.5862	22.7884	2.9220	18.5210		
Moisture B	19.5260	22.6027	3.0767	22.0400	2.5140	18.2891	18.276	81.724
Moisture C	19.8860	23.0443	3.1583	22.4752	2.5892	18.0192		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	11.3	887.0	90	75-125%
-20˚C	10.5	828.1	95	75-125%

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.7573	21.9519	2.1946	21.5512	1.7939	18.2585		
Moisture B	19.8362	22.2295	2.3933	21.7873	1.9511	18.4766	18.355	81.645
Moisture C	19.6261	22.4908	2.8647	21.9657	2.3396	18.3300		

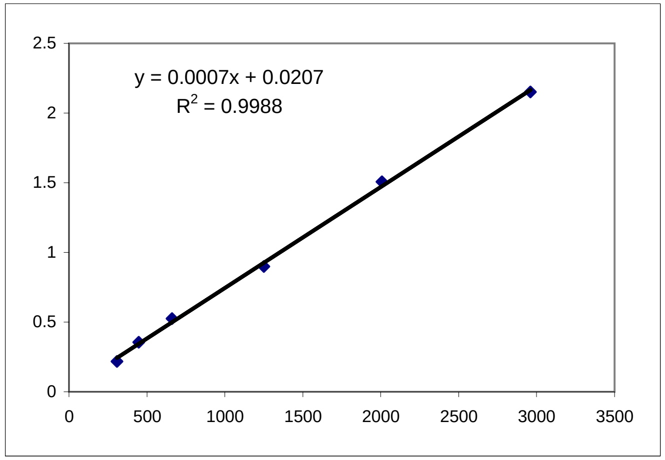
Cr Soil Extraction

T=224 day
12763-125B
Boom Snub 3'

7/23/2003

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	308	0.2182	272.6	9
	448	0.3564	463.3	10
	661	0.5249	695.9	11
	1251	0.8980	1210.7	12
	2007	1.5066	2050.6	13
	2961	2.1520	2941.3	14



slope	0.000725
intercept	0.020661
RSQ	0.998763

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.4724	623.4	8.0	4987.2	4992.2	7.03	2.5280	4.9872	309.7205	315.3	7.9
4˚C #2	0.4733	624.6	8.0	4997.2			2.5700	4.9972	320.9336		
4˚C #3 sol	0.7348	985.5	16.0	15768.3			2.5674	15.7683	997.6314		
4˚C #4 insol	0.8260	1111.4	16.0	17782.0	ave 5&6	STD DEV	2.5315	17.7820	1275.8588	ave 5&6	STD DEV
-20˚C #5	0.4369	574.4	8.0	4595.3	4403.8	270.89	2.5383	4.5953	325.5971	309.5	22.8
-20˚C #6	0.4022	526.5	8.0	4212.2			2.5586	4.2122	293.4226		
-20˚C #7 sol	0.6573	878.6	16.0	14057.1			2.5090	14.0571	1061.3288		
-20˚C #8 insol	0.8045	1081.7	16.0	17307.3	% Recovery	Range	2.5132	17.3073	1273.4296		
Sample 1+spk	0.8125	1092.7	16.0	17484.0	94.7	85-115%	2.5700	17.4840	670.1402		
Sample 6+spk	0.7912	1063.4	16.0	17013.6	97.0	85-115%	2.5586	17.0136	741.3416		

			% Recovery	Range	
LCS #15	0.9504	1283	103.6	80-120%	1.283
Blank #16	0.0015	-26			-0.026

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	1.5	706	97	75-125%
-20˚C	1.5	744	101	75-125%

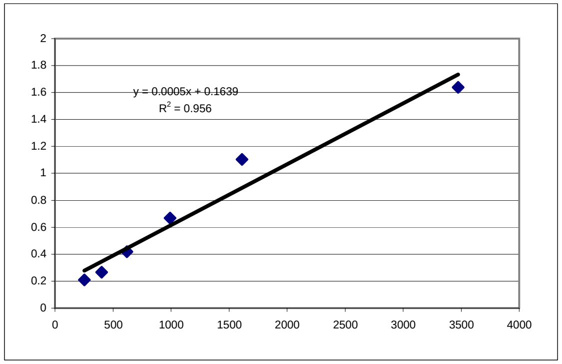
	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	12.6	977.9	98	75-125%
-20˚C	13.1	1062.1	91	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9918	2.1152	1.1234	1.9114	0.9196	18.1414		
Moisture B	0.9960	2.1503	1.1543	1.9441	0.9481	17.8636	18.112	81.888
Moisture C	0.9916	2.1153	1.1237	1.9093	0.9177	18.3323		

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9994	2.1569	1.1575	1.9529	0.9535	17.6242		
Moisture B	0.9925	2.3563	1.3638	1.9733	0.9808	28.0833	21.037	78.963
Moisture C	1.0005	2.1066	1.1061	1.9141	0.9136	17.4035		

Cr Soil Extraction

T=0 day	1/6/2003
12763-125C	
Boom Snub 5.5'	



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	254	0.2103	102.6	9
	402	0.2671	228.4	10
	620	0.4192	565.0	11
	991	0.6681	1115.9	12
	1612	1.1031	2078.6	13
	3475	1.6386	3263.8	14

slope	0.000452
intercept	0.163921
RSQ	0.955981

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.4480	628.7	2.0	1257.5	1198.6	75.68	2.4837	1.2575	63.9753	62.5	7.1
Sample 2	0.4361	602.4	2.0	1204.8			2.4795	1.2048	61.3765		
Sample 3	0.4198	566.3	2.0	1132.6			2.5041	1.1326	57.1793		
Sample 4	0.4152	556.1	2.0	1112.3			2.5037	1.1123	56.1337		
Sample 5	0.4544	642.9	2.0	1285.8			2.1961	1.2858	73.9816		
Sol Spike 6	0.2355	158.4	5.0	792.1			2.4995	0.7921	40.0351		
Insol Spike 7	0.6159	1000.3	20.0	20006.8	% recovery	Range	2.4938	20.0068	1046.3221		
Sample 4+spk	0.3420	394.1	10.0	3941.3	70.7	85-115%					
Sample 5+spk	0.3285	364.3	10.0	3642.5	58.9	85-115%					

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.5013	253.450	-9	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.6707	1122	113.3	80-120%
Blank #8	-0.0470	-467		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	11	896.8	110	75-125%

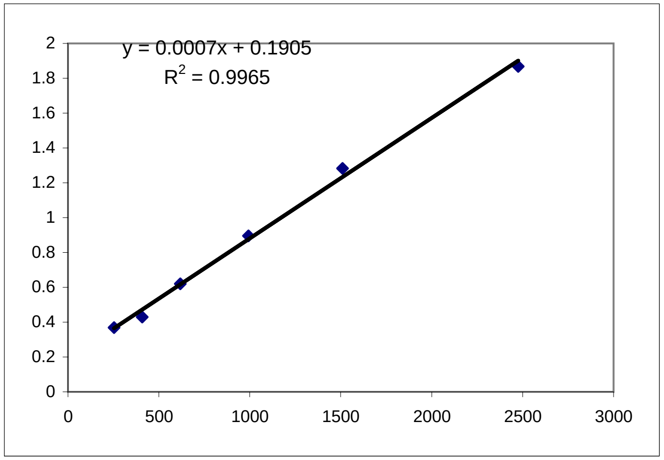
	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8729	21.9668	2.0939	21.5307	1.6578	20.827		
Moisture B	19.6099	22.2456	2.6357	21.6996	2.0897	20.716	20.868	79.132
Moisture C	19.8178	21.9820	2.1642	21.5262	1.7084	21.061		

Cr Soil Extraction

T=14 day	1/20/2003
12763-125C	
Boom Snub 5.5'	

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	254	0.3684	257.5	9
	408	0.4285	344.5	10
	617	0.6209	623.0	11
	993	0.8957	1020.8	12
	1510	1.2833	1582.0	13
	2476	1.8688	2429.6	14



slope	0.000691
intercept	0.190547
RSQ	0.99648

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.6008	593.9	2.0	1187.8	1193.5	7.98	2.4826	1.1878	59.9195	64.3	6.3
4˚C #2	0.6047	599.6	2.0	1199.1			2.1847	1.1991	68.7660		
4˚C #3 sol	0.5221	480.0	10.0	4799.9			2.4924	4.7999	244.5513		
4˚C #4 insol	0.6975	733.9	20.0	14678.2	ave 5&6	STD DEV	2.4888	14.6782	738.7074	ave 5&6	STD DEV
-20˚C #5	0.5889	576.7	2.0	1153.4	1143.4	14.13	2.4911	1.1534	58.7818	58.2	0.8
-20˚C #6	0.5820	566.7	2.0	1133.4			2.4935	1.1334	57.7112		
-20˚C #7 sol	0.5457	514.2	10.0	5141.5			2.4930	5.1415	261.7922		
-20˚C #8 insol	0.7105	752.7	20.0	15054.6	% Recovery	Range	2.4940	15.0546	782.4976		
Sample 2+spk	0.4621	393.1	10.0	3931.3	68.3	85-115%	2.1847	3.9313	225.2913		
Sample 6+spk	0.4653	397.8	10.0	3977.6	71.1	85-115%	2.4935	3.9776	200.4526		

			% Recovery	Range	
LCS #15	0.8980	1024	102.7	80-120%	1.024
Blank #16	0.0230	-243			-0.243

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.5	251	72	75-125%
-20˚C	0.5	254	80	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8764	22.7076	2.8312	22.1316	2.2552	20.3447		
Moisture B	19.6097	22.4536	2.8439	21.8814	2.2717	20.1203	20.161	79.839
Moisture C	18.7043	20.7394	2.0351	20.3320	1.6277	20.0187		

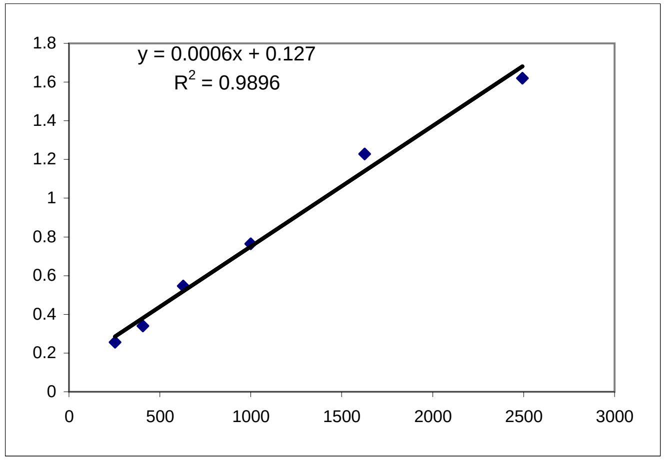
	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	10.4	842.1	80	75-125%
-20˚C	10.7	876.4	83	75-125%

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	29.2384	34.0584	4.8200	33.0360	3.7976	21.2116		
Moisture B	29.1905	33.2625	4.0720	32.3895	3.1990	21.4391	21.241	78.759
Moisture C	19.8558	23.9071	4.0513	23.0534	3.1976	21.0722		

Cr Soil Extraction

T=28 day	2/3/2003
12763-125C	
Boom Snub 5.5'	

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.2557	206.5	9
	407	0.3400	341.7	10
	628	0.5464	672.7	11
	999	0.7649	1023.2	12
	1626	1.2283	1766.4	13
	2493	1.6207	2395.7	14

slope	0.000624
intercept	0.126957
RSQ	0.989632

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.5408	663.7	2.0	1327.5	1450.0	173.29	2.4921	1.3275	67.8305	76.6	12.4
4˚C #2	0.6172	786.3	2.0	1572.5			2.4878	1.5725	85.3219		
4˚C #3 sol	0.4811	568.0	10.0	5679.9			2.4926	5.6799	296.0176		
4˚C #4 insol	0.6904	903.7	20.0	18073.4	ave 5&6	STD DEV	2.4949	18.0734	950.5815	ave 5&6	STD DEV
-20˚C #5	0.5266	641.0	2.0	1281.9	1237.5	62.83	2.4805	1.2819	67.5748	65.5	2.9
-20˚C #6	0.4989	596.5	2.0	1193.1			2.4869	1.1931	63.4793		
-20˚C #7 sol	0.4757	559.3	10.0	5593.3			2.4908	5.5933	299.5098		
-20˚C #8 insol	0.7384	980.7	20.0	19613.1	% Recovery	Range	2.4945	19.6131	1001.6898		
Sample 1+spk	0.4108	455.2	10.0	4552.4	80.6	85-115%	2.4878	4.5524	232.0992		
Sample 5+spk	0.4028	442.4	10.0	4424.1	78.6	85-115%	2.4869	4.4241	226.5436		

			% Recovery	Range	
LCS #15	0.7407	984	98.7	80-120%	0.984
Blank #16	0.1762	79			0.079

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.5	256	86	75-125%
-20˚C	0.5	258	91	75-125%

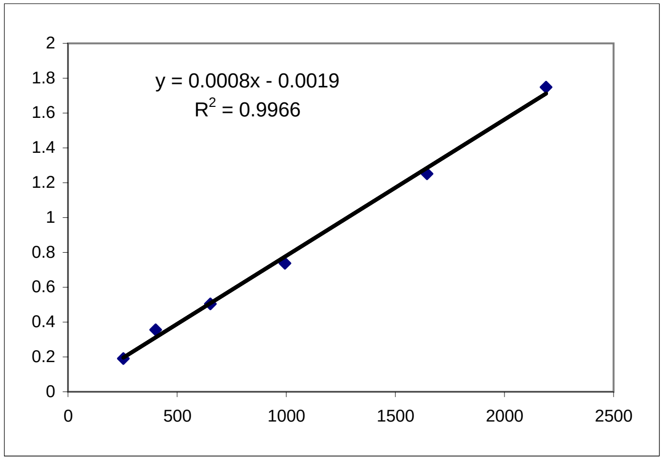
4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8721	23.4469	3.5748	22.6928	2.8207	21.0949		
Moisture B	19.6097	24.0281	4.4184	23.0804	3.4707	21.4489	21.159	78.841
Moisture C	18.7037	21.6442	2.9405	21.0287	2.3250	20.9318		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	11.3	924.3	95	75-125%
-20˚C	11	903.3	104	75-125%

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	29.2382	35.0315	5.7933	33.8136	4.5754	21.0226		
Moisture B	29.1906	34.4537	5.2631	33.3205	4.1299	21.5310	21.457	78.543
Moisture C	19.8555	23.2923	3.4368	22.5425	2.6870	21.8168		

Cr Soil Extraction

T=56 day	3/3/2003
12763-125C	
Boom Snub 5.5'	



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.1913	246.9	9
	401	0.3564	458.0	10
	652	0.5054	648.4	11
	995	0.7378	945.4	12
	1645	1.2515	1602.0	13
	2191	1.7485	2237.2	14

slope	0.000782
intercept	-0.001904
RSQ	0.996615

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	0.4847	621.9	2.0	1243.9	1234.7	121.17	2.4849	1.2439	62.7002	62.2	6.1
4˚C #2	0.4819	618.4	2.0	1236.7			2.4867	1.2367	62.3159		
4˚C #3 sol	0.4810	617.2	10.0	6172.0			2.4931	6.1720	310.2306		
4˚C #4 insol	0.6758	866.2	20.0	17323.6	ave 5&6	STD DEV	2.4899	17.3236	871.6522	ave 5&6	STD DEV
-20˚C #5	0.5385	690.7	2.0	1381.4	1407.5	36.87	2.4905	1.3814	69.6079	71.7	3.0
-20˚C #6	0.5589	716.8	2.0	1433.5			2.4903	1.4335	73.8058		
-20˚C #7 sol	0.4999	641.4	10.0	6413.6			2.4914	6.4136	323.0977		
-20˚C #8 insol	0.6466	828.9	20.0	16577.2	% Recovery	Range	2.4993	16.5772	832.4798		
4˚C #17	0.5543	710.9	2.0	1421.8			2.4895	1.4218	71.7364		
4˚C #18	0.4597	590.0	2.0	1180.0			2.4943	1.1800	59.3741		
4˚C #19	0.4249	545.5	2.0	1091.0			2.4907	1.0910	55.0001		
Sample 1+spk	0.3988	512.1	10.0	5121.4	96.9	85-115%	2.4867	5.1214	258.2886		
Sample 6+spk	0.4151	533.0	10.0	5329.8	97.4	85-115%	2.4903	5.3298	268.6175		

			% Recovery	Range	
LCS #15	0.7387	947	95.1	80-120%	0.947
Blank #16	0.0167	24			0.024

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.5	256	97	75-125%
-20˚C	0.5	256	98	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8727	23.2004	3.3277	22.5281	2.6554	20.2031		
Moisture B	19.6098	22.0248	2.4150	21.5393	1.9295	20.1035	20.176	79.824
Moisture C	18.7037	21.0570	2.3533	20.5811	1.8774	20.2227		

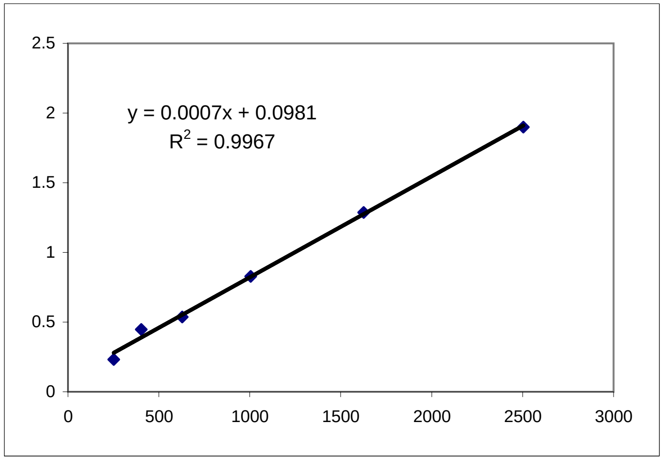
	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	10.8	874.3	93	75-125%
-20˚C	10.1	815.8	93	75-125%

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	29.2372	32.8949	3.6577	32.1341	2.8969	20.8000		
Moisture B	29.1898	32.5751	3.3853	31.8839	2.6941	20.4177	20.302	79.698
Moisture C	19.8555	23.9626	4.1071	23.1540	3.2985	19.6879		

Cr Soil Extraction

T=112 day	4/28/2003
12763-125C	
Boom Snub 5.5'	

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	252	0.2314	184.3	9
	402	0.4479	483.4	10
	629	0.5374	607.1	11
	1004	0.8278	1008.5	12
	1626	1.2866	1642.5	13
	2503	1.8997	2489.8	14

slope	0.000724
intercept	0.098071
RSQ	0.996731

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.5404	611.3	2.0	1222.6	1210.1	17.59	2.4856	1.2226	62.7878	62.1	1.0
4˚C #2	0.5314	598.8	2.0	1197.7			2.4940	1.1977	61.3920		
4˚C #3 sol	0.4904	542.2	10.0	5421.8			2.4944	5.4218	279.9077		
4˚C #4 insol	0.7320	876.1	20.0	17521.3	ave 5&6	STD DEV	2.4957	17.5213	896.3147	ave 5&6	STD DEV
-20˚C #5	0.5522	627.6	2.0	1255.2	1268.2	18.37	2.4859	1.2552	63.5286	65.1	2.2
-20˚C #6	0.5616	640.6	2.0	1281.2			2.4880	1.2812	66.5802		
-20˚C #7 sol	0.4863	536.5	10.0	5365.2			2.4835	5.3652	276.1352		
-20˚C #8 insol	0.6261	729.7	20.0	14594.3	% Recovery	Range	2.4905	14.5943	789.1480		
Sample 1+spk	0.4748	520.6	10.0	5206.2	99.6	85-115%	2.4940	5.2062	262.4960		
Sample 6+spk	0.4823	531.0	10.0	5309.9	100.7	85-115%	2.4880	5.3099	268.3889		

			% Recovery	Range	
LCS #15	0.7982	968	94.3	80-120%	0.968
Blank #16	0.0525	-63			-0.063

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.6	278	78	75-125%
-20˚C	0.5	253	83	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8724	23.9407	4.0683	23.0941	3.2217	20.8097		
Moisture B	19.6100	23.4177	3.8077	22.6337	3.0237	20.5899	20.532	79.468
Moisture C	18.7034	21.6045	2.9011	21.0186	2.3152	20.1958		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	11.1	900.5	93	75-125%
-20˚C	10.2	828.7	87	75-125%

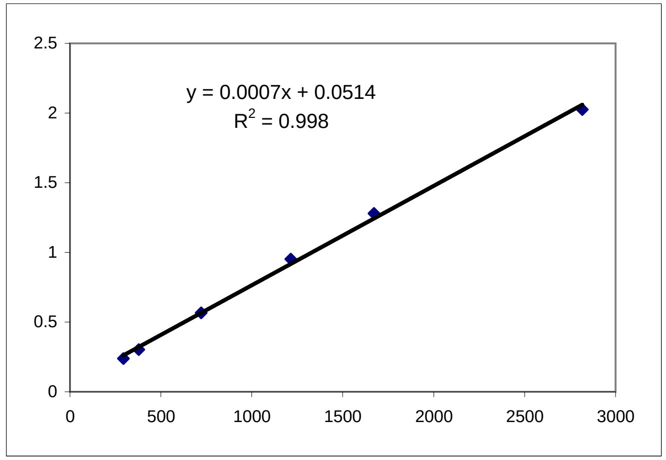
-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	29.2391	33.1208	3.8817	32.3429	3.1038	20.0402		
Moisture B	29.1911	33.6385	4.4474	32.7119	3.5208	20.8346	20.486	79.514
Moisture C	19.8561	24.0327	4.1766	23.1730	3.3169	20.5837		

Cr Soil Extraction

T=224 day	8/26/2003
12763-125C	
Boom Snub 5.5'	

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	294	0.2379	261.7	9
	379	0.3024	352.2	10
	721	0.5668	723.3	11
	1213	0.9524	1264.6	12
	1672	1.2792	1723.3	13
	2818	2.0259	2771.3	14



slope	0.000712
intercept	0.05145
RSQ	0.997998

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.3216	379.2	2.0	758.4	735.1	32.95	2.4666	0.7584	60.5766	60.4	0.2
4˚C #2	0.3050	355.9	2.0	711.8			2.5033	0.7118	60.2275		
4˚C #3 sol	0.4746	593.9	16.0	9502.9			2.4960	9.5029	810.3800		
4˚C #4 insol	0.3917	477.6	16.0	7641.2	ave 5&6	STD DEV	2.5285	7.6412	654.3722	ave 5&6	STD DEV
-20˚C #5	0.3571	429.0	2.0	858.0	787.1	100.24	2.4947	0.8580	61.5241	59.4	3.0
-20˚C #6	0.3066	358.1	2.0	716.3			2.5349	0.7163	57.3336		
-20˚C #7 sol	0.5407	686.7	16.0	10987.3			2.4623	10.9873	814.0103		
-20˚C #8 insol	0.5827	745.7	16.0	11930.6	% Recovery	Range	2.5853	11.9306	926.7739		
Sample 2+spk	0.6723	871.4	16.0	13942.7	100.2	85-115%	2.5033	13.9427	601.7046		
Sample 6+spk	0.6670	864.0	16.0	13823.7	99.3	85-115%	2.5349	13.8237	700.6530		

	A540	ppb calc.	% Recovery	Range	
LCS #15	0.8792	1162	102.5	80-120%	1.162
Blank #16	0.0048	-65			-0.065

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	1.5	766	98	75-125%
-20˚C	1.5	747	101	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9907	2.2435	1.2528	1.9672	0.9765	22.0546		
Moisture B	0.9809	2.2248	1.2439	1.9501	0.9692	22.0838	21.726	78.274
Moisture C	0.9881	2.1197	1.1316	1.8816	0.8935	21.0410		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	10.8	878.0	68	75-125%
-20˚C	11.5	881.4	98	75-125%

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9917	2.1704	1.1787	1.9247	0.9330	20.8450		
Moisture B	0.9864	2.1945	1.2081	1.9650	0.9786	18.9968	18.803	81.197
Moisture C	0.9895	2.0935	1.1040	1.9106	0.9211	16.5670		

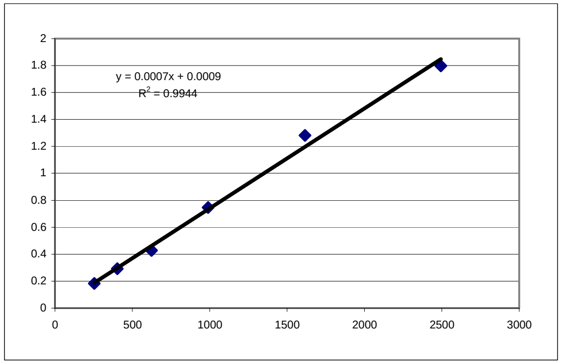
Cr Soil Extraction

T=0 day **1/9/2003**

12763-126D

Frontier Hard Chrome, Sandy Soil

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.1825	245.4	9
	403	0.2918	393.1	10
	624	0.4279	577.0	11
	990	0.7461	1006.9	12
	1616	1.2829	1732.2	13
	2494	1.7971	2427.0	14

slope	0.00074
intercept	0.000901
RSQ	0.994374

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	1.2325	1664.1	10.0	16641.4	16596.8	582.29	2.5137	16.6414	827.9809	815.3	30.6
Sample 2	1.2686	1712.9	10.0	17129.2			2.5016	17.1292	840.0165		
Sample 3	1.1679	1576.9	10.0	15768.5			2.5146	15.7685	769.4911		
Sample 4	1.2074	1630.2	10.0	16302.3			2.5031	16.3023	799.0276		
Sample 5	1.2696	1714.3	10.0	17142.7			2.5034	17.1427	840.1259		
Sol Spike 6	0.8889	1199.9	20.0	23997.3			2.5112	23.9973	1172.7190		
Insol Spike 7	0.6290	848.7	40.0	33947.6	% recovery	Range	2.4527	33.9476	1697.3265		
Sample 4+spk	0.7278	982.2	20.0	19643.8	83.5	85-115%					

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.5052	246.841	145	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.8086	1091	109.7	80-120%
Blank #8	-0.0200	-28		

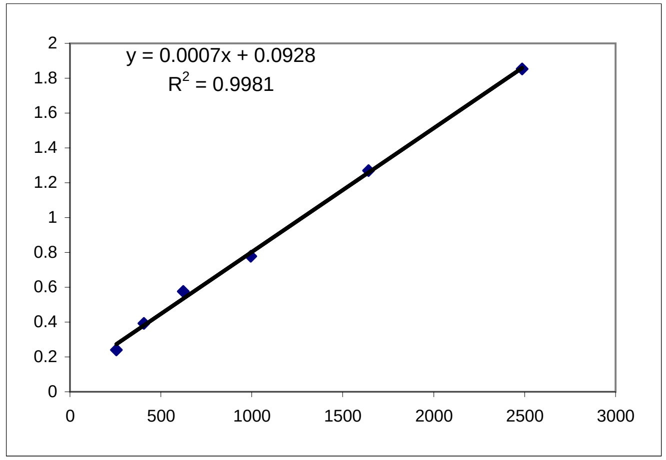
	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	10.9	877.3	101	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8132	22.8038	2.9906	22.2560	2.4428	18.317		
Moisture B	19.7520	23.0542	3.3022	22.4510	2.6990	18.267	18.499	81.501
Moisture C	19.7401	22.9840	3.2439	22.3705	2.6304	18.912		

Cr Soil Extraction

T=14 day	**1/23/2003**
12763-126D	
Frontier Hard Chrome, Sandy Soil	

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	254	0.2408	208.3	9
	407	0.3927	422.1	10
	623	0.5761	680.3	11
	995	0.7775	963.7	12
	1642	1.2693	1656.0	13
	2487	1.8534	2478.2	14

slope	0.00071
intercept	0.092824
RSQ	0.998129

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	1.2149	1579.4	10.0	15794.2	15413.4	538.46	2.4981	15.7942	770.3265	770.6	0.4
4˚C #2	1.1608	1503.3	10.0	15032.7			2.5043	15.0327	770.9333		
4˚C #3 sol	0.8472	1061.8	20.0	21237.0			2.4990	21.2370	1046.1578		
4˚C #4 insol	0.6144	734.2	40.0	29366.5	ave 5&6	STD DEV	2.4857	29.3665	1439.0202	ave 5&6	STD DEV
-20˚C #5	1.2611	1644.4	10.0	16444.5	16747.8	428.98	2.4976	16.4445	805.2203	819.7	20.5
-20˚C #6	1.3042	1705.1	10.0	17051.2			2.4999	17.0512	834.1691		
-20˚C #7 sol	0.8294	1036.8	20.0	20735.9			2.4959	20.7359	1015.9818		
-20˚C #8 insol	0.6100	728.0	40.0	29118.8	% Recovery	Range	2.4964	29.1188	1480.9667		
Sample 1+spk	0.7766	962.5	20.0	19249.5	86.4	85-115%	2.5043	19.2495	936.2300		
Sample 5+spk	0.7726	956.8	20.0	19136.9	67.3	85-115%	2.4999	19.1369	936.1486		

			% Recovery	Range	
LCS #15	0.7831	972	97.7	80-120%	0.972
Blank #16	0.1247	45			0.045

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.5	228	121	75-125%
-20˚C	0.5	246	80	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8140	23.0900	3.2760	22.5138	2.6998	17.5885		
Moisture B	19.7528	22.2393	2.4865	21.8014	2.0486	17.6111	17.921	82.079
Moisture C	19.7412	23.8372	4.0960	23.0768	3.3356	18.5645		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	11.7	922.6	72	75-125%
-20˚C	11.1	874.8	76	75-125%

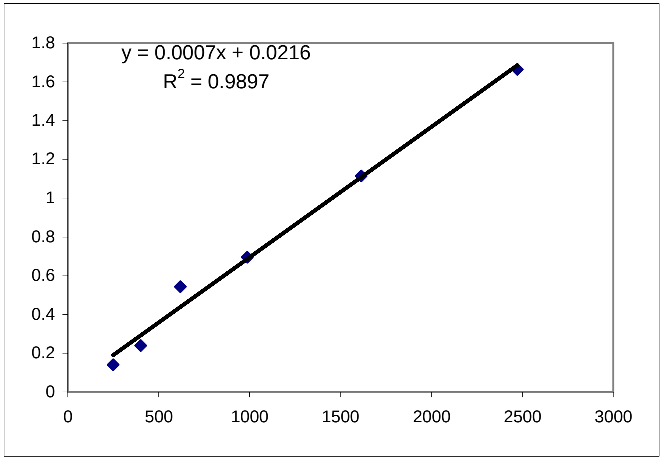
-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	18.6709	22.3224	3.6515	21.6498	2.9789	18.4198		
Moisture B	18.5904	23.2159	4.6255	22.3889	3.7985	17.8791	18.225	81.775
Moisture C	18.3910	21.3296	2.9386	20.7896	2.3986	18.3761		

Cr Soil Extraction

T=28 day	**2/6/2003**
12763-126D	
Frontier Hard Chrome, Sandy Soil	

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	250	0.1409	177.2	9
	401	0.2392	323.2	10
	619	0.5441	776.0	11
	987	0.6960	1001.6	12
	1614	1.1155	1624.6	13
	2471	1.6641	2439.3	14



slope	0.000673
intercept	0.021589
RSQ	0.98967

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	1.3283	1940.6	10.0	19405.8	18727.8	958.75	2.7612	19.4058	854.6062	867.6	18.3
4˚C #2	1.2370	1805.0	10.0	18049.9			2.4927	18.0499	880.5297		
4˚C #3 sol	0.8030	1160.5	20.0	23209.3			2.4964	23.2093	1130.5896		
4˚C #4 insol	0.5449	777.2	40.0	31086.5	ave 5&6	STD DEV	2.4940	31.0865	1590.0454	ave 5&6	STD DEV
-20˚C #5	1.2311	1796.2	10.0	17962.3	17266.5	983.96	2.4945	17.9623	893.2512	874.2	27.0
-20˚C #6	1.1374	1657.1	10.0	16570.8			2.4945	16.5708	855.0766		
-20˚C #7 sol	0.7613	1098.5	20.0	21970.7			2.5001	21.9707	1143.1141		
-20˚C #8 insol	0.5448	777.0	40.0	31080.5	% Recovery	Range	2.4973	31.0805	1541.2779		
Sample 2+spk	0.7331	1056.7	20.0	21133.1	77.1	85-115%	2.4927	21.1331	1031.2855		
Sample 6+spk	0.6846	984.6	20.0	19692.6	78.0	85-115%	2.4945	19.6926	973.1411		

			% Recovery	Range	
LCS #15	0.7112	1024	102.2	80-120%	1.024
Blank #16	0.0199	-3			-0.003

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.5	245	107	75-125%
-20˚C	0.5	249	108	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8154	23.7288	3.9134	23.0370	3.2216	17.6777		
Moisture B	19.7584	23.3465	3.5881	22.7029	2.9445	17.9371	17.763	82.237
Moisture C	19.7573	23.7728	4.0155	23.0631	3.3058	17.6740		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	11.6	910.0	79	75-125%
-20˚C	10.3	817.6	82	75-125%

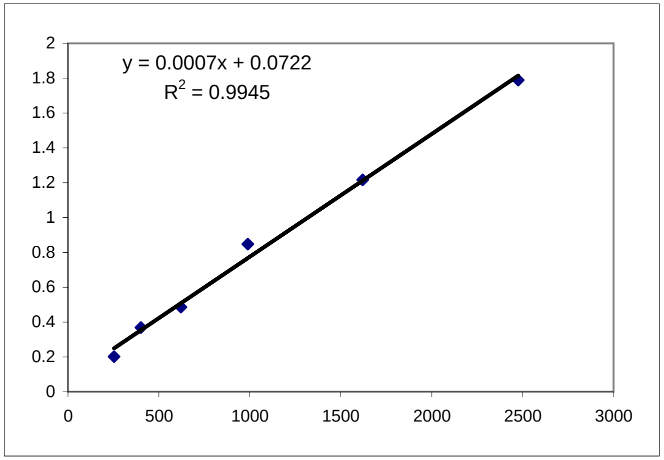
-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	18.6734	24.7441	6.0707	23.6447	4.9713	18.1099		
Moisture B	18.5942	24.2224	5.6282	23.1692	4.5750	18.7129	18.842	81.158
Moisture C	18.3927	26.1860	7.7933	24.6505	6.2578	19.7028		

Cr Soil Extraction

T=56 day	**3/6/2003**
12763-126D	
Frontier Hard Chrome, Sandy Soil	

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.2021	184.6	9
	401	0.3690	421.9	10
	621	0.4857	587.7	11
	989	0.8469	1101.1	12
	1620	1.2156	1625.2	13
	2476	1.7892	2440.5	14



slope	0.000704
intercept	0.0722
RSQ	0.994464

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	1.2409	1661.2	10.0	16611.7	16302.4	855.88	2.4933	16.6117	811.5936	802.2	42.1
4˚C #2	1.2105	1618.0	10.0	16179.6			2.4875	16.1796	792.5880		
4˚C #3 sol	0.8514	1107.5	20.0	22150.8			2.4924	22.1508	1115.5730		
4˚C #4 insol	0.6129	768.5	40.0	30741.6	ave 5&6	STD DEV	2.4889	30.7416	1505.0720	ave 5&6	STD DEV
-20˚C #5	1.2528	1678.1	10.0	16780.8	16859.0	110.56	2.4846	16.7808	848.8661	844.3	6.5
-20˚C #6	1.2638	1693.7	10.0	16937.2			2.4861	16.9372	839.6401		
-20˚C #7 sol	0.8705	1134.7	20.0	22693.8			2.4873	22.6938	1124.4287		
-20˚C #8 insol	0.6106	765.3	40.0	30610.9	% Recovery	Range	2.4925	30.6109	1529.9316		
4˚C #17	1.2692	1701.4	10.0	17013.9			2.4950	17.0139	840.1507		
4˚C #18	1.2563	1683.1	10.0	16830.6			2.4919	16.8306	832.1520		
4˚C #19	1.1188	1487.6	10.0	14876.2			2.4950	14.8762	734.6224		
Sample 1+spk	0.7658	985.9	20.0	19717.4	77.6	85-115%	2.4875	19.7174	965.4305		
Sample 6+spk	0.7915	1022.4	20.0	20448.0	87.8	85-115%	2.4861	20.4480	1013.3662		

			% Recovery	Range	
LCS #15	0.8636	1125	113.3	80-120%	1.125
Blank #16	0.0362	-51			-0.051

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.5	246	127	75-125%
-20˚C	0.5	250	112	75-125%

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	10.4	819.1	86	75-125%
-20˚C	10	795.6	86	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8159	24.4202	4.6043	23.6024	3.7865	17.7617		
Moisture B	19.7659	24.5795	4.8136	23.7087	3.9428	18.0904	17.928	82.072
Moisture C	19.7540	24.5255	4.7715	23.6699	3.9159	17.9315		

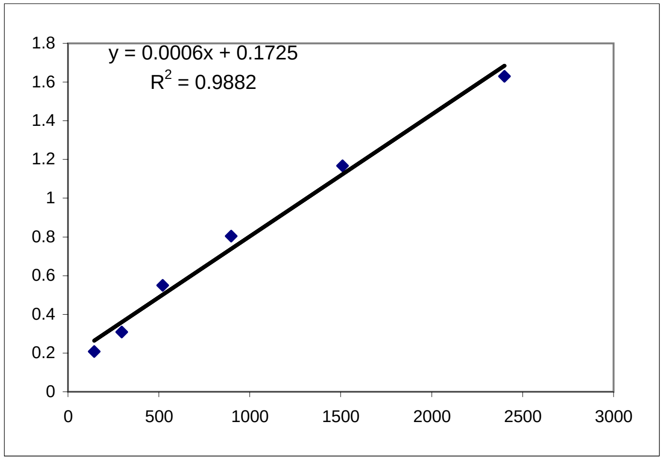
-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	18.6718	24.2759	5.6041	23.2572	4.5854	18.1778		
Moisture B	18.5907	20.4366	1.8459	20.0878	1.4971	18.8959	18.865	81.135
Moisture C	18.3921	22.5418	4.1497	21.7317	3.3396	19.5219		

Cr Soil Extraction

T=112 day **5/1/2003**
12763-126D
Frontier Hard Chrome, Sandy Soil

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	145	0.2077	55.9	9
	296	0.3087	216.2	10
	520	0.5501	599.5	11
	898	0.8045	1003.4	12
	1510	1.1673	1579.4	13
	2399	1.6300	2314.0	14



slope	0.00063
intercept	0.172512
RSQ	0.988215

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	1.2450	1702.7	10.0	17027.5	16977.5	70.73	2.5446	17.0275	826.7163	832.8	8.7
4˚C #2	1.2387	1692.7	10.0	16927.5			2.4939	16.9275	838.9651		
4˚C #3 sol	0.7477	913.2	20.0	18264.1			2.4843	18.2641	1012.0140		
4˚C #4 insol	0.5816	649.5	40.0	25979.8	ave 5&6	STD DEV	2.4838	25.9798	1500.7659	ave 5&6	STD DEV
-20˚C #5	1.2354	1687.5	10.0	16875.1	16774.3	142.58	2.5829	16.8751	792.0368	798.5	9.1
-20˚C #6	1.2227	1667.3	10.0	16673.5			2.5112	16.6735	804.9542		
-20˚C #7 sol	0.8187	1025.9	20.0	20518.6			2.5455	20.5186	977.1581		
-20˚C #8 insol	0.7906	981.3	40.0	39252.6	% Recovery	Range	2.5434	39.2526	1870.8486		
Sample 1+spk	0.7635	938.3	20.0	18765.8	43.5	85-115%	2.4939	18.7658	929.9245		
Sample 6+spk	0.7283	882.4	20.0	17648.1	24.4	85-115%	2.5112	17.6481	850.8789		

	A540	ppb calc.	% Recovery	Range	
LCS #15	0.7565	927	104.5	80-120%	0.927
Blank #16	0.0270	-231			-0.231

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	0.4	192	93	75-125%
-20˚C	0.4	191	94	75-125%

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	13.7	1097.3	61	75-125%
-20˚C	16.6	1273.8	84	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8173	21.1003	1.2830	20.8579	1.0406	18.8932		
Moisture B	19.7835	21.4245	1.6410	21.1160	1.3325	18.7995	19.129	80.871
Moisture C	19.7599	21.7807	2.0208	21.3827	1.6228	19.6952		

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	18.3748	21.1463	2.7715	20.7027	2.3279	16.0058		
Moisture B	18.5940	20.1036	1.5096	19.8287	1.2347	18.2101	17.564	82.436
Moisture C	18.4038	20.1715	1.7677	19.8449	1.4411	18.4760		

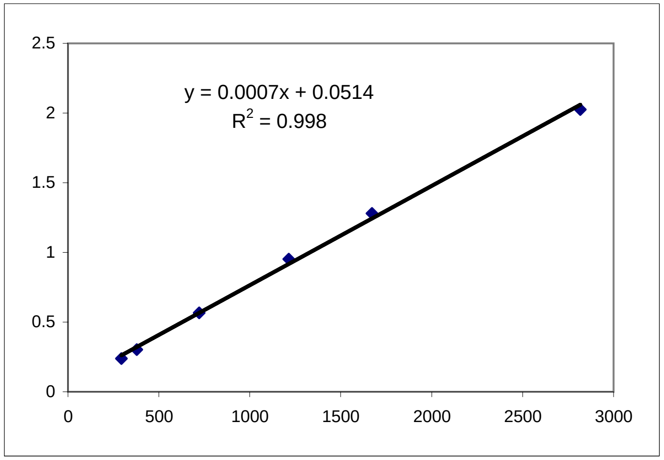
Cr Soil Extraction

T=224 day 8/26/2003

12763-126D

Frontier Hard Chrome, Sandy Soil

Chrome VI digestion assay



Sample/STD	A540	ppb calc.	Sample #
Blank	0.0000		
294	0.2379	261.7	9
379	0.3024	352.2	10
721	0.5668	723.3	11
1213	0.9524	1264.6	12
1672	1.2792	1723.3	13
2818	2.0259	2771.3	14

slope	0.000712
intercept	0.05145
RSQ	0.997998

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 1&2	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1&2	STD DEV
4˚C #1	0.6519	842.8	16.0	13484.6	14550.2	1507.00	2.4381	13.4846	846.3754	894.9	68.7
4˚C #2	0.7468	976.0	16.0	15615.8			2.5065	15.6158	943.4850		
4˚C #3 sol	0.7192	937.3	32.0	29992.0			2.4491	29.9920	1607.5283		
4˚C #4 insol	0.7521	983.4	32.0	31469.7	ave 5&6	STD DEV	2.5723	31.4697	1605.9017	ave 5&6	STD DEV
-20˚C #5	0.7381	963.8	16.0	15420.4	15830.3	579.61	2.4834	15.4204	865.8760	845.6	28.7
-20˚C #6	0.7746	1015.0	16.0	16240.1			2.4803	16.2401	825.3510		
-20˚C #7 sol	0.6245	804.3	32.0	25738.6			2.4735	25.7386	1545.7100		
-20˚C #8 insol	0.7497	980.1	32.0	31361.9	% Recovery	Range	2.5209	31.3619	1697.3965		
Sample 2+spk	0.6426	829.7	32.0	26551.5	82.8	85-115%	2.5065	26.5515	1101.3956		
Sample 5+spk	0.6577	850.9	32.0	27229.7	89.5	85-115%	2.4803	27.2297	1374.5810		

			% Recovery	Range	
LCS #15	0.8792	1162	102.5	80-120%	1.162
Blank #16	0.0048	-65			-0.065

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
4˚C	1.5	749	95	75-125%
-20˚C	1.5	726	96	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9792	2.3715	1.3923	2.1066	1.1274	19.0261		
Moisture B	0.9864	2.0821	1.0957	1.8827	0.8963	18.1984	18.672	81.328
Moisture C	0.9938	2.0326	1.0388	1.8374	0.8436	18.7909		

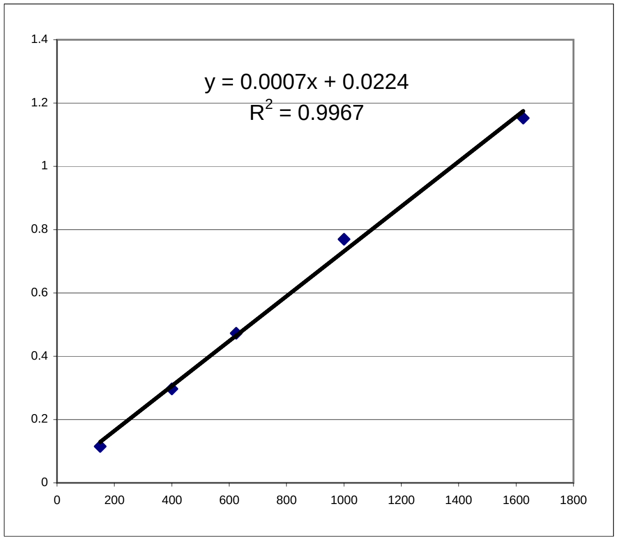
	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
4˚C	10.2	784.4	91	75-125%
-20˚C	11.5	880.9	97	75-125%

-20oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9889	2.1591	1.1702	1.9624	0.9735	16.8091		
Moisture B	0.9899	2.1898	1.1999	1.9912	1.0013	16.5514	16.680	83.320
Moisture C	0.9862	2.1177	1.1315	lost sample				

Cr Soil Extraction

T=0 day
Soil 138
Bradford Soil

Chrome VI digestion assay



Sample/STD		A540	ppb calc.
Blank		0.0000	-64.4
	150	0.1153	106.4
	400	0.2974	376.3
	625	0.4730	636.6
	1000	0.7693	1075.7
	1625	1.1528	1644.1
	2500	1.7038	2460.8

slope	0.000675
intercept	0.043485
RSQ	0.997348

TOC in sediment
16.24%

	au	DOC in five extracts (mg/L)
Sample 1	0.3076	419
Sample 2	0.1903	391
Sample 3	0.2181	372
Sample 4	0.2054	393
Sample 5	0.2093	390
	Ave.	393
	SD	16.8077363

		ppb calc.	ave 1-5	STD DEV	wet mass	ppm Calc.	Sample Conc. µg/g dry	ave 1-5	STD DEV
Sample 1	0.3076	391.4	270.7	69.12	2.5134	0.3914	22.9857	15.9	4.1
Sample 2	0.1903	217.6			2.5388	0.2176	12.6493		
Sample 3	0.2181	258.8			2.5033	0.2588	15.2579		
Sample 4	0.2054	240.0			2.5076	0.2400	14.1239		
Sample 5	0.2093	245.8			2.5286	0.2458	14.3440		
Sol Spike	0.2343	282.8			2.5130	0.2828	16.6091		
Insol Spike	0.2386	289.2			2.5251	0.2892	16.9020		

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution
0.1	58.729	1

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid
20	18.8	5

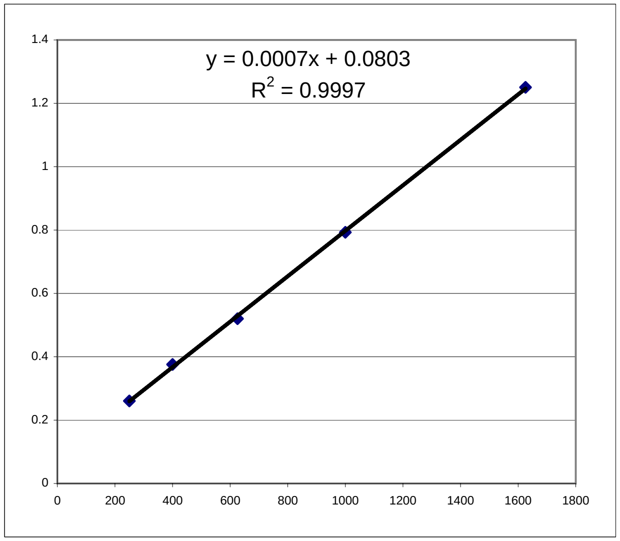
LCS	0.8513	1197	1.197
Blank	0.1069	94	0.094

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8142	22.2120	2.3978	21.4433	1.6291	32.0586		
Moisture B	19.7399	22.1210	2.3811	21.3484	1.6085	32.4472	32.243	67.757
Moisture C	19.5213	21.7092	2.1879	21.0042	1.4829	32.2227		

Cr Soil Extraction
Re-extraction of soil 138 do to extremely low soluble and insoluble spike recoveries

Bradford Soil

Chrome VI digestion assay



Sample/STD	A540	ppb calc.
Blank	0.0000	-136.8
250	0.2603	237.9
400	0.3762	404.7
625	0.5207	612.8
1000	0.7926	1004.2
1625	1.2507	1663.7
2500	1.8154	2476.7

slope	0.000695
intercept	0.095052
RSQ	0.999353

		ppb calc.	ave 1-5	STD DEV	wet mass	ppm Calc.	Sample Conc. µg/g dry	ave 1-5	STD DEV
Sample 1	0.3635	386.5	261.7	81.99	2.5340	0.3865	22.0621	14.9	4.7
Sample 2	0.2632	242.1			2.5749	0.2421	13.5995		
Sample 3	0.2945	287.1			2.5343	0.2871	16.3895		
Sample 4	0.2109	166.8			2.5283	0.1668	9.5423		
Sample 5	0.2520	225.9			2.5492	0.2259	12.8217		
Sol Spike	0.1565	88.5			2.5719	0.0885	4.9756		
Insol Spike	0.2325	197.9			2.5797	0.1979	11.0959		
LCS	0.8315	1060				1.060			
Blank	0.0720	-33				-0.033			

$K_2Cr_2O_7$ added (mg)	Cr added µg/g dry	Spike Recovery % Solution
0.1	56.246	-18

$PbCrO_4$ Added (mg)	Cr added µg/g dry	Spike Recovery % Solid
11.6	10.5	-36

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	18.5202	19.5716	1.0514	19.2452	0.7250	31.0443		
Moisture B	18.5027	19.6391	1.1364	19.2834	0.7807	31.3006	30.871	69.129
Moisture C	18.4899	19.7410	1.2511	19.3623	0.8724	30.2694		

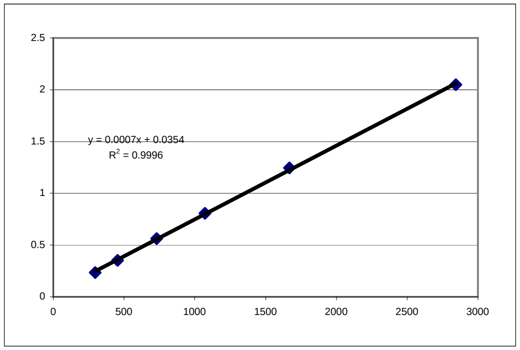
Appendix D

Chromate [Cr(VI)] Soil Extract Holding Time

Chromate [Cr(VI)] extract holding time data for soil extracts from 125A, 125B, 125C, and 126D

The laboratory control sample (LCS), soluble ($K_2Cr_2O_7$) and insoluble ($PbCrO_4$) spikes, and the extract ($K_2Cr_2O_7$) spike are listed in red for each extraction along with the permissible QA/QC range. The soluble and insoluble spike solutions were original to the initial extraction, but were carried through the entire extract storage study as an additional check. The solution spike and LCS were produced at each analysis point in this study.

T=0 day | **9/10/2003** | **Day 1 Color**
12763-125A | **storage = 4 C**
Boom Snub 0.5'



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	297	0.2358	281.3	9
	455	0.3513	443.4	10
	730	0.5624	739.7	11
	1072	0.8051	1080.3	12
	1669	1.2446	1697.1	13
	2843	2.0481	2824.9	14

slope	0.000712
intercept	0.0354
RSQ	0.999635

		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.2286	271.2	4	1084.6	1441.0	613.48	2.5422	1.0846	78.9476	107.1	45.3
Sample 2	0.2222	262.2	4	1048.7			2.5219	1.0487	74.8173		
Sample 3	0.2785	341.2	4	1364.8			2.5169	1.3648	110.1043		
Sample 4	0.4836	629.1	4	2516.2			2.5701	2.5162	184.4395		
Sample 5	0.2475	297.7	4	1190.7			2.5415	1.1907	87.1019		
Sol Spike 6	0.5296	693.6	16	11097.9			2.5043	11.0979	773.9919		
Insol Spike 7	0.5345	700.5	16	11207.9	% recovery	Range	2.4832	11.2079	1006.2799		
#2 + spike	0.3737	474.8	16	7596.9	96.3	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
1.4893	696.487	96	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.9551	1291	101.8	80-120%
Blank #8	0.0058	-42		

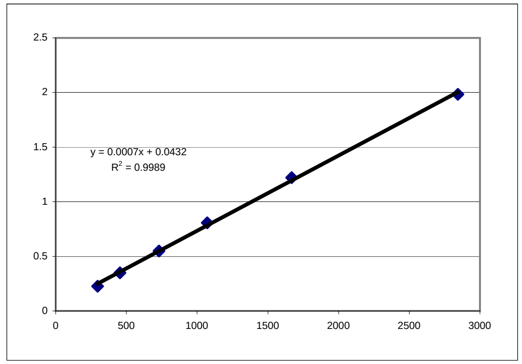
PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
13.1	994.0	90	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9835	2.5068	1.5233	2.2807	1.2972	14.843		
Moisture B	0.9838	2.3479	1.3641	2.1500	1.1662	14.508	14.615	85.385
Moisture C	0.9745	2.5483	1.5738	2.3202	1.3457	14.494		

T=0 day	**9/12/2003**	**Day 3 Color**
12763-125A	**storage = 4 C**	
Boom Snub 0.5'		

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	297	0.2254	264.2	9
	455	0.3483	442.4	10
	730	0.5482	732.1	11
	1072	0.8081	1108.9	12
	1669	1.2204	1706.6	13
	2843	1.9832	2812.4	14



slope	0.00069
intercept	0.043155
RSQ	0.998912

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.4092	530.6	2	1061.3	1433.2	603.52	2.5422	1.0613	77.2469	106.5	44.7
Sample 2	0.4117	534.3	2	1068.5			2.5219	1.0685	76.2307		
Sample 3	0.5215	693.4	2	1386.9			2.5169	1.3869	111.8859		
Sample 4	0.9009	1243.4	2	2486.9			2.5701	2.4869	182.2870		
Sample 5	0.4441	581.2	2	1162.5			2.5415	1.1625	85.0328		
Sol Spike 6	0.5268	701.1	16	11217.8			2.5043	11.2178	782.3584		
Insol Spike 7	0.5226	695.0	16	11120.4	% recovery	Range	2.4832	11.1204	998.4249		
#2 + spike	0.7162	975.7	8	7805.4	99.1	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
1.4893	696.487	97	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

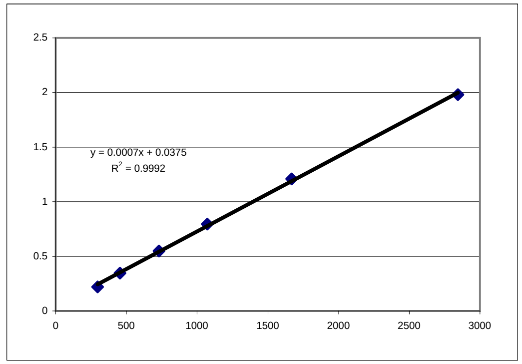
	A540	ppb calc.	% recovery	Range
LCS #15	0.9441	1306	103.0	80-120%
Blank #8	0.0056	-54		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
13.1	994.0	90	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9835	2.5068	1.5233	2.2807	1.2972	14.843		
Moisture B	0.9838	2.3479	1.3641	2.1500	1.1662	14.508	14.615	85.385
Moisture C	0.9745	2.5483	1.5738	2.3202	1.3457	14.494		

T=0 day	9/16/2003	Day 7 Color
12763-125A	Storage = 4 C	
Boom Snub 0.5'		

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		-0.0001		
	297	0.2190	263.1	9
	455	0.3459	447.1	10
	730	0.5480	740.0	11
	1072	0.7965	1100.2	12
	1669	1.2092	1698.3	13
	2843	1.9816	2817.9	14

slope	0.00069
intercept	0.037455
RSQ	0.999208

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.4371	579.2	2	1158.5	1479.0	578.32	2.5422	1.1585	84.3237	109.9	42.8
Sample 2	0.4168	549.8	2	1099.7			2.5219	1.0997	78.4518		
Sample 3	0.5240	705.2	2	1410.4			2.5169	1.4104	113.7853		
Sample 4	0.8972	1246.1	2	2492.2			2.5701	2.4922	182.6821		
Sample 5	0.4633	617.2	2	1234.4			2.5415	1.2344	90.2989		
Sol Spike 6	0.5316	716.2	16	11459.5			2.5043	11.4595	799.2125		
Insol Spike 7	0.5391	727.1	16	11633.4	% recovery	Range	2.4832	11.6334	1044.4843		
#2 + spike	0.7322	1007.0	8	8055.8	102.3	85-115%					

$K_2Cr_2O_7$ added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
1.4893	696.487	99	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

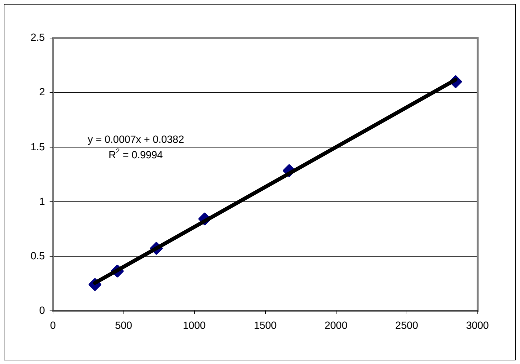
	A540	ppb calc.	% recovery	Range
LCS #15	0.9267	1289	101.7	80-120%
Blank #8	0.0057	-46		

$PbCrO_4$ Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
13.1	994.0	94	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9835	2.5068	1.5233	2.2807	1.2972	14.843		
Moisture B	0.9838	2.3479	1.3641	2.1500	1.1662	14.508	14.615	85.385
Moisture C	0.9745	2.5483	1.5738	2.3202	1.3457	14.494		

T=0 day	9/23/2003	Day 14 Color
12763-125A	Storage = 4 C	
Boom Snub 0.5'		

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	297	0.2397	275.2	9
	455	0.3639	444.9	10
	730	0.5714	728.4	11
	1072	0.8409	1096.6	12
	1669	1.2847	1702.9	13
	2843	2.1014	2818.6	14

slope	0.000732
intercept	0.038247
RSQ	0.999359

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.4548	569.1	2	1138.2	1443.4	567.77	2.5422	1.1382	82.8438	107.2	42.0
Sample 2	0.4352	542.3	2	1084.6			2.5219	1.0846	77.3788		
Sample 3	0.5370	681.4	2	1362.8			2.5169	1.3628	109.9418		
Sample 4	0.9319	1220.9	2	2441.8			2.5701	2.4418	178.9822		
Sample 5	0.4737	594.9	2	1189.8			2.5415	1.1898	87.0335		
Sol Spike 6	0.5496	698.6	16	11177.5			2.5043	11.1775	779.5483		
Insol Spike 7	0.5483	696.8	16	11149.1	% recovery	Range	2.4832	11.1491	1001.0024		
#2 + spike	0.7779	1010.5	8	8083.9	102.9	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
1.4893	696.487	97	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.9867	1296	102.2	80-120%
Blank #8	0.0046	-46		

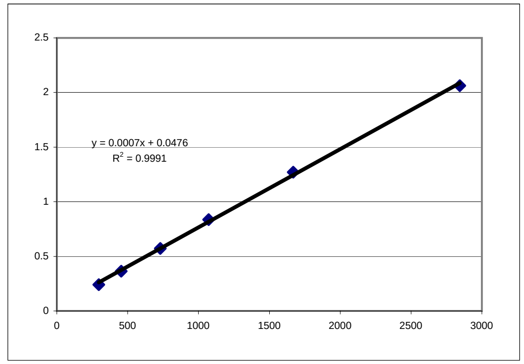
PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
13.1	994.0	90	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9835	2.5068	1.5233	2.2807	1.2972	14.843		
Moisture B	0.9838	2.3479	1.3641	2.1500	1.1662	14.508	14.615	85.385
Moisture C	0.9745	2.5483	1.5738	2.3202	1.3457	14.494		

T=0 day	**10/7/2003**	**Day 28 Color**
12763-125A	**Storage = 4 C**	
Boom Snub 0.5'		

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	297	0.2409	269.8	9
	455	0.3640	441.5	10
	730	0.5719	731.6	11
	1072	0.8369	1101.4	12
	1669	1.2718	1708.3	13
	2843	2.0641	2813.9	14



slope	0.000717
intercept	0.047574
RSQ	0.999082

		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.4469	557.2	2	1114.4	1449.5	588.60	2.5422	1.1144	81.1171	107.7	43.5
Sample 2	0.4308	534.8	2	1069.5			2.5219	1.0695	76.3015		
Sample 3	0.5380	684.3	2	1368.7			2.5169	1.3687	110.4195		
Sample 4	0.9370	1241.1	2	2482.2			2.5701	2.4822	181.9473		
Sample 5	0.4821	606.3	2	1212.7			2.5415	1.2127	88.7066		
Sol Spike 6	0.5425	690.6	16	11050.0			2.5043	11.0500	770.6507		
Insol Spike 7	0.5450	694.1	16	11105.8	% recovery	Range	2.4832	11.1058	997.1106		
#2 + spike	0.7486	978.2	8	7825.7	99.4	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
1.4893	696.487	95	75-125%

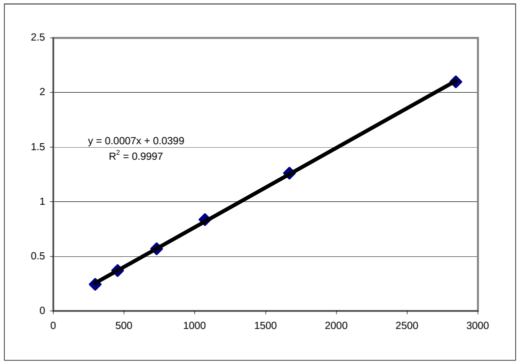
Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.9801	1301	102.7	80-120%
Blank #8	0.0046	-60		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
13.1	994.0	89	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9835	2.5068	1.5233	2.2807	1.2972	14.843		
Moisture B	0.9838	2.3479	1.3641	2.1500	1.1662	14.508	14.615	85.385
Moisture C	0.9745	2.5483	1.5738	2.3202	1.3457	14.494		

T=0 day	11/4/2003	Day 56 Color
12763-125A	storage = 4 C	
Boom Snub 0.5'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	297	0.2429	279.4	9
	455	0.3687	452.5	10
	730	0.5690	728.1	11
	1072	0.8361	1095.7	12
	1669	1.2609	1680.2	13
	2843	2.0970	2830.7	14

slope	0.000727
intercept	0.039858
RSQ	0.999746

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.4512	566.0	2	1132.0	1457.8	587.44	2.5422	1.1320	82.3979	108.3	43.5
Sample 2	0.4265	532.0	2	1064.1			2.5219	1.0641	75.9129		
Sample 3	0.5425	691.7	2	1383.3			2.5169	1.3833	111.5988		
Sample 4	0.9434	1243.3	2	2486.6			2.5701	2.4866	182.2689		
Sample 5	0.4842	611.4	2	1222.9			2.5415	1.2229	89.4512		
Sol Spike 6	0.5349	681.2	16	10899.1			2.5043	10.8991	760.1299		
Insol Spike 7	0.5325	677.9	16	10846.3	% recovery	Range	2.4832	10.8463	973.8112		
#2 + spike	0.7465	972.4	8	7778.9	98.7	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
1.4893	696.487	94	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

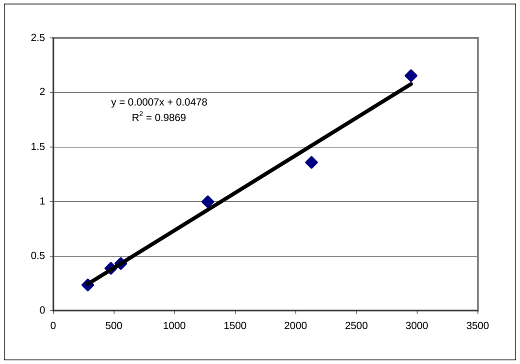
	A540	ppb calc.	% recovery	Range
LCS #15	0.9744	1286	101.5	80-120%
Blank #8	0.0051	-48		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
13.1	994.0	87	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9835	2.5068	1.5233	2.2807	1.2972	14.843		
Moisture B	0.9838	2.3479	1.3641	2.1500	1.1662	14.508	14.615	85.385
Moisture C	0.9745	2.5483	1.5738	2.3202	1.3457	14.494		

Storage = Rm Temperature

T=0 day	**5/12/2003**	**Day 1 Color**
12763-125A		
Boom Snub 0.5'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	286	0.2334	269.7	9
	476	0.3886	495.3	10
	557	0.4305	556.2	11
	1273	0.9979	1380.9	12
	2128	1.3584	1904.9	13
	2949	2.1543	3061.7	14

slope	0.000688
intercept	0.047839
RSQ	0.986947

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.7529	1024.8	1.0	1024.8	1164.3	182.87	2.4933	1.0248	70.6682	82.6	11.9
Sample 2	0.9641	1331.8	1.0	1331.8			2.4908	1.3318	98.9546		
Sample 3	0.9507	1312.3	1.0	1312.3			2.5072	1.3123	79.5580		
Sample 4	0.8134	1112.7	4.0	4450.9			2.5478	4.4509	323.3490	This samplewas not used due to varience	
Sample 5	0.7279	988.4	1.0	988.4			2.5003	0.9884	81.0965	from the other 4 samples	
Sol Spike 6	0.8668	1190.3	4.0	4761.3			2.4942	4.7613	311.4414		
Insol Spike 7	0.7475	1016.9	16.0	16271.0			2.5240	16.2710	1104.5402		

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.9130	1257	108.2	80-120%
Blank #8	0.0087	-57		

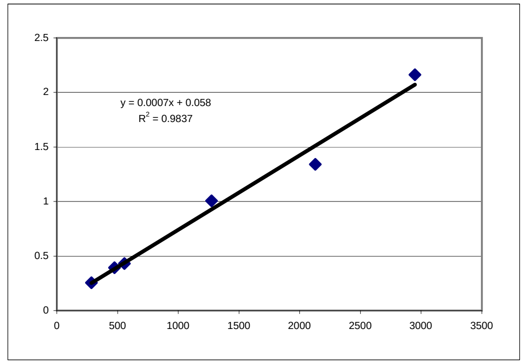
	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4974	234.271	98	75-125%

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	13.3	995.9	103	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9651	2.1051	1.1400	1.9346	0.9695	14.956		
Moisture B	0.9643	2.1118	1.1475	1.9370	0.9727	15.233	14.875	85.125
Moisture C	0.9605	2.0522	1.0917	1.8946	0.9341	14.436		

Storage = Rm Temperature

T=0 day	**5/14/2003**	**Day 2 Color**
12763-125A		
Boom Snub 0.5'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	286	0.254	286.9	9
	476	0.3920	488.9	10
	557	0.4319	547.3	11
	1273	1.0071	1389.2	12
	2128	1.3406	1877.3	13
	2949	2.1616	3079.0	14

slope	0.000683
intercept	0.057988
RSQ	0.983728

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.8010	1087.5	1.0	1087.5	1198.3	173.78	2.4933	1.0875	74.9950	85.0	11.5
Sample 2	0.9914	1366.2	1.0	1366.2			2.4908	1.3662	101.5148		
Sample 3	0.9636	1325.5	1.0	1325.5			2.5072	1.3255	80.3608		
Sample 4	0.7244	975.4	4.0	3901.6			2.5478	3.9016	283.4482	This samplewas not used due to varience from the other 4 samples	
Sample 5	0.7508	1014.1	1.0	1014.1			2.5003	1.0141	83.1972		
Sol Spike 6	0.8742	1194.7	4.0	4778.7			2.4942	4.7787	312.5758		
Insol Spike 7	0.7046	946.4	16.0	15142.9	% recovery	Range	2.5240	15.1429	1027.9615		
Sample 2+spk	0.2672	306.2	16.0	4899.5	88.3	85-115%					

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.9250	1269	109.2	80-120%
Blank #8	0.0063	-76		

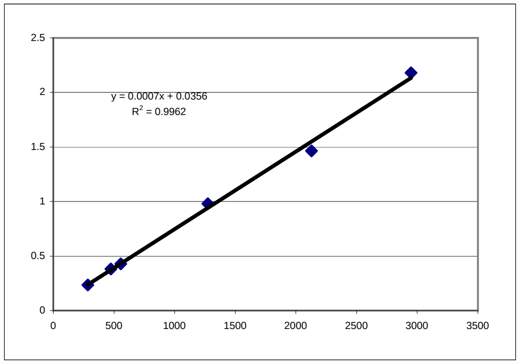
	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4974	234.271	97	75-125%

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	13.3	995.9	95	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9651	2.1051	1.1400	1.9346	0.9695	14.956		
Moisture B	0.9643	2.1118	1.1475	1.9370	0.9727	15.233	14.875	85.125
Moisture C	0.9605	2.0522	1.0917	1.8946	0.9341	14.436		

Storage = Rm Temperature

T=0 day	**5/16/2003**	**Day 4 Color**
12763-125A		
Boom Snub 0.5'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	286	0.2355	280.9	9
	476	0.3829	487.9	10
	557	0.4289	552.6	11
	1273	0.9815	1328.9	12
	2128	1.4647	2007.7	13
	2949	2.1787	3010.7	14

slope	0.000712
intercept	0.035579
RSQ	0.996189

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.8142	1093.8	1.0	1093.8	1191.2	184.78	2.4933	1.0938	75.4297	84.3	10.7
Sample 2	0.9924	1344.2	1.0	1344.2			2.4908	1.3442	99.8772		
Sample 3	0.9949	1347.7	1.0	1347.7			2.5072	1.3477	81.7044		
Sample 4	0.7244	967.7	4.0	3870.7			2.5478	3.8707	281.2011	This samplewas not used due to varience from the other 4 samples	
Sample 5	0.7324	978.9	1.0	978.9			2.5003	0.9789	80.3146		
Sol Spike 6	0.8664	1167.2	4.0	4668.7			2.4942	4.6687	305.3792		
Insol Spike 7	0.7142	953.3	16.0	15253.6	% recovery	Range	2.5240	15.2536	1035.4762		
Sample 2+spk	0.2713	331.1	16.0	5298.4	98.9	85-115%					

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.9223	1246	107.2	80-120%
Blank #8	0.0054	-42		

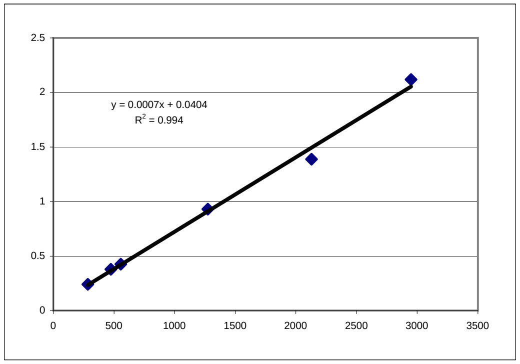
	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4974	234.271	94	75-125%

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	13.3	995.9	96	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9651	2.1051	1.1400	1.9346	0.9695	14.956		
Moisture B	0.9643	2.1118	1.1475	1.9370	0.9727	15.233	14.875	85.125
Moisture C	0.9605	2.0522	1.0917	1.8946	0.9341	14.436		

Storage = Rm Temperature

T=0 day	**5/20/2003**	**Day 8 Color**
12763-125A		
Boom Snub 0.5'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	286	0.2394	291.5	9
	476	0.3781	494.6	10
	557	0.4245	562.5	11
	1273	0.9314	1304.9	12
	2128	1.3877	1973.1	13
	2949	2.1176	3042.0	14

slope	0.000683
intercept	0.04038
RSQ	0.994006

							Sample Conc.					
		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV	
Sample 1	0.8085	1124.9	1.0	1124.9	1209.1	182.58	2.4933	1.1249	77.5715	85.7	11.1	
Sample 2	0.9789	1374.4	1.0	1374.4			2.4908	1.3744	102.1259			
Sample 3	0.9588	1345.0	1.0	1345.0			2.5072	1.3450	81.5417			
Sample 4	0.7064	975.4	4.0	3901.5			2.5478	3.9015	283.4358	This samplewas not used due to varience		
Sample 5	0.7178	992.1	1.0	992.1			2.5003	0.9921	81.3932	from the other 4 samples		
Sol Spike 6	0.8406	1171.9	4.0	4687.6			2.4942	4.6876	306.6184			
Insol Spike 7	0.6805	937.4	16.0	14999.0	% recovery	Range	2.5240	14.9990	1018.1951			
Sample 2+spk	0.2637	327.0	16.0	5232.7	96.5	85-115%						

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4974	234.271	94	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

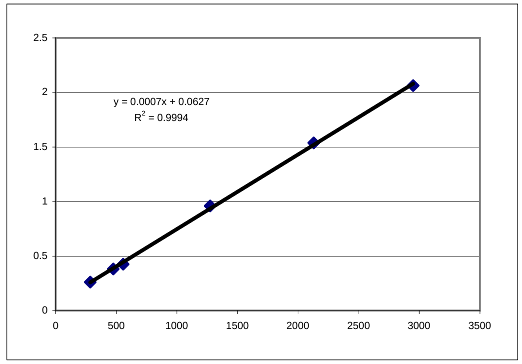
			% recovery	Range
LCS #15	0.8867	1239	106.6	80-120%
Blank #8	0.0097	-45		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	13.3	995.9	94	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9651	2.1051	1.1400	1.9346	0.9695	14.956		
Moisture B	0.9643	2.1118	1.1475	1.9370	0.9727	15.233	14.875	85.125
Moisture C	0.9605	2.0522	1.0917	1.8946	0.9341	14.436		

Storage = Rm Temperature

T=0 day	**5/27/2003**	**Day 15 Color**
12763-125A		
Boom Snub 0.5'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	286	0.2599	288.0	9
	476	0.3818	466.0	10
	557	0.4260	530.6	11
	1273	0.9594	1309.7	12
	2128	1.5371	2153.6	13
	2949	2.0623	2920.7	14

slope	0.000685
intercept	0.062744
RSQ	0.99936

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV	
Sample 1	0.8307	1121.7	1.0	1121.7	1211.9	188.62	2.4933	1.1217	77.3538	85.8	11.1	
Sample 2	1.0035	1374.1	1.0	1374.1			2.4908	1.3741	102.1038			
Sample 3	0.9956	1362.6	1.0	1362.6			2.5072	1.3626	82.6086			
Sample 4	0.6979	927.8	4.0	3711.0			2.5478	3.7110	269.6000	This samplewas not used due to varience		
Sample 5	0.7400	989.3	1.0	989.3			2.5003	0.9893	81.1624	from the other 4 samples		
Sol Spike 6	0.8356	1128.9	4.0	4515.6			2.4942	4.5156	295.3654			
Insol Spike 7	0.7121	948.5	16.0	15176.0	% recovery	Range	2.5240	15.1760	1030.2072			
Sample 2+spk	0.2664	297.5	16.0	4759.6	84.6	85-115%						

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4974	234.271	89	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

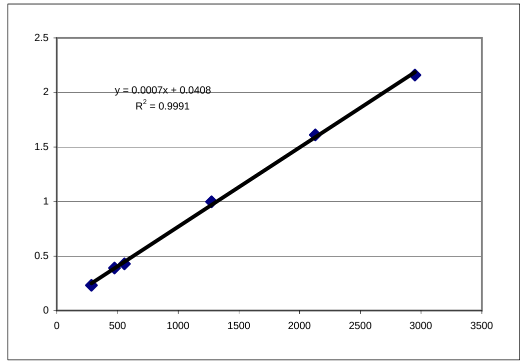
	A540	ppb calc.	% recovery	Range
LCS #15	0.8837	1199	103.2	80-120%
Blank #8	0.0062	-83		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	13.3	995.9	95	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9651	2.1051	1.1400	1.9346	0.9695	14.956		
Moisture B	0.9643	2.1118	1.1475	1.9370	0.9727	15.233	14.875	85.125
Moisture C	0.9605	2.0522	1.0917	1.8946	0.9341	14.436		

Storage = Rm Temperature

T=0 day	**6/10/2003**	**Day 29 Color**
12763-125A		
Boom Snub 0.5'		



Chrome VI digestion assay

Sample/STD	A540	ppb calc.	Sample #
Blank	0.0000		
286	0.2332	264.6	9
476	0.3906	481.1	10
557	0.4296	534.8	11
1273	0.9977	1316.1	12
2128	1.6102	2158.6	13
2949	2.1590	2913.4	14

slope	0.000727
intercept	0.040784
RSQ	0.99911

							Sample Conc.					
		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV	
Sample 1	0.8204	1072.3	1.0	1072.3	1161.1	177.70	2.4933	1.0723	73.9430	82.3	10.8	
Sample 2	1.0017	1321.6	1.0	1321.6			2.4908	1.3216	98.2022			
Sample 3	0.9833	1296.3	1.0	1296.3			2.5072	1.2963	78.5906			
Sample 4	0.7158	928.4	4.0	3713.6			2.5478	3.7136	269.7892	This samplewas not used due to varience from the other 4 samples		
Sample 5	0.7346	954.3	1.0	954.3			2.5003	0.9543	78.2920			
Sol Spike 6	0.8626	1130.3	4.0	4521.3			2.4942	4.5213	295.7376			
Insol Spike 7	0.6990	905.3	16.0	14484.8	% recovery	Range	2.5240	14.4848	983.2889			
Sample 2+spk	0.2714	317.2	16.0	5075.0	93.8	85-115%						

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4974	234.271	91	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

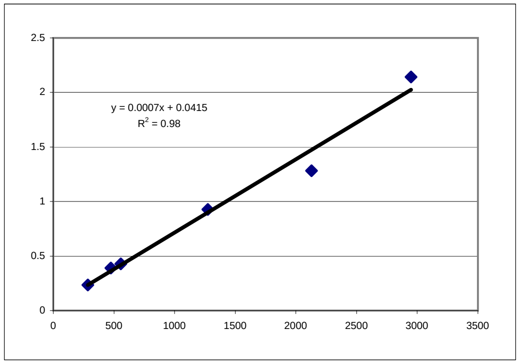
			% recovery	Range
LCS #15	0.9211	1211	104.2	80-120%
Blank #8	0.0047	-50		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	13.3	995.9	90	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9651	2.1051	1.1400	1.9346	0.9695	14.956		
Moisture B	0.9643	2.1118	1.1475	1.9370	0.9727	15.233	14.875	85.125
Moisture C	0.9605	2.0522	1.0917	1.8946	0.9341	14.436		

Storage = Rm Temperature

T=0 day	**7/1/2003**	**Day 57 Color**
12763-125A		
Boom Snub 0.5'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	286	0.2359	289.1	9
	476	0.3891	517.0	10
	557	0.4294	576.9	11
	1273	0.9280	1318.5	12
	2128	1.2810	1843.5	13
	2949	2.1416	3123.6	14

slope	0.000672
intercept	0.04152
RSQ	0.979978

							Sample Conc.				
		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.8309	1174.1	1.0	1174.1	1258.6	177.77	2.4933	1.1741	80.9638	89.2	11.0
Sample 2	0.9958	1419.3	1.0	1419.3			2.4908	1.4193	105.4630		
Sample 3	0.9775	1392.1	1.0	1392.1			2.5072	1.3921	84.3989		
Sample 4	0.7319	1026.8	4.0	4107.3			2.5478	4.1073	298.3920	This samplewas not used due to varience	
Sample 5	0.7467	1048.8	1.0	1048.8			2.5003	1.0488	86.0521	from the other 4 samples	
Sol Spike 6	0.8555	1210.7	4.0	4842.7			2.4942	4.8427	316.7628		
Insol Spike 7	0.7273	1020.0	16.0	16319.9	% recovery	Range	2.5240	16.3199	1107.8630		
Sample 2+spk	0.2735	345.0	16.0	5520.6	102.5	85-115%					

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4974	234.271	97	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

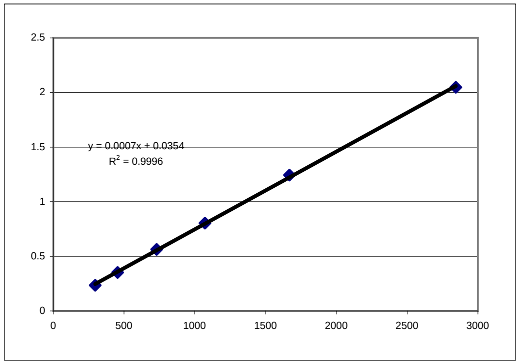
			% recovery	Range
LCS #15	0.9148	1299	111.8	80-120%
Blank #8	0.0089	-49		

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	13.3	995.9	102	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9651	2.1051	1.1400	1.9346	0.9695	14.956		
Moisture B	0.9643	2.1118	1.1475	1.9370	0.9727	15.233	14.875	85.125
Moisture C	0.9605	2.0522	1.0917	1.8946	0.9341	14.436		

T=0 day	9/10/2003	Day 1 Color
12763-125B	Storage = 4 C	
Boom Snub 3'		

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	297	0.2358	281.3	9
	455	0.3513	443.4	10
	730	0.5624	739.7	11
	1072	0.8051	1080.3	12
	1669	1.2446	1697.1	13
	2843	2.0481	2824.9	14

slope	0.000712
intercept	0.0354
RSQ	0.999635

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1 (#16)	0.4502	582.2	8	4657.4	4477.5	697.96	2.5123	4.6574	310.5684	326.1	36.8
Sample 2 (#17)	0.3411	429.1	8	3432.4			2.5458	3.4324	305.8664		
Sample 3 (#18)	0.4688	608.3	8	4866.3			2.5507	4.8663	346.5099		
Sample 4 (#19)	0.4083	523.4	8	4187.0			2.5737	4.1870	287.7671		
Sample 5 (#20)	0.5025	655.6	8	5244.7			2.5132	5.2447	379.8420		
Sol Spike 6 (#21)	0.7871	1055.0	16	16880.3			2.5359	16.8803	1146.7139		
Insol Spike 7 (#22)	0.7771	1041.0	16	16655.8	% recovery	Range	2.5385	16.6558	1274.5568		
#2 + spike (#17)	0.4777	620.8	16	9932.4	95.6	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
1.4895	710.451	116	75-125%

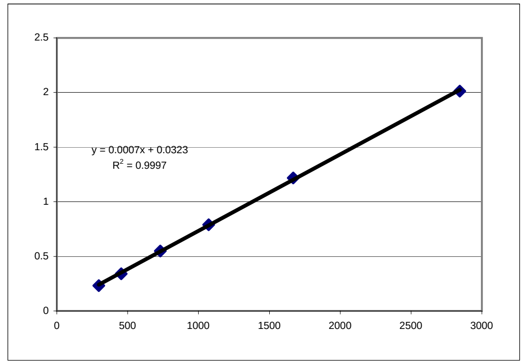
Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.9551	1291	101.8	80-120%
Blank #8	0.0058	-42		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
12.7	973.6	97	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9822	2.1423	1.1601	1.9375	0.9553	17.654		
Moisture B	0.9934	2.1163	1.1229	1.9220	0.9286	17.303	17.325	82.675
Moisture C	0.9845	2.1086	1.1241	1.9173	0.9328	17.018		

T=0 day	**9/12/2003**	**Day 3 Color**
12763-125B	**Storage = 4 C**	
Boom Snub 3'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	297	0.232	285.1	9
	455	0.3418	441.9	10
	730	0.5484	737.0	11
	1072	0.7904	1082.6	12
	1669	1.2178	1692.9	13
	2843	2.0119	2827.0	14

slope	0.0007
intercept	0.032325
RSQ	0.999716

		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1 (#16)	0.4359	576.3	8	4610.6	4462.6	645.38	2.5123	4.6106	307.4491	325.3	34.3
Sample 2 (#17)	0.3389	437.8	8	3502.5			2.5458	3.5025	312.1070		
Sample 3 (#18)	0.4523	599.8	8	4798.0			2.5507	4.7980	341.6494		
Sample 4 (#19)	0.4002	525.3	8	4202.8			2.5737	4.2028	288.8547		
Sample 5 (#20)	0.4874	649.9	8	5199.0			2.5132	5.1990	376.5360		
Sol Spike 6 (#21)	0.7729	1057.6	16	16921.4			2.5359	16.9214	1149.5028		
Insol Spike 7 (#22)	0.7553	1032.5	16	16519.2	% recovery	Range	2.5385	16.5192	1264.1093		
#2 + spike (#17)	0.9163	1262.4	8	10099.0	97.0	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
1.4895	710.451	116	75-125%

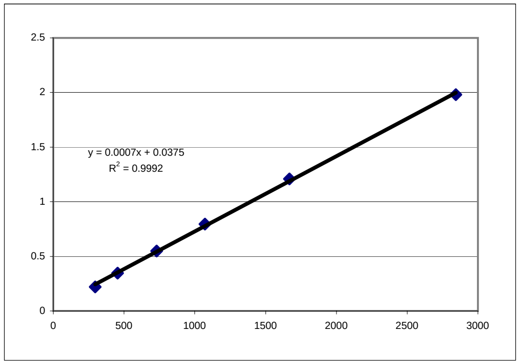
Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.9487	1309	103.3	80-120%
Blank #8	0.0038	-41		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
12.7	973.6	96	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9822	2.1423	1.1601	1.9375	0.9553	17.654		
Moisture B	0.9934	2.1163	1.1229	1.9220	0.9286	17.303	17.325	82.675
Moisture C	0.9845	2.1086	1.1241	1.9173	0.9328	17.018		

T=0 day	**9/16/2003**	**Day 7 Color**
12763-125B	**Storage = 4 C**	
Boom Snub 3'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		-0.0001		
	297	0.2190	263.1	9
	455	0.3459	447.1	10
	730	0.5480	740.0	11
	1072	0.7965	1100.2	12
	1669	1.2092	1698.3	13
	2843	1.9816	2817.9	14

slope	0.00069
intercept	0.037455
RSQ	0.999208

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1 (#16)	0.4254	562.3	8	4498.3	4478.8	659.07	2.5123	4.4983	299.9597	326.8	38.1
Sample 2 (#17)	0.3437	443.9	8	3551.0			2.5458	3.5510	316.4313		
Sample 3 (#18)	0.4572	608.4	8	4867.1			2.5507	4.8671	346.5664		
Sample 4 (#19)	0.3993	524.5	8	4195.7			2.5737	4.1957	288.3669		
Sample 5 (#20)	0.4930	660.3	8	5282.2			2.5132	5.2822	382.5591		
Sol Spike 6 (#21)	0.7877	1087.4	16	17398.6			2.5359	17.3986	1181.9197		
Insol Spike 7 (#22)	0.7586	1045.2	16	16723.7	% recovery	Range	2.5385	16.7237	1279.7580		
#2 + spike (#17)	0.9341	1299.6	8	10396.8	100.7	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
1.4895	710.451	120	75-125%

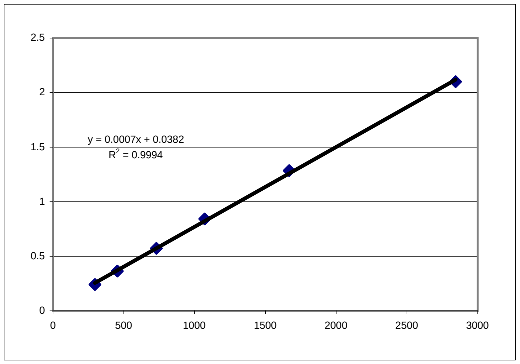
Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.9267	1289	101.7	80-120%
Blank #8	0.0057	-46		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
12.7	973.6	98	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9822	2.1423	1.1601	1.9375	0.9553	17.654		
Moisture B	0.9934	2.1163	1.1229	1.9220	0.9286	17.303	17.325	82.675
Moisture C	0.9845	2.1086	1.1241	1.9173	0.9328	17.018		

T=0 day	**9/23/2003**	**Day 14 Color**
12763-125B	**Storage = 4 C**	
Boom Snub 3'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	297	0.2397	275.2	9
	455	0.3639	444.9	10
	730	0.5714	728.4	11
	1072	0.8409	1096.6	12
	1669	1.2847	1702.9	13
	2843	2.1014	2818.6	14

slope	0.000732
intercept	0.038247
RSQ	0.999359

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1 (#16)	0.4597	575.8	8	4606.2	4479.2	649.17	2.5123	4.6062	307.1540	326.6	35.4
Sample 2 (#17)	0.3613	441.3	8	3530.8			2.5458	3.5308	314.6287		
Sample 3 (#18)	0.4816	605.7	8	4845.6			2.5507	4.8456	345.0364		
Sample 4 (#19)	0.4217	523.9	8	4190.9			2.5737	4.1909	288.0377		
Sample 5 (#20)	0.5161	652.8	8	5222.6			2.5132	5.2226	378.2474		
Sol Spike 6 (#21)	0.8174	1064.5	16	17031.3			2.5359	17.0313	1156.9700		
Insol Spike 7 (#22)	0.8064	1049.4	16	16790.9	% recovery	Range	2.5385	16.7909	1284.8944		
#2 + spike (#17)	0.9856	1294.2	8	10354.0	100.3	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
1.4895	710.451	117	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

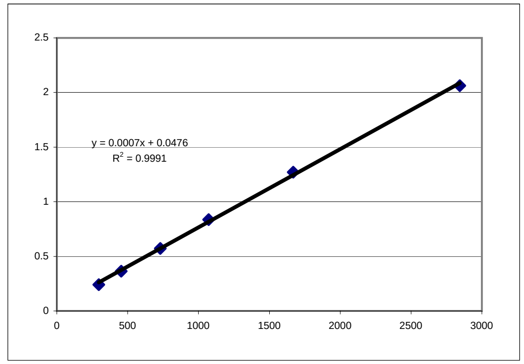
	A540	ppb calc.	% recovery	Range
LCS #15	0.9867	1296	102.2	80-120%
Blank #8	0.0046	-46		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
12.7	973.6	98	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9822	2.1423	1.1601	1.9375	0.9553	17.654		
Moisture B	0.9934	2.1163	1.1229	1.9220	0.9286	17.303	17.325	82.675
Moisture C	0.9845	2.1086	1.1241	1.9173	0.9328	17.018		

T=0 day	**10/7/2003**	**Day 28 Color**
12763-125B	**Storage = 4 C**	
Boom Snub 3'		

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	297	0.2409	269.8	9
	455	0.3640	441.5	10
	730	0.5719	731.6	11
	1072	0.8369	1101.4	12
	1669	1.2718	1708.3	13
	2843	2.0641	2813.9	14

slope	0.000717
intercept	0.047574
RSQ	0.999082

							Sample Conc.				
		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1 (#16)	0.4510	562.9	8	4503.5	4327.6	660.53	2.5123	4.5035	300.3074	315.3	35.4
Sample 2 (#17)	0.3481	419.4	8	3354.8			2.5458	3.3548	298.9523		
Sample 3 (#18)	0.4665	584.6	8	4676.6			2.5507	4.6766	333.0026		
Sample 4 (#19)	0.4085	503.6	8	4029.1			2.5737	4.0291	276.9176		
Sample 5 (#20)	0.5021	634.2	8	5074.0			2.5132	5.0740	367.4815		
Sol Spike 6 (#21)	0.8098	1063.6	16	17017.8			2.5359	17.0178	1156.0538		
Insol Spike 7 (#22)	0.7926	1039.6	16	16633.8	% recovery	Range	2.5385	16.6338	1272.8760		
#2 + spike (#17)	0.9571	1269.2	8	10153.3	100.0	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
1.4895	710.451	118	75-125%

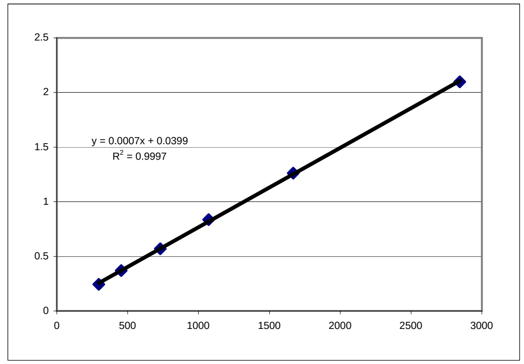
Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.9801	1301	102.7	80-120%
Blank #8	0.0046	-60		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
12.7	973.6	98	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9822	2.1423	1.1601	1.9375	0.9553	17.654		
Moisture B	0.9934	2.1163	1.1229	1.9220	0.9286	17.303	17.325	82.675
Moisture C	0.9845	2.1086	1.1241	1.9173	0.9328	17.018		

T=0 day	**11/4/2003**	**Day 56 Color**
12763-125B	**Storage = 4 C**	
Boom Snub 3'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	297	0.2429	279.4	9
	455	0.3687	452.5	10
	730	0.5690	728.1	11
	1072	0.8361	1095.7	12
	1669	1.2609	1680.2	13
	2843	2.0970	2830.7	14

slope	0.000727
intercept	0.039858
RSQ	0.999746

		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1 (#16)	0.4525	567.8	8	4542.5	4361.9	640.66	2.5123	4.5425	302.9033	318.0	34.5
Sample 2 (#17)	0.3511	428.3	8	3426.2			2.5458	3.4262	305.3139		
Sample 3 (#18)	0.4652	585.3	8	4682.3			2.5507	4.6823	333.4088		
Sample 4 (#19)	0.4088	507.7	8	4061.4			2.5737	4.0614	279.1380		
Sample 5 (#20)	0.5029	637.2	8	5097.3			2.5132	5.0973	369.1693		
Sol Spike 6 (#21)	0.7955	1039.8	16	16636.6			2.5359	16.6366	1130.1570		
Insol Spike 7 (#22)	0.7783	1016.1	16	16257.9	% recovery	Range	2.5385	16.2579	1244.1120		
#2 + spike (#17)	0.9576	1262.8	8	10102.7	98.2	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
1.4895	710.451	114	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.9744	1286	101.5	80-120%
Blank #8	0.0051	-48		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
12.7	973.6	95	75-125%

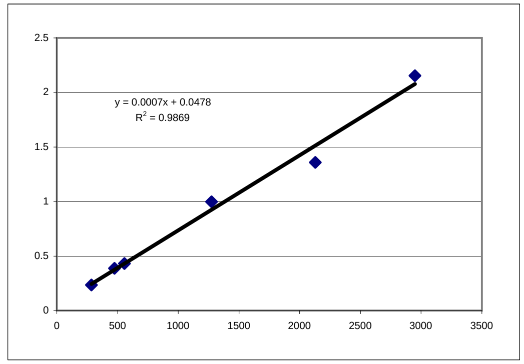
	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9822	2.1423	1.1601	1.9375	0.9553	17.654		
Moisture B	0.9934	2.1163	1.1229	1.9220	0.9286	17.303	17.325	82.675
Moisture C	0.9845	2.1086	1.1241	1.9173	0.9328	17.018		

Storage = Rm Temperature

T=0 day	**5/12/2003**	**Day 1 Color**
12763-125B		
Boom Snub 3'		

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	286	0.2334	269.7	9
	476	0.3886	495.3	10
	557	0.4305	556.2	11
	1273	0.9979	1380.9	12
	2128	1.3584	1904.9	13
	2949	2.1543	3061.7	14



slope	0.000688
intercept	0.047839
RSQ	0.986947

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.9482	1308.6	4.0	5234.6	5331.8	1503.08	2.5409	5.2346	382.5974	406.4	30.2
Sample 2	0.7528	1024.6	4.0	4098.6			2.5396	4.0986	421.2475		
Sample 3	0.8375	1147.7	4.0	4591.0			3.5382	4.5910	222.3626		
Sample 4	0.6906	934.2	8.0	7473.9			2.5497	7.4739	441.8130		
Sample 5	0.8253	1130.0	4.0	4520.1			2.5537	4.5201	379.9068		
Sol Spike 6	0.8507	1166.9	8.0	9335.5			2.5431	9.3355	584.5286		
Insol Spike 7	0.5777	770.1	16.0	12322.2			2.5017	12.3222	1127.4072		

This sample was not used due to breakage of filter apparatus and loss of sample

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.9130	1257	108.2	80-120%
Blank #8	0.0087	-57		

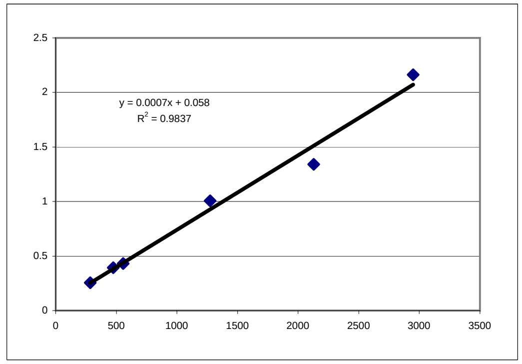
	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4947	237.167	75	75-125%

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	11.7	917.4	79	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9598	2.0633	1.1035	1.8669	0.9071	17.798		
Moisture B	0.9582	2.3249	1.3667	2.0777	1.1195	18.087	17.979	82.021
Moisture C	0.9641	2.2875	1.3234	2.0486	1.0845	18.052		

Storage = Rm Temperature

T=0 day	**5/14/2003**	**Day 2 Color**
12763-125B		
Boom Snub 3'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	286	0.254	286.9	9
	476	0.3920	488.9	10
	557	0.4319	547.3	11
	1273	1.0071	1389.2	12
	2128	1.3406	1877.3	13
	2949	2.1616	3079.0	14

slope	0.000683
intercept	0.057988
RSQ	0.983728

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.8743	1194.8	4.0	4779.3	5184.3	1517.22	2.5409	4.7793	349.3178	395.2	38.4
Sample 2	0.7431	1002.8	4.0	4011.1			2.5396	4.0111	412.2618		
Sample 3	0.8359	1138.6	4.0	4554.4			3.5382	4.5544	220.5925	This sample was not used due to breakage of	
Sample 4	0.6907	926.1	8.0	7408.7			2.5497	7.4087	437.9598	filter apparatus and loss of sample	
Sample 5	0.8331	1134.5	4.0	4538.1			2.5537	4.5381	381.4188		
Sol Spike 6	0.8449	1151.8	8.0	9214.3			2.5431	9.2143	576.9403		
Insol Spike 7	0.5917	781.2	16.0	12498.9	% recovery	Range	2.5017	12.4989	1143.5759		
Sample 2+spk	0.3891	484.6	16.0	7754.3	93.6	85-115%					

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.9250	1269	109.2	80-120%
Blank #8	0.0063	-76		

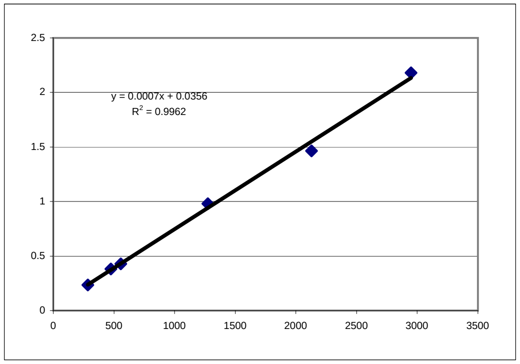
	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4947	237.167	77	75-125%

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	11.7	917.4	82	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9598	2.0633	1.1035	1.8669	0.9071	17.798		
Moisture B	0.9582	2.3249	1.3667	2.0777	1.1195	18.087	17.979	82.021
Moisture C	0.9641	2.2875	1.3234	2.0486	1.0845	18.052		

Storage = Rm Temperature

T=0 day	**5/16/2003**	**Day 4 Color**
12763-125B		
Boom Snub 3'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	286	0.2355	280.9	9
	476	0.3829	487.9	10
	557	0.4289	552.6	11
	1273	0.9815	1328.9	12
	2128	1.4647	2007.7	13
	2949	2.1787	3010.7	14

slope	0.000712
intercept	0.035579
RSQ	0.996189

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.8656	1166.0	4.0	4664.2	5097.4	1493.27	2.5409	4.6642	340.9050	388.8	39.8
Sample 2	0.7443	995.6	4.0	3982.5			2.5396	3.9825	409.3234		
Sample 3	0.8270	1111.8	4.0	4447.3			3.5382	4.4473	215.4009	This sample was not used due to breakage of filter apparatus and loss of sample	
Sample 4	0.6848	912.0	8.0	7296.4			2.5497	7.2964	431.3209		
Sample 5	0.8269	1111.7	4.0	4446.7			2.5537	4.4467	373.7404		
Sol Spike 6	0.8455	1137.8	8.0	9102.4			2.5431	9.1024	569.9372		
Insol Spike 7	0.5813	766.6	16.0	12266.4	% recovery	Range	2.5017	12.2664	1122.2988		
Sample 2+spk	0.3839	489.3	16.0	7829.3	96.2	85-115%					

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.9223	1246	107.2	80-120%
Blank #8	0.0054	-42		

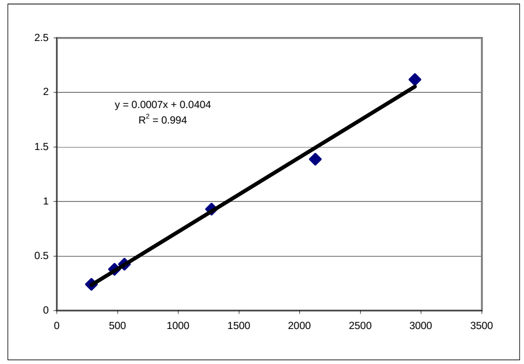
	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4947	237.167	76	75-125%

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	11.7	917.4	80	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9598	2.0633	1.1035	1.8669	0.9071	17.798		
Moisture B	0.9582	2.3249	1.3667	2.0777	1.1195	18.087	17.979	82.021
Moisture C	0.9641	2.2875	1.3234	2.0486	1.0845	18.052		

Rm Temperature

T=0 day	**5/20/2003**	**Day 8 Color**
12763-125B		
Boom Snub 3'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	286	0.2394	291.5	9
	476	0.3781	494.6	10
	557	0.4245	562.5	11
	1273	0.9314	1304.9	12
	2128	1.3877	1973.1	13
	2949	2.1176	3042.0	14

slope	0.000683
intercept	0.04038
RSQ	0.994006

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV	
Sample 1	0.8452	1178.6	4.0	4714.6	5113.4	1492.10	2.5409	4.7146	344.5877	390.1	39.9	
Sample 2	0.7271	1005.7	4.0	4022.7			2.5396	4.0227	413.4545			
Sample 3	0.8091	1125.8	4.0	4503.1			3.5382	4.5031	218.1047	This sample was not used due to breakage of		
Sample 4	0.6644	913.9	8.0	7310.9			2.5497	7.3109	432.1786	filter apparatus and loss of sample		
Sample 5	0.7924	1101.3	4.0	4405.3			2.5537	4.4053	370.2572			
Sol Spike 6	0.7992	1111.3	8.0	8890.2			2.5431	8.8902	556.6471			
Insol Spike 7	0.5704	776.2	16.0	12419.2	% recovery	Range	2.5017	12.4192	1136.2838			
Sample 2+spk	0.3733	487.6	16.0	7800.8	94.5	85-115%						

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4947	237.167	70	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540		% recovery	Range
LCS #15	0.8867	1239	106.6	80-120%
Blank #8	0.0097	-45		

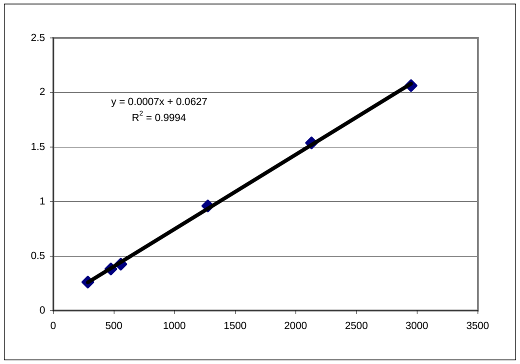
	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	11.7	917.4	81	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9598	2.0633	1.1035	1.8669	0.9071	17.798		
Moisture B	0.9582	2.3249	1.3667	2.0777	1.1195	18.087	17.979	82.021
Moisture C	0.9641	2.2875	1.3234	2.0486	1.0845	18.052		

Storage = Rm Temperature

T=0 day	**5/27/2003**	**Day 15 Color**
12763-125B		
Boom Snub 3'		

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	286	0.2599	288.0	9
	476	0.3818	466.0	10
	557	0.4260	530.6	11
	1273	0.9594	1309.7	12
	2128	1.5371	2153.6	13
	2949	2.0623	2920.7	14

slope	0.000685
intercept	0.062744
RSQ	0.99936

							Sample Conc.					
		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV	
Sample 1	0.8464	1144.7	4.0	4578.7	4995.3	1542.16	2.5409	4.5787	334.6560	380.0	41.1	
Sample 2	0.7201	960.2	4.0	3840.7			2.5396	3.8407	394.7488			
Sample 3	0.8103	1091.9	4.0	4367.7			3.5382	4.3677	211.5498	This sample was not used due to breakage of filter apparatus and loss of sample		
Sample 4	0.6843	907.9	8.0	7263.1			2.5497	7.2631	429.3556			
Sample 5	0.7985	1074.7	4.0	4298.8			2.5537	4.2988	361.3101			
Sol Spike 6	0.8220	1109.0	8.0	8872.2			2.5431	8.8722	555.5224			
Insol Spike 7	0.5686	738.9	16.0	11822.3	% recovery	Range	2.5017	11.8223	1081.6669			
Sample 2+spk	0.3769	458.9	16.0	7342.1	87.5	85-115%						

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4947	237.167	74	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.8837	1199	103.2	80-120%
Blank #8	0.0062	-83		

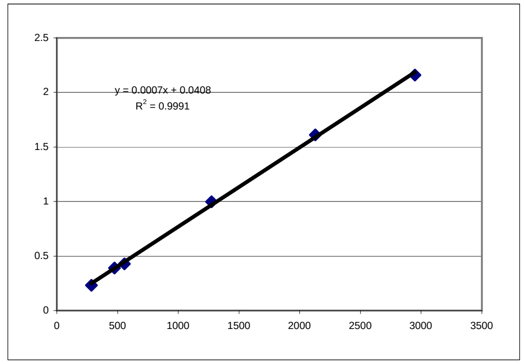
	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	11.7	917.4	76	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9598	2.0633	1.1035	1.8669	0.9071	17.798		
Moisture B	0.9582	2.3249	1.3667	2.0777	1.1195	18.087	17.979	82.021
Moisture C	0.9641	2.2875	1.3234	2.0486	1.0845	18.052		

T=0 day	6/10/2003	Day 29 Color
12763-125B		
Boom Snub 3'		

Storage = Rm Temperature

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	286	0.2332	264.6	9
	476	0.3906	481.1	10
	557	0.4296	534.8	11
	1273	0.9977	1316.1	12
	2128	1.6102	2158.6	13
	2949	2.1590	2913.4	14

slope	0.000727
intercept	0.040784
RSQ	0.99911

		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV	
Sample 1	0.8564	1121.8	4.0	4487.2	4896.6	1451.03	2.5409	4.4872	327.9668	373.3	39.0	
Sample 2	0.7363	956.6	4.0	3826.4			2.5396	3.8264	393.2767			
Sample 3	0.8207	1072.7	4.0	4290.7			3.5382	4.2907	207.8202	This sample was not used due to breakage of		
Sample 4	0.6801	879.3	8.0	7034.5			2.5497	7.0345	415.8372	filter apparatus and loss of sample		
Sample 5	0.8112	1059.6	4.0	4238.5			2.5537	4.2385	356.2399			
Sol Spike 6	0.8483	1110.6	8.0	8885.2			2.5431	8.8852	556.3338			
Insol Spike 7	0.5704	728.4	16.0	11654.8	% recovery	Range	2.5017	11.6548	1066.3473			
Sample 2+spk	0.3886	478.4	16.0	7654.1	95.7	85-115%						

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4947	237.167	77	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.9211	1211	104.2	80-120%
Blank #8	0.0047	-50		

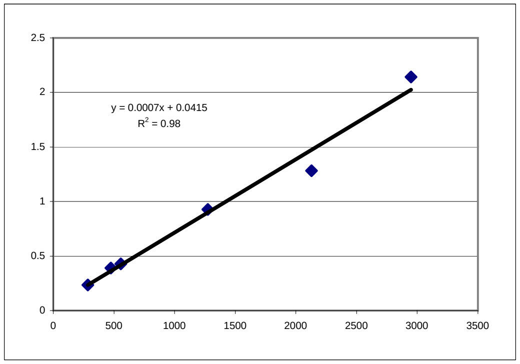
	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	11.7	917.4	76	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9598	2.0633	1.1035	1.8669	0.9071	17.798		
Moisture B	0.9582	2.3249	1.3667	2.0777	1.1195	18.087	17.979	82.021
Moisture C	0.9641	2.2875	1.3234	2.0486	1.0845	18.052		

Storage = Rm Temperature

T=0 day **7/1/2003** **Day 57 Color**
12763-125B
Boom Snub 3'

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	286	0.2359	289.1	9
	476	0.3891	517.0	10
	557	0.4294	576.9	11
	1273	0.9280	1318.5	12
	2128	1.2810	1843.5	13
	2949	2.1416	3123.6	14

slope	0.000672
intercept	0.04152
RSQ	0.979978

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.8644	1223.9	4.0	4895.6	5334.2	1590.07	2.5409	4.8956	357.8238	406.5	42.2
Sample 2	0.7393	1037.8	4.0	4151.4			2.5396	4.1514	426.6759		
Sample 3	0.8268	1168.0	4.0	4671.9			3.5382	4.6719	226.2836	This sample was not used due to breakage of filter apparatus and loss of sample	
Sample 4	0.6865	959.3	8.0	7674.5			2.5497	7.6745	453.6726		
Sample 5	0.8173	1153.9	4.0	4615.4			2.5537	4.6154	387.9220		
Sol Spike 6	0.8269	1168.1	8.0	9345.1			2.5431	9.3451	585.1304		
Insol Spike 7	0.5897	815.3	16.0	13045.4	% recovery	Range	2.5017	13.0454	1193.5740		
Sample 2+spk	0.3893	517.3	16.0	8276.3	103.1	85-115%					

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.9148	1299	111.8	80-120%
Blank #8	0.0089	-49		

	K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
#6	0.4947	237.167	75	75-125%

	PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
#7	11.7	917.4	86	75-125%

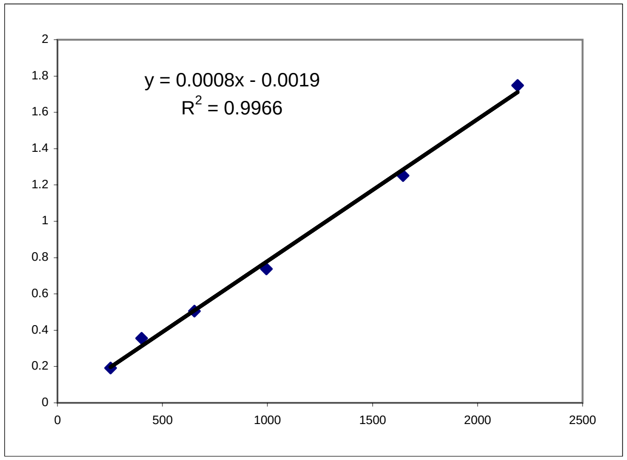
	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	0.9598	2.0633	1.1035	1.8669	0.9071	17.798		
Moisture B	0.9582	2.3249	1.3667	2.0777	1.1195	18.087	17.979	82.021
Moisture C	0.9641	2.2875	1.3234	2.0486	1.0845	18.052		

T=56 day
12763-125C
Boom Snub 5.5'

3/4/2003
Storage = 4 C

Day 1 color

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.1913	246.9	9
	401	0.3564	458.0	10
	652	0.5054	648.4	11
	995	0.7378	945.4	12
	1645	1.2515	1602.0	13
	2191	1.7485	2237.2	14

slope	0.000782
intercept	-0.001904
RSQ	0.996615

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	wet mass (Sample Conc.)	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	0.4847	621.9	2.0	1243.9	1234.7	121.17	2.4849	1.2439	62.7002	62.2	6.1
4˚C #2	0.4819	618.4	2.0	1236.7			2.4867	1.2367	62.3159		
4˚C #17	0.5543	710.9	2.0	1421.8			2.4895	1.4218	71.7364		
4˚C #18	0.4597	590.0	2.0	1180.0			2.4943	1.1800	59.3741		
4˚C #19	0.4249	545.5	2.0	1091.0			2.4907	1.0910	55.0001		
4˚C #3 sol	0.4810	617.2	10.0	6172.0			2.4931	6.1720	310.2306		
4˚C #4 insol	0.6758	866.2	20.0	17323.6	% Recovery	Range	2.4899	17.3236	871.6522		
Sample 6+spk	0.4151	532.9	10.0	5329.1	102.1	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5	256	97	75-125%

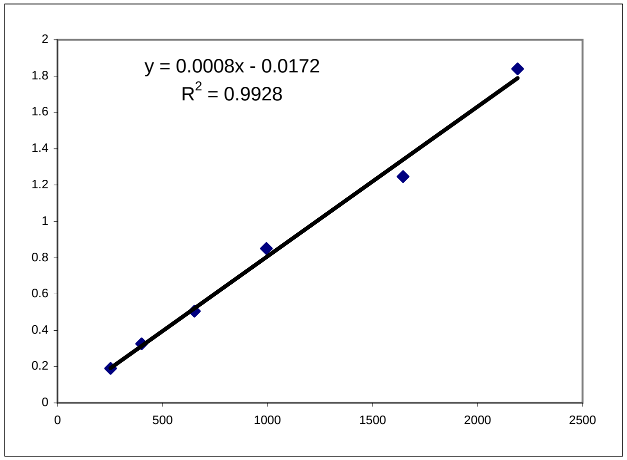
PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.8	874.3	93	75-125%

	A540	ppb calc.	% Recovery	Range	
LCS #15	0.7387	947	95.1	80-120%	0.947
Blank #16	0.0167	24			0.024

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8727	23.2004	3.3277	22.5281	2.6554	20.2031		
Moisture B	19.6098	22.0248	2.4150	21.5393	1.9295	20.1035	20.176	79.824
Moisture C	18.7037	21.0570	2.3533	20.5811	1.8774	20.2227		

T=56 day	**3/7/2003**
12763-125C	**Storage = 4 C**
Boom Snub 5.5'	

Day 3 color



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.1908	252.2	9
	401	0.3250	415.0	10
	652	0.5052	633.5	11
	995	0.8505	1052.4	12
	1645	1.2456	1531.6	13
	2191	1.8406	2253.2	14

slope	0.000824
intercept	-0.017153
RSQ	0.992835

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	0.5020	629.7	2.0	1259.3	1231.8	113.49	2.4849	1.2593	63.4799	62.1	5.8
4˚C #2	0.4681	588.6	2.0	1177.1			2.4867	1.1771	59.3124		
4˚C #17	0.5642	705.1	2.0	1410.2			2.4895	1.4102	71.1531		
4˚C #18	0.4791	601.9	2.0	1203.8			2.4943	1.2038	60.5729		
4˚C #19	0.4399	554.3	2.0	1108.7			2.4907	1.1087	55.8920		
4˚C #3 sol	0.4765	598.7	10.0	5987.4			2.4931	5.9874	300.9496		
4˚C #4 insol	0.3241	413.9	40.0	16555.9	% Recovery	Range	2.4899	16.5559	833.0242		
Sample 6+spk	0.4044	517.9	10.0	5179.0	98.0	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5	256	93	75-125%

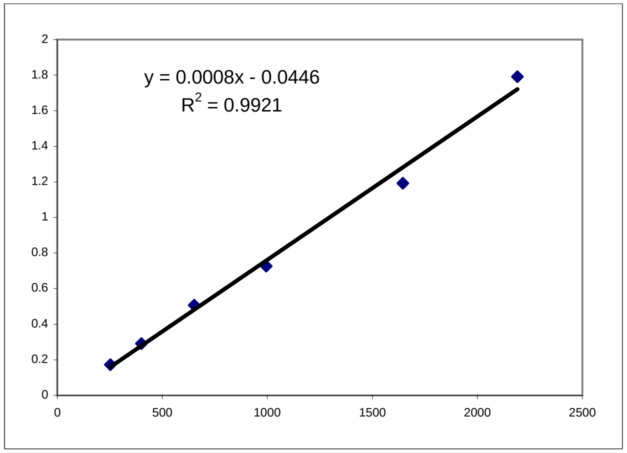
	A540	ppb calc.	% Recovery	Range	
LCS #15	0.7657	950	95.4	80-120%	0.950
Blank #16	0.0312	59			0.059

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.8	874.3	88	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8727	23.2004	3.3277	22.5281	2.6554	20.2031		
Moisture B	19.6098	22.0248	2.4150	21.5393	1.9295	20.1035	20.176	79.824
Moisture C	18.7037	21.0570	2.3533	20.5811	1.8774	20.2227		

T=56 day **3/11/2003**
12763-125C **Storage = 4 C**
Boom Snub 5.5'

Day 7 color



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.1727	269.5	9
	401	0.2909	416.0	10
	652	0.5071	684.1	11
	995	0.7269	956.7	12
	1645	1.1923	1533.9	13
	2191	1.7921	2277.7	14

slope	0.000806
intercept	-0.044587
RSQ	0.992067

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	0.4789	649.2	2.0	1298.4	1297.0	129.36	2.4849	1.2984	65.4467	65.4	6.6
4˚C #2	0.4560	620.8	2.0	1241.6			2.4867	1.2416	62.5601		
4˚C #17	0.5640	754.7	2.0	1509.4			2.4895	1.5094	76.1582		
4˚C #18	0.4688	636.7	2.0	1273.3			2.4943	1.2733	64.0709		
4˚C #19	0.4240	581.1	2.0	1162.2			2.4907	1.1622	58.5887		
4˚C #3 sol	0.4713	639.8	10.0	6397.5			2.4931	6.3975	321.5636		
4˚C #4 insol	0.6752	892.6	20.0	17852.2	% Recovery	Range	2.4899	17.8522	898.2464		
Sample 6+spk	0.3964	506.7	10.0	5066.7	94.2	85-115%					

	A540	ppb calc.	% Recovery	Range		
LCS #15	0.7390	972	97.7	80-120%		0.972
Blank #16	-0.0150	37				0.037

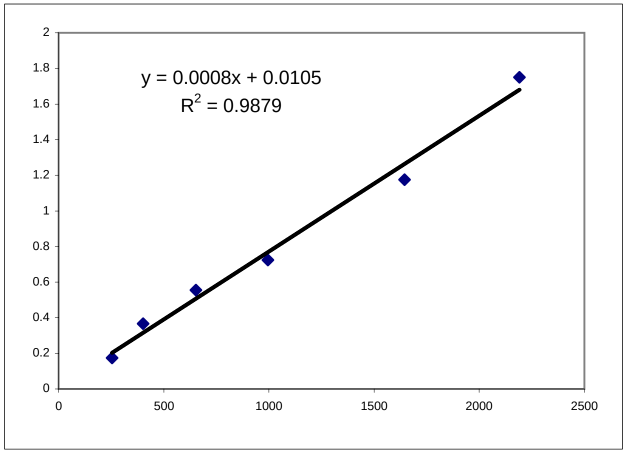
K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5	256	100	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8727	23.2004	3.3277	22.5281	2.6554	20.2031		
Moisture B	19.6098	22.0248	2.4150	21.5393	1.9295	20.1035	20.176	79.824
Moisture C	18.7037	21.0570	2.3533	20.5811	1.8774	20.2227		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.8	874.3	95	75-125%

T=56 day	3/18/2003
12763-125C	Storage = 4 C
Boom Snub 5.5'	

Day 14 color



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.1741	214.6	9
	401	0.3661	466.4	10
	652	0.5545	713.4	11
	995	0.7241	935.9	12
	1645	1.1747	1526.8	13
	2191	1.7496	2280.8	14

slope	0.000762
intercept	0.010507
RSQ	0.987903

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	0.4784	613.6	2.0	1227.3	1227.3	142.92	2.4849	1.2273	61.8643	61.9	7.2
4˚C #2	0.4461	571.3	2.0	1142.6			2.4867	1.1426	57.5719		
4˚C #17	0.5704	734.3	2.0	1468.6			2.4895	1.4686	74.0988		
4˚C #18	0.4658	597.1	2.0	1194.2			2.4943	1.1942	60.0923		
4˚C #19	0.4314	552.0	2.0	1104.0			2.4907	1.1040	55.6554		
4˚C #3 sol	0.4696	602.1	10.0	6021.0			2.4931	6.0210	302.6391		
4˚C #4 insol	0.6766	873.6	20.0	17471.6	% Recovery	Range	2.4899	17.4716	879.1002		
Sample 6+spk	0.4115	525.9	10.0	5259.0	95.8	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5	256	94	75-125%

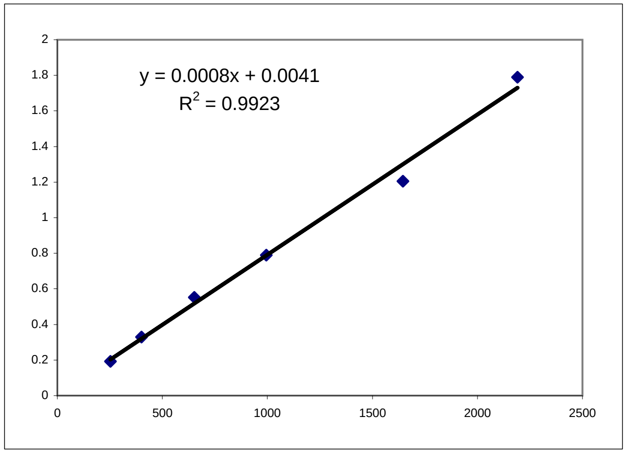
			% Recovery	Range	
LCS #15	0.7286	942	94.7	80-120%	0.942
Blank #16	-0.0110	-28			-0.028

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.8	874.3	93	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8727	23.2004	3.3277	22.5281	2.6554	20.2031		
Moisture B	19.6098	22.0248	2.4150	21.5393	1.9295	20.1035	20.176	79.824
Moisture C	18.7037	21.0570	2.3533	20.5811	1.8774	20.2227		

T=56 day	**4/1/2003**
12763-125C	**Storage = 4 C**
Boom Snub 5.5'	

Day 28 color



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.1932	240.1	9
	401	0.3295	413.2	10
	652	0.5517	695.3	11
	995	0.7903	998.3	12
	1645	1.2051	1525.0	13
	2191	1.7887	2266.1	14

slope	0.000788
intercept	0.004126
RSQ	0.99227

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	0.4985	627.8	2.0	1255.5	1210.5	117.39	2.4849	1.2555	63.2873	61.0	6.0
4˚C #2	0.4668	587.5	2.0	1175.0			2.4867	1.1750	59.2069		
4˚C #17	0.5504	693.7	2.0	1387.3			2.4895	1.3873	69.9978		
4˚C #18	0.4599	578.7	2.0	1157.5			2.4943	1.1575	58.2431		
4˚C #19	0.4283	538.6	2.0	1077.2			2.4907	1.0772	54.3059		
4˚C #3 sol	0.4878	614.2	10.0	6141.7			2.4931	6.1417	308.7057		
4˚C #4 insol	0.6847	864.2	20.0	17283.9	% Recovery	Range	2.4899	17.2839	869.6538		
Sample 6+spk	0.4185	526.2	10.0	5261.7	95.3	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5	256	97	75-125%

	A540	ppb calc.	% Recovery	Range	
LCS #15	0.7351	928	93.3	80-120%	0.928
Blank #16	0.0152	14			0.014

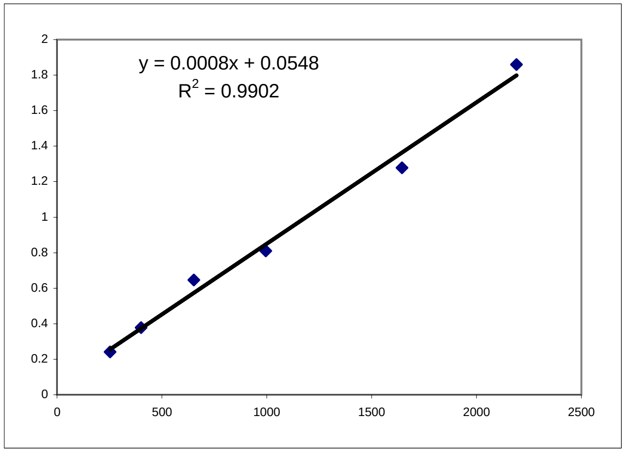
PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.8	874.3	92	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8727	23.2004	3.3277	22.5281	2.6554	20.2031		
Moisture B	19.6098	22.0248	2.4150	21.5393	1.9295	20.1035	20.176	79.824
Moisture C	18.7037	21.0570	2.3533	20.5811	1.8774	20.2227		

T=56 day
12763-125C
Boom Snub 5.5'

4/29/2003
Storage = 4 C

Day 56 color



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.2420	235.2	9
	401	0.3783	406.5	10
	652	0.6467	743.7	11
	995	0.8096	948.4	12
	1645	1.2783	1537.2	13
	2191	1.8591	2266.9	14

slope	0.000796
intercept	0.054775
RSQ	0.990201

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	0.5819	662.3	2.0	1324.5	1258.3	115.16	2.4849	1.3245	66.7671	63.4	5.8
4˚C #2	0.5459	617.0	2.0	1234.1			2.4867	1.2341	62.1838		
4˚C #17	0.6199	710.0	2.0	1420.0			2.4895	1.4200	71.6483		
4˚C #18	0.5246	590.3	2.0	1180.6			2.4943	1.1806	59.4045		
4˚C #19	0.5054	566.2	2.0	1132.3			2.4907	1.1323	57.0829		
4˚C #3 sol	0.5382	607.4	10.0	6073.7			2.4931	6.0737	305.2873		
4˚C #4 insol	0.7388	859.4	20.0	17188.0	% Recovery	Range	2.4899	17.1880	864.8304		
Sample 6+spk	0.4697	521.3	10.0	5213.1	93.7	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5	256	94	75-125%

	A540	ppb calc.	% Recovery	Range	
LCS #15	0.8014	938	94.3	80-120%	0.938
Blank #16	0.0552	1			0.001

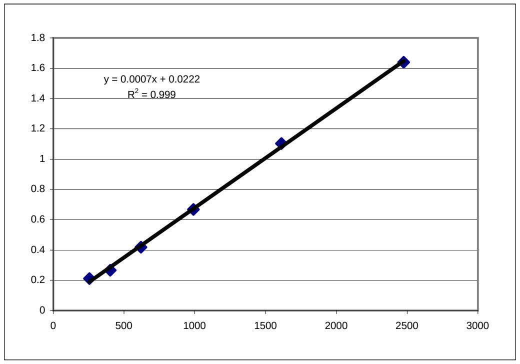
PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.8	874.3	92	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8727	23.2004	3.3277	22.5281	2.6554	20.2031		
Moisture B	19.6098	22.0248	2.4150	21.5393	1.9295	20.1035	20.176	79.824
Moisture C	18.7037	21.0570	2.3533	20.5811	1.8774	20.2227		

Storage = Rm Temperature

T=0 day	1/6/2003
12763-125C	
Boom Snub 5.5'	

Day 1 color



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	254	0.2103	286.4	9
	402	0.2671	372.9	10
	620	0.4192	604.5	11
	991	0.6681	983.4	12
	1612	1.1031	1645.7	13
	2475	1.6386	2461.0	14

slope	0.000657
intercept	0.022154
RSQ	0.999035

							Sample Conc.				
		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.4480	648.3	2.0	1296.7	1256.2	52.06	2.4837	1.2967	65.9701	65.5	6.2
Sample 2	0.4361	630.2	2.0	1260.4			2.4795	1.2604	64.2114		
Sample 3	0.4198	605.4	2.0	1210.8			2.5041	1.2108	61.1254		
Sample 4	0.4152	598.4	2.0	1196.8			2.5037	1.1968	60.3994		
Sample 5	0.4544	658.1	2.0	1316.2			2.1961	1.3162	75.7288		
Sol Spike 6	0.2355	324.8	5.0	1624.1			2.4995	1.6241	82.0842		
Insol Spike 7	0.6159	904.0	20.0	18079.3	% recovery	Range	2.4938	18.0793	945.5171		
Sample 4+spk	0.3285	466.4	10.0	4664.0	83.7	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5013	253.450	7	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.6707	987	99.7	80-120%
Blank #8	-0.0470	-105		

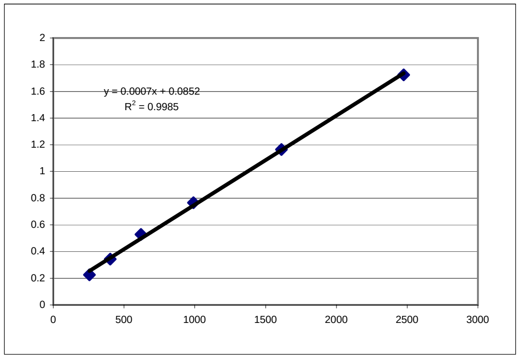
PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
11	896.8	98	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8729	21.9668	2.0939	21.5307	1.6578	20.827		
Moisture B	19.6099	22.2456	2.6357	21.6996	2.0897	20.716		
Moisture C	19.8178	21.9820	2.1642	21.5262	1.7084	21.061	20.868	79.132

T=0 day
12763-125C
Boom Snub 5.5'

1/10/2003
Storage = Rm temperature

Day 3 color



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	254	0.2259	210.9	9
	402	0.3422	385.2	10
	620	0.5281	663.8	11
	991	0.7670	1021.8	12
	1612	1.1644	1617.3	13
	2475	1.7235	2455.1	14

slope	0.000667
intercept	0.085152
RSQ	0.998487

							Sample Conc.				
	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.5083	634.1	2.0	1268.2	1206.3	81.19	2.4837	1.2682	64.5209	62.9	7.5
Sample 2	0.4889	605.0	2.0	1210.0			2.4795	1.2100	61.6442		
Sample 3	0.4548	553.9	2.0	1107.9			2.5041	1.1079	55.9277		
Sample 4	0.4670	572.2	2.0	1144.4			2.5037	1.1444	57.7554		
Sample 5	0.5193	650.6	2.0	1301.2			2.1961	1.3012	74.8654		
Sol Spike 6	0.2823	295.4	5.0	1477.2			2.4995	1.4772	74.6588		
Insol Spike 7	0.6972	917.2	20.0	18343.3	% recovery	Range	2.4938	18.3433	959.3277		
Sample 4+spk	0.3809	443.2	10.0	4431.8	82.2	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5013	253.450	5	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

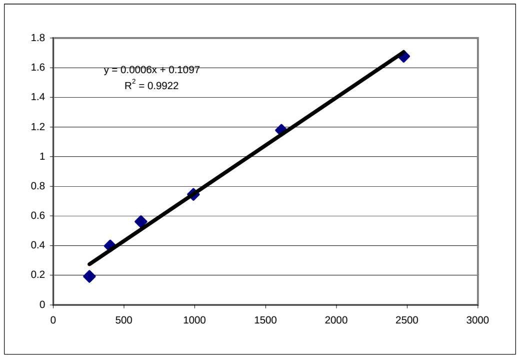
	A540	ppb calc.	% recovery	Range
LCS #15	0.7728	1030	104.1	80-120%
Blank #8	0.0201	-97		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
11	896.8	100	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8729	21.9668	2.0939	21.5307	1.6578	20.827		
Moisture B	19.6099	22.2456	2.6357	21.6996	2.0897	20.716		
Moisture C	19.8178	21.9820	2.1642	21.5262	1.7084	21.061	20.868	79.132

T=0 day	**1/14/2003**
12763-125C	**Storage = Rm Temperature**
Boom Snub 5.5'	

Day 7 color



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	254	0.1932	129.6	9
	402	0.3968	445.5	10
	620	0.5623	702.3	11
	991	0.7463	987.8	12
	1612	1.1779	1657.4	13
	2475	1.6768	2431.5	14

slope	0.000645
intercept	0.109674
RSQ	0.992218

		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.4703	559.5	2.0	1119.1	1058.9	81.23	2.4837	1.1191	56.9336	55.3	7.1
Sample 2	0.4527	532.2	2.0	1064.4			2.4795	1.0644	54.2266		
Sample 3	0.4284	494.5	2.0	989.0			2.5041	0.9890	49.9297		
Sample 4	0.4211	483.2	2.0	966.4			2.5037	0.9664	48.7709		
Sample 5	0.4820	577.7	2.0	1155.4			2.1961	1.1554	66.4768		
Sol Spike 6	0.6188	789.9	5.0	3949.7			2.4995	3.9497	199.6259		
Insol Spike 7	0.6572	849.5	20.0	16990.3	% recovery	Range	2.4938	16.9903	888.5671		
Sample 4+spk	0.3837	425.2	10.0	4251.7	82.1	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5013	253.450	57	75-125%

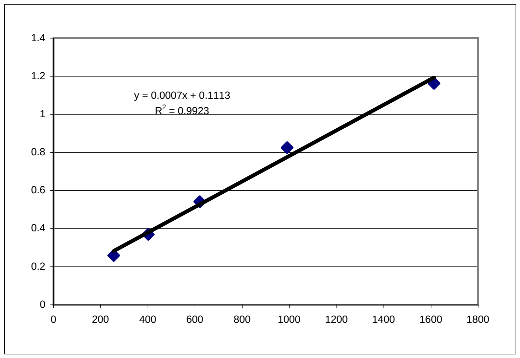
Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.7414	980	99.0	80-120%
Blank #8	0.0463	-98		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
11	896.8	93	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8729	21.9668	2.0939	21.5307	1.6578	20.827		
Moisture B	19.6099	22.2456	2.6357	21.6996	2.0897	20.716		
Moisture C	19.8178	21.9820	2.1642	21.5262	1.7084	21.061	20.868	79.132

T=0 day	1/21/2003	**Day 14 color**
12763-125C	**Storage = Rm Temperature**	
Boom Snub 5.5'		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	254	0.2595	220.9	9
	402	0.3690	384.2	10
	620	0.5419	641.9	11
	991	0.8250	1063.8	12
	1612	1.1637	1568.7	13
	2475	1.1471	1543.9	14

slope	0.000671	
intercept	0.111267	Linear regression without high standard
RSQ	0.992317	

							Sample Conc.				
		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.5219	612.1	2.0	1224.1	1084.3	98.19	2.4837	1.2241	62.2780	56.5	6.6
Sample 2	0.4818	552.3	2.0	1104.6			2.4795	1.1046	56.2706		
Sample 3	0.4416	492.4	2.0	984.7			2.5041	0.9847	49.7122		
Sample 4	0.4452	497.7	2.0	995.5			2.5037	0.9955	50.2382		
Sample 5	0.4845	556.3	2.0	1112.6			2.1961	1.1126	64.0171		
Sol Spike 6	0.6373	784.1	5.0	3920.3			2.4995	3.9203	198.1407		
Insol Spike 7	0.6675	829.1	20.0	16581.4	% recovery	Range	2.4938	16.5814	867.1839		
Sample 4+spk	0.3876	411.9	10.0	4118.8	78.1	85-115%					

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.7671	978	98.7	80-120%
Blank #8	0.1150	6		

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5013	253.450	56	75-125%

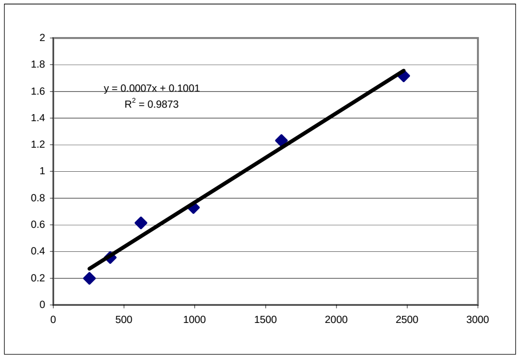
PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
11	896.8	90	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8729	21.9668	2.0939	21.5307	1.6578	20.827		
Moisture B	19.6099	22.2456	2.6357	21.6996	2.0897	20.716		
Moisture C	19.8178	21.9820	2.1642	21.5262	1.7084	21.061	20.868	79.132

T=0 day
12763-125C
Boom Snub 5.5'

2/3/2003
Storage = Rm Temperature

Day 28 color



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	254	0.2001	149.6	9
	402	0.3552	381.6	10
	620	0.6158	771.3	11
	991	0.7290	940.6	12
	1612	1.2317	1692.4	13
	2475	1.7173	2418.6	14

slope	0.000669
intercept	0.100071
RSQ	0.987261

		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.4885	580.9	2.0	1161.8	1096.4	83.80	2.4837	1.1618	59.1087	57.1	5.8
Sample 2	0.4711	554.9	2.0	1109.8			2.4795	1.1098	56.5355		
Sample 3	0.4183	475.9	2.0	951.8			2.5041	0.9518	48.0518		
Sample 4	0.4833	573.1	2.0	1146.3			2.5037	1.1463	57.8485		
Sample 5	0.4719	556.1	2.0	1112.2			2.1961	1.1122	63.9909		
Sol Spike 6	0.6293	791.5	5.0	3957.4			2.4995	3.9574	200.0153		
Insol Spike 7	0.6861	876.4	20.0	17528.5	% recovery	Range	2.4938	17.5285	916.7108		
Sample 4+spk	0.4067	458.6	10.0	4585.7	86.0	85-115%					

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.6707	853	86.2	80-120%
Blank #8	-0.0470	-220		

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5013	253.450	56	75-125%

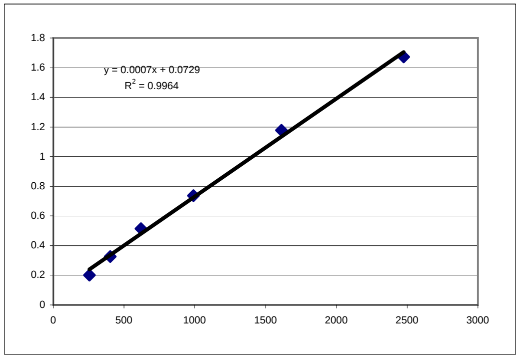
PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
11	896.8	96	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8729	21.9668	2.0939	21.5307	1.6578	20.827		
Moisture B	19.6099	22.2456	2.6357	21.6996	2.0897	20.716		
Moisture C	19.8178	21.9820	2.1642	21.5262	1.7084	21.061	20.868	79.132

T=0 day
12763-125C
Boom Snub 5.5'

3/4/2003
Storage = Rm Temperature

Day 56 color



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	254	0.2008	193.9	9
	402	0.3266	384.7	10
	620	0.5143	669.3	11
	991	0.7377	1008.1	12
	1612	1.1766	1673.6	13
	2475	1.6716	2424.3	14

slope	0.000659
intercept	0.0729
RSQ	0.996398

							Sample Conc.				
		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	0.4807	618.4	2.0	1236.8	1184.0	90.85	2.4837	1.2368	62.9224	61.8	7.5
Sample 2	0.4828	621.6	2.0	1243.1			2.4795	1.2431	63.3300		
Sample 3	0.4337	547.1	2.0	1094.2			2.5041	1.0942	55.2401		
Sample 4	0.4280	538.5	2.0	1076.9			2.5037	1.0769	54.3504		
Sample 5	0.4913	634.5	2.0	1268.9			2.1961	1.2689	73.0104		
Sol Spike 6	0.6359	853.7	5.0	4268.7			2.4995	4.2687	215.7478		
Insol Spike 7	0.6724	909.1	20.0	18181.6	% recovery	Range	2.4938	18.1816	950.8697		
Sample 4+spk	0.3822	469.0	10.0	4690.2	90.3	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5013	253.450	61	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.7061	960	97.0	80-120%
Blank #8	0.0087	-97		

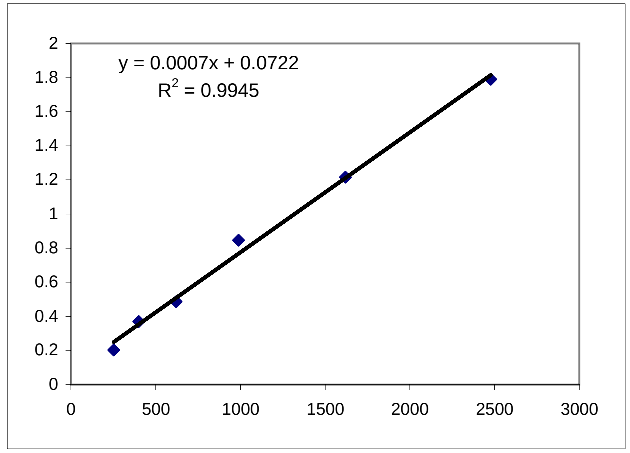
PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
11	896.8	99	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8729	21.9668	2.0939	21.5307	1.6578	20.827		
Moisture B	19.6099	22.2456	2.6357	21.6996	2.0897	20.716		
Moisture C	19.8178	21.9820	2.1642	21.5262	1.7084	21.061	20.868	79.132

T=56 day	**3/6/2003**	**Day 1 color**
12763-126D	**Storage = 4 C**	
Frontier Hard Chrome, Sandy Soil		

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.2021	184.6	9
	401	0.3690	421.9	10
	621	0.4857	587.7	11
	989	0.8469	1101.1	12
	1620	1.2156	1625.2	13
	2476	1.7892	2440.5	14



slope	0.000704
intercept	0.0722
RSQ	0.994464

							Sample Conc.				
Sample:		ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	wet mass	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	1.2409	1661.2	10.0	16611.7	16302.4	855.88	2.4933	16.6117	811.5936	802.2	42.1
4˚C #2	1.2105	1618.0	10.0	16179.6			2.4875	16.1796	792.5880		
4˚C #17	1.2692	1701.4	10.0	17013.9			2.4950	17.0139	840.1507		
4˚C #18	1.2563	1683.1	10.0	16830.6			2.4919	16.8306	832.1520		
4˚C #19	1.1188	1487.6	10.0	14876.2			2.4875	16.1796	792.5880		
4˚C #3 sol	0.8514	1107.5	20.0	22150.8			2.4950	14.8762	734.6224		
4˚C #4 insol	0.6129	768.5	40.0	30741.6	% Recovery	Range	2.4889	30.7416	1505.0720		
Sample 1+spk	0.7658	985.9	20.0	19717.4	77.6	85-115%					
LCS #15	0.8636	1125	113.3	80-120%		1.125					
Blank #16	0.0362	-51				-0.051					

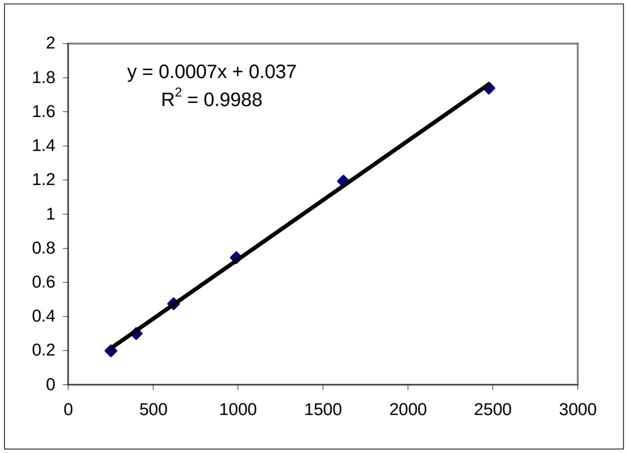
K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5	246	127	75-125%

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.4	819.1	86	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture		
Moisture A	19.8159	24.4202	4.6043	23.6024	3.7865	17.7617	mean	% Solid
Moisture B	19.7659	24.5795	4.8136	23.7087	3.9428	18.0904		
Moisture C	19.7540	24.5255	4.7715	23.6699	3.9159	17.9315	17.928	82.072

T=56 day	**3/10/2003**	**Day 3 color**
12763-126D	**Stroage = 4 C**	
Frontier Hard Chrome, Sandy Soil		

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.1998	233.7	9
	401	0.3006	378.4	10
	621	0.4751	628.9	11
	989	0.7456	1017.1	12
	1620	1.1934	1659.9	13
	2476	1.7390	2443.1	14

slope	0.000697
intercept	0.036977
RSQ	0.998788

							Sample Conc.				
Sample:		ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	wet mass	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	1.2519	1743.9	10.0	17438.8	16887.6	771.25	2.4933	17.4388	852.0053	831.0	36.9
4˚C #2	1.2104	1684.3	10.0	16843.1			2.4875	16.8431	825.0938		
4˚C #17	1.2491	1739.9	10.0	17398.6			2.4950	17.3986	859.1474		
4˚C #18	1.2341	1718.3	10.0	17183.3			2.4919	17.1833	849.5932		
4˚C #19	1.1220	1557.4	10.0	15574.3			2.4950	15.5743	769.0957		
4˚C #3 sol	0.8254	1131.7	20.0	22633.8			2.4924	22.6338	1139.8986		
4˚C #4 insol	0.6661	903.0	40.0	36121.4	% Recovery	Range	2.4889	36.1214	1768.4560		
Sample 1+spk	0.7699	1052.0	20.0	21040.5	90.0	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5	246	126	75-125%

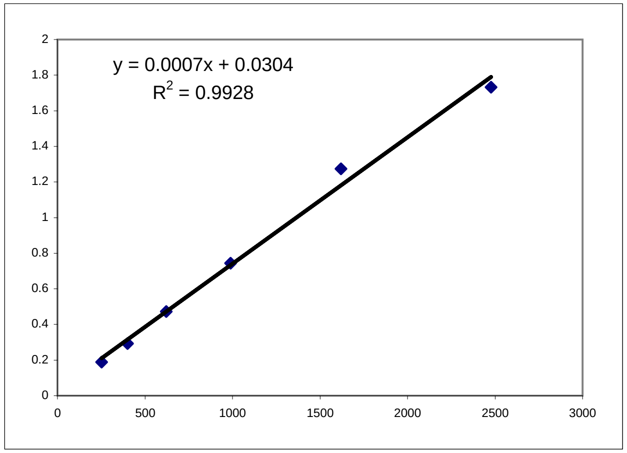
			% Recovery	Range	
LCS #15	0.7535	1028	103.6	80-120%	1.028
Blank #16	0.0204	-24			-0.024

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.4	819.1	114	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8159	24.4202	4.6043	23.6024	3.7865	17.7617		
Moisture B	19.7659	24.5795	4.8136	23.7087	3.9428	18.0904		
Moisture C	19.7540	24.5255	4.7715	23.6699	3.9159	17.9315	17.928	82.072

T=56 day	3/14/2003	Day 7 color
12763-126D	Storage = 4 C	
Frontier Hard Chrome, Sandy Soil		

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.1883	222.2	9
	401	0.2927	369.0	10
	621	0.4720	621.3	11
	989	0.7447	1005.0	12
	1620	1.2744	1750.2	13
	2476	1.7316	2393.4	14

slope	0.000711
intercept	0.030396
RSQ	0.99285

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	1.2538	1721.2	10.0	17212.2	16707.1	802.27	2.4933	17.2122	840.9342	822.1	38.7
4˚C #2	1.2126	1663.3	10.0	16632.6			2.4875	16.6326	814.7789		
4˚C #17	1.2652	1737.3	10.0	17372.6			2.4950	17.3726	857.8624		
4˚C #18	1.2356	1695.6	10.0	16956.2			2.4919	16.9562	838.3617		
4˚C #19	1.1223	1536.2	10.0	15362.1			2.4950	15.3621	758.6203		
4˚C #3 sol	0.8430	1143.3	20.0	22865.3			2.4924	22.8653	1151.5546		
4˚C #4 insol	0.6700	899.9	40.0	35994.7			2.4889	35.9947	1762.2541		
Sample 1+spk	0.783	1058.8	20.0	21177.0	99.1	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5	246	134	75-125%

			% Recovery	Range	
LCS #15	0.7487	1011	101.8	80-120%	1.011
Blank #16	-0.0070	-53			-0.053

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.4	819.1	115	75-125%

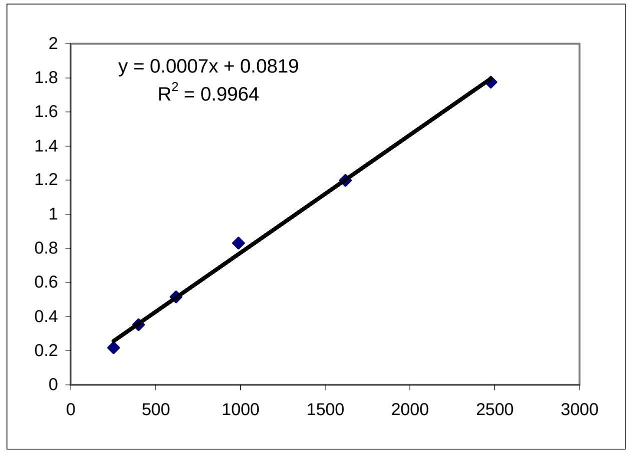
4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8159	24.4202	4.6043	23.6024	3.7865	17.7617		
Moisture B	19.7659	24.5795	4.8136	23.7087	3.9428	18.0904		
Moisture C	19.7540	24.5255	4.7715	23.6699	3.9159	17.9315	17.928	82.072

T=56 day	**3/21/2003**	**Day 14 color**
12763-126D	**Storage = 4 C**	
Frontier Hard Chrome, Sandy Soil		

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.2171	195.4	9
	401	0.3529	391.7	10
	621	0.5160	627.4	11
	989	0.8313	1083.2	12
	1620	1.1996	1615.6	13
	2476	1.7753	2447.8	14

slope	0.000692
intercept	0.081936
RSQ	0.996383



Sample Conc.

Sample:	A540	ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	wet mass	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	1.2572	1698.9	10.0	16988.6	16736.2	876.93	2.4933	16.9886	830.0092	823.6	43.2
4˚C #2	1.2308	1660.7	10.0	16607.0			2.4875	16.6070	813.5258		
4˚C #17	1.3086	1773.2	10.0	17731.6			2.4950	17.7316	875.5896		
4˚C #18	1.2585	1700.7	10.0	17007.4			2.4919	17.0074	840.8950		
4˚C #19	1.1436	1534.7	10.0	15346.5			2.4950	15.3465	757.8486		
4˚C #3 sol	0.8515	1112.4	20.0	22248.3			2.4924	22.2483	1120.4840		
4˚C #4 insol	0.6741	856.0	40.0	34239.3	% Recovery	Range	2.4889	34.2393	1676.3112		
Sample 1+spk	0.7696	994.0	20.0	19880.6	72.3	85-115%					

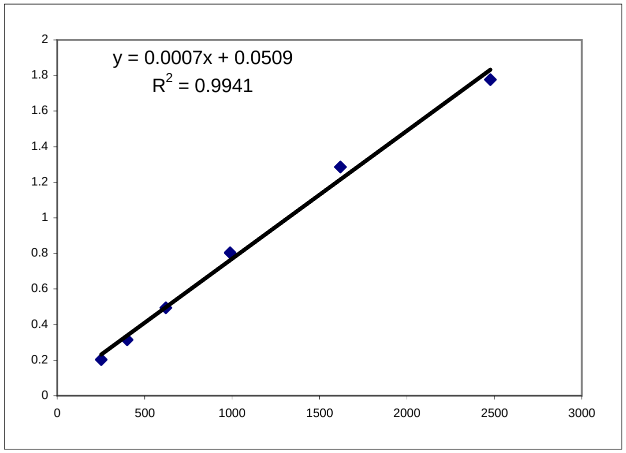
K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5	246	121	75-125%

	A540	ppb calc.	% Recovery	Range		
LCS #15	0.8326	1085	109.3	80-120%		1.085
Blank #16	0.0413	-59				-0.059

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.4	819.1	104	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8159	24.4202	4.6043	23.6024	3.7865	17.7617		
Moisture B	19.7659	24.5795	4.8136	23.7087	3.9428	18.0904		
Moisture C	19.7540	24.5255	4.7715	23.6699	3.9159	17.9315	17.928	82.072

T=56 day	**4/4/2003**	**Day 28 color**
12763-126D	**Storage = 4 C**	
Frontier Hard Chrome, Sandy Soil		



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.2041	213.0	9
	401	0.3150	367.1	10
	621	0.4944	616.6	11
	989	0.8031	1045.7	12
	1620	1.2868	1718.2	13
	2476	1.7776	2400.5	14

slope	0.000719
intercept	0.050924
RSQ	0.994134

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	wet mass (Sample Conc.)	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	1.2537	1672.2	10.0	16721.8	16469.1	790.04	2.4933	16.7218	816.9737	810.4	39.1
4˚C #2	1.2230	1629.5	10.0	16295.0			2.4875	16.2950	798.2415		
4˚C #17	1.2889	1721.1	10.0	17211.2			2.4950	17.2112	849.8906		
4˚C #18	1.2686	1692.9	10.0	16929.0			2.4919	16.9290	837.0160		
4˚C #19	1.1434	1518.8	10.0	15188.3			2.4950	15.1883	750.0377		
4˚C #3 sol	0.8429	1101.1	20.0	22021.2			2.4924	22.0212	1109.0442		
4˚C #4 insol	0.6744	866.8	40.0	34671.9	% Recovery	Range	2.4889	34.6719	1697.4946		
Sample 1+spk	0.7768	1009.2	20.0	20183.2	86.5	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5	246	121	75-125%

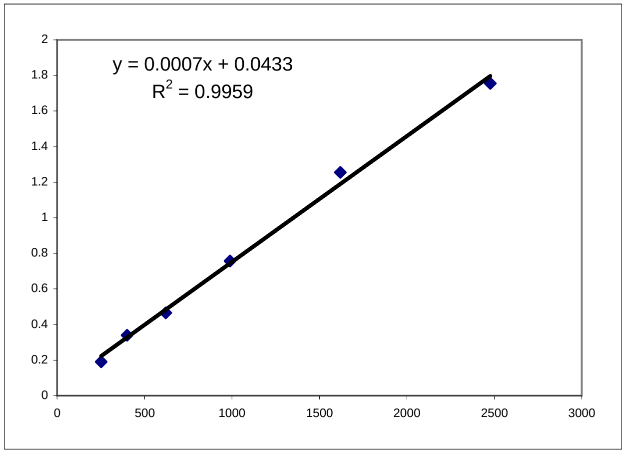
			% Recovery	Range	
LCS #15	0.8447	1104	111.1	80-120%	1.104
Blank #16	0.0813	42			0.042

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.4	819.1	108	75-125%

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8159	24.4202	4.6043	23.6024	3.7865	17.7617		
Moisture B	19.7659	24.5795	4.8136	23.7087	3.9428	18.0904		
Moisture C	19.7540	24.5255	4.7715	23.6699	3.9159	17.9315	17.928	82.072

T=56 day | **5/2/2003**
12763-126D | **Storage = 4 C**
Frontier Hard Chrome, Sandy Soil

Day 56 color



Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.1912	208.8	9
	401	0.3403	419.4	10
	621	0.4656	596.4	11
	989	0.7573	1008.3	12
	1620	1.2548	1711.0	13
	2476	1.7549	2417.3	14

slope	0.000708
intercept	0.043346
RSQ	0.995853

Sample:		ppb calc.	dil. Factor	ppb in sol	ave 4˚C	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 4˚C	STD DEV
4˚C #1	1.2469	1699.8	10.0	16998.0	16524.6	745.23	2.4933	16.9980	830.4675	813.1	35.6
4˚C #2	1.2195	1661.1	10.0	16611.0			2.4875	16.6110	813.7227		
4˚C #17	1.2412	1691.7	10.0	16917.5			2.4950	16.9175	835.3883		
4˚C #18	1.2385	1687.9	10.0	16879.4			2.4919	16.8794	834.5639		
4˚C #19	1.1208	1521.7	10.0	15217.1			2.4950	15.2171	751.4562		
4˚C #3 sol	0.8134	1087.6	20.0	21751.2			2.4924	21.7512	1095.4478		
4˚C #4 insol	0.6502	857.1	40.0	34282.8			2.4889	34.2828	1678.4427		
Sample 1+spk	0.7572	1008.2	20.0	20163.8	79.1	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5	246	115	75-125%

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.4	819.1	106	75-125%

			% Recovery	Range	
LCS #15	0.7618	1015	102.2	80-120%	1.015
Blank #16	0.0000	-61			-0.061

4oC	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8159	24.4202	4.6043	23.6024	3.7865	17.7617		
Moisture B	19.7659	24.5795	4.8136	23.7087	3.9428	18.0904		
Moisture C	19.7540	24.5255	4.7715	23.6699	3.9159	17.9315	17.928	82.072

Storage = Rm Temperature

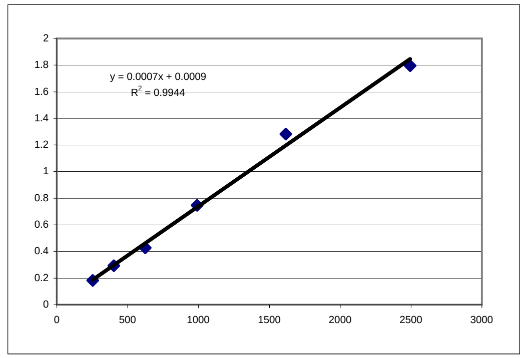
T=0 day | **1/10/2003** | **Day 1 Color**

12763-126D

Frontier Hard Chrome, Sandy Soil

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.1825	245.4	9
	403	0.2918	393.1	10
	624	0.4279	577.0	11
	990	0.7461	1006.9	12
	1616	1.2829	1732.2	13
	2494	1.7971	2427.0	14



slope	0.00074
intercept	0.000901
RSQ	0.994374

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	1.2325	1664.1	10.0	16641.4	16596.8	582.29	2.5137	16.6414	827.9809	815.3	30.6
Sample 2	1.2686	1712.9	10.0	17129.2			2.5016	17.1292	840.0165		
Sample 3	1.1679	1576.9	10.0	15768.5			2.5146	15.7685	769.4911		
Sample 4	1.2074	1630.2	10.0	16302.3			2.5031	16.3023	799.0276		
Sample 5	1.2696	1714.3	10.0	17142.7			2.5034	17.1427	840.1259		
Sol Spike 6	0.8889	1199.9	20.0	23997.3			2.5112	23.9973	1172.7190		
Insol Spike 7	0.6290	848.7	40.0	33947.6	% recovery	Range	2.4527	33.9476	1697.3265		
Sample 4+spk	0.7278	982.2	20.0	19643.8	83.5	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5052	246.841	145	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

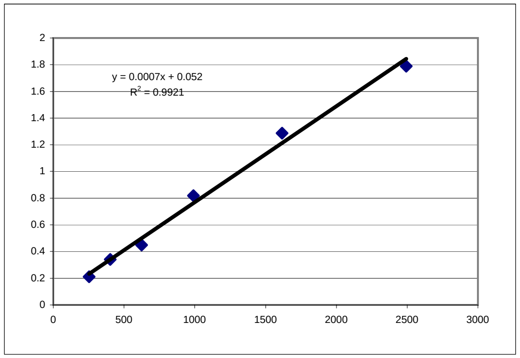
	A540	ppb calc.	% recovery	Range
LCS #15	0.8086	1091	109.7	80-120%
Blank #8	-0.0200	-28		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.9	877.3	101	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8132	22.8038	2.9906	22.2560	2.4428	18.317		
Moisture B	19.7520	23.0542	3.3022	22.4510	2.6990	18.267		
Moisture C	19.7401	22.9840	3.2439	22.3705	2.6304	18.912	18.499	81.501

T=0 day	1/13/2003	Day 3 Color
12763-126D	Storage = Rm Temperature	
Frontier Hard Chrome, Sandy Soil		

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.2115	222.0	9
	403	0.3399	400.8	10
	624	0.4487	552.3	11
	990	0.8195	1068.6	12
	1616	1.2876	1720.3	13
	2494	1.7884	2417.6	14

slope	0.000718
intercept	0.052028
RSQ	0.992114

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	1.2436	1659.0	10.0	16590.5	16902.1	384.36	2.5137	16.5905	825.4460	830.2	18.1
Sample 2	1.3047	1744.1	10.0	17441.2			2.5016	17.4412	855.3157		
Sample 3	1.2470	1663.8	10.0	16637.8			2.5146	16.6378	811.9107		
Sample 4	1.2488	1666.3	10.0	16662.9			2.5031	16.6629	816.7020		
Sample 5	1.2858	1717.8	10.0	17178.0			2.5034	17.1780	841.8566		
Sol Spike 6	0.8675	1135.4	20.0	22707.9			2.5112	22.7079	1109.7060		
Insol Spike 7	0.5640	712.8	40.0	28513.1	% recovery	Range	2.4527	28.5131	1425.6103		
Sample 4+spk	0.7985	1039.3	20.0	20786.5	103.1	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5052	246.841	113	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

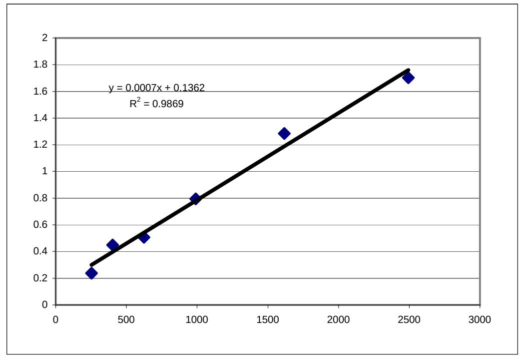
	A540	ppb calc.	% recovery	Range
LCS #15	0.7495	971	97.6	80-120%
Blank #8	0.0404	-16		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.9	877.3	68	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8132	22.8038	2.9906	22.2560	2.4428	18.317		
Moisture B	19.7520	23.0542	3.3022	22.4510	2.6990	18.267		
Moisture C	19.7401	22.9840	3.2439	22.3705	2.6304	18.912	18.499	81.501

T=0 day | **1/17/2003** | **Day 7 Color**
12763-126D | **Storage = Rm Temperature**
Frontier Hard Chrome, Sandy Soil

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.2379	156.2	9
	403	0.4498	481.5	10
	624	0.5067	568.8	11
	990	0.7939	1009.7	12
	1616	1.2838	1761.8	13
	2494	1.7018	2403.5	14

slope	0.000651
intercept	0.136174
RSQ	0.986886

							Sample Conc.				
		ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	1.2610	1726.8	10.0	17268.3	17579.9	509.25	2.5137	17.2683	859.1709	863.5	24.1
Sample 2	1.2971	1782.2	10.0	17822.5			2.5016	17.8225	874.0161		
Sample 3	1.2716	1743.1	10.0	17431.0			2.5146	17.4310	850.6192		
Sample 4	1.2463	1704.3	10.0	17042.6			2.5031	17.0426	835.3150		
Sample 5	1.3305	1833.5	10.0	18335.3			2.5034	18.3353	898.5700		
Sol Spike 6	0.8578	1107.8	20.0	22156.8			2.5112	22.1568	1082.7717		
Insol Spike 7	0.6657	812.9	40.0	32517.1	% recovery	Range	2.4527	32.5171	1625.8025		
Sample 4+spk	0.7677	969.5	20.0	19390.3	58.7	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5052	246.841	89	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

			% recovery	Range
LCS #15	0.8126	1038	104.3	80-120%
Blank #8	0.1693	51		

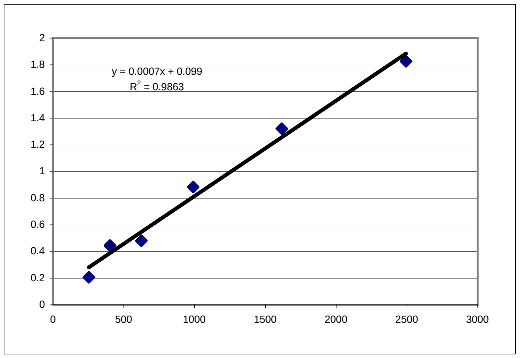
PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.9	877.3	87	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8132	22.8038	2.9906	22.2560	2.4428	18.317		
Moisture B	19.7520	23.0542	3.3022	22.4510	2.6990	18.267		
Moisture C	19.7401	22.9840	3.2439	22.3705	2.6304	18.912	18.499	81.501

T=0 day	1/24/2003	Day 14 Color
12763-126D	Storage = Rm Temperature	
Frontier Hard Chrome, Sandy Soil		

Chrome VI digestion assay

Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.2066	150.3	9
	403	0.4450	483.4	10
	624	0.4796	531.7	11
	990	0.8827	1094.9	12
	1616	1.3196	1705.4	13
	2494	1.8281	2415.9	14



slope	0.000716
intercept	0.099039
RSQ	0.986293

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	1.2485	1606.0	10.0	16060.4	16397.7	401.15	2.5137	16.0604	799.0751	805.5	18.2
Sample 2	1.3063	1686.8	10.0	16868.0			2.5016	16.8680	827.2089		
Sample 3	1.2697	1635.7	10.0	16356.6			2.5146	16.3566	798.1907		
Sample 4	1.2415	1596.3	10.0	15962.6			2.5031	15.9626	782.3815		
Sample 5	1.2972	1674.1	10.0	16740.9			2.5034	16.7409	820.4334		
Sol Spike 6	0.8737	1082.4	20.0	21647.4			2.5112	21.6474	1057.8779		
Insol Spike 7	0.5736	663.1	40.0	26522.5	% recovery	Range	2.4527	26.5225	1326.0859		
Sample 4+spk	0.7674	933.8	20.0	18676.9	67.9	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5052	246.841	102	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

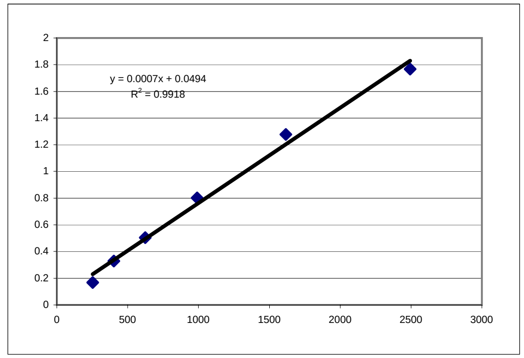
	A540	ppb calc.	% recovery	Range
LCS #15	0.7931	970	97.4	80-120%
Blank #8	0.0055	-131		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.9	877.3	59	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8132	22.8038	2.9906	22.2560	2.4428	18.317		
Moisture B	19.7520	23.0542	3.3022	22.4510	2.6990	18.267		
Moisture C	19.7401	22.9840	3.2439	22.3705	2.6304	18.912	18.499	81.501

T=0 day	2/7/2003	Day 28 Color
12763-126D	Storage = Rm Temperature	
Frontier Hard Chrome, Sandy Soil		

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.1692	168.0	9
	403	0.3289	391.9	10
	624	0.5039	637.2	11
	990	0.8023	1055.6	12
	1616	1.2768	1720.8	13
	2494	1.7670	2408.1	14

slope	0.000713
intercept	0.049379
RSQ	0.991781

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	1.2121	1630.1	10.0	16301.2	16423.1	406.70	2.5137	16.3012	811.0525	806.7	20.4
Sample 2	1.2542	1689.1	10.0	16891.4			2.5016	16.8914	828.3553		
Sample 3	1.2072	1623.2	10.0	16232.5			2.5146	16.2325	792.1310		
Sample 4	1.1842	1591.0	10.0	15910.0			2.5031	15.9100	779.8025		
Sample 5	1.2463	1678.1	10.0	16780.6			2.5034	16.7806	822.3823		
Sol Spike 6	0.8137	1071.6	20.0	21431.3			2.5112	21.4313	1047.3210		
Insol Spike 7	0.5154	653.4	40.0	26134.2	% recovery	Range	2.4527	26.1342	1306.6684		
Sample 4+spk	0.7055	919.9	20.0	18397.4	62.2	85-115%					

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.7514	984	98.9	80-120%
Blank #8	-0.0240	-103		

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5052	246.841	97	75-125%

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.9	877.3	57	75-125%

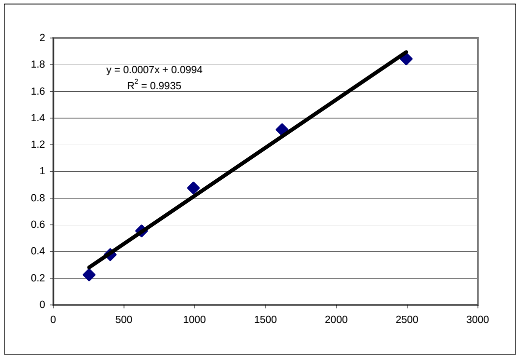
	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8132	22.8038	2.9906	22.2560	2.4428	18.317		
Moisture B	19.7520	23.0542	3.3022	22.4510	2.6990	18.267		
Moisture C	19.7401	22.9840	3.2439	22.3705	2.6304	18.912	18.499	81.501

T=0 day | **3/7/2003** | **Day 56 Color**

12763-126D **Storage = Rm Temperature**

Frontier Hard Chrome, Sandy Soil

Chrome VI digestion assay



Sample/STD		A540	ppb calc.	Sample #
Blank		0.0000		
	253	0.2266	176.8	9
	403	0.3766	385.1	10
	624	0.5545	632.2	11
	990	0.8758	1078.6	12
	1616	1.3130	1685.9	13
	2494	1.8437	2423.1	14

slope	0.00072
intercept	0.099359
RSQ	0.993468

	A540	ppb calc.	dil. Factor	ppb in sol	ave 1-5	STD DEV	Sample Conc. wet mass	ppm Calc.	µg/g dry	ave 1-5	STD DEV
Sample 1	1.2322	1573.6	10.0	15736.3	16121.6	274.34	2.5137	15.7363	782.9477	791.9	10.2
Sample 2	1.2711	1627.7	10.0	16276.7			2.5016	16.2767	798.2081		
Sample 3	1.2610	1613.6	10.0	16136.4			2.5146	16.1364	787.4407		
Sample 4	1.2512	1600.0	10.0	16000.2			2.5031	16.0002	784.2240		
Sample 5	1.2842	1645.9	10.0	16458.6			2.5034	16.4586	806.6009		
Sol Spike 6	0.8637	1061.7	20.0	21234.9			2.5112	21.2349	1037.7231		
Insol Spike 7	0.5893	680.6	40.0	27223.1	% recovery	Range	2.4527	27.2231	1361.1122		
Sample 4+spk	0.7671	927.6	20.0	18551.2	63.8	85-115%					

K2Cr2O7 added (mg)	Cr added µg/g dry	Spike Recovery % Solution	Range
0.5052	246.841	100	75-125%

Samples # 1 through 7 had to be re-filtered after bringing pH to the 7 range (because of precipitation).

	A540	ppb calc.	% recovery	Range
LCS #15	0.8676	1067	107.2	80-120%
Blank #8	0.0090	-126		

PbCrO4 Added (mg)	Cr added µg/g dry	Spike Recovery % Solid	Range
10.9	877.3	65	75-125%

	Tare	Tin + Soil	wet	Tin + Soil	dry	%moisture	mean	% Solid
Moisture A	19.8132	22.8038	2.9906	22.2560	2.4428	18.317		
Moisture B	19.7520	23.0542	3.3022	22.4510	2.6990	18.267		
Moisture C	19.7401	22.9840	3.2439	22.3705	2.6304	18.912	18.499	81.501

Appendix E

Semi-Volatile Organic Compound Extraction Data

BATTELLE MARINE SCIENCES LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382
(360) 681-4564

MSL Sample ID	Extraction Date	Analysis Date	Days held from Extraction to Analysis	Storage Temperature	PAH's naphthalene		
1790-9ab Blk A	**12/30/2003**	**1/24/2004**	**25**	**NA**	61.87	U	
1790-9ab Blk Spk A	**1/6/2004**	**1/24/2004**	**18**	**NA**	2019.08		
1790-9a Blk B	**1/27/2004**	**4/16/2004**	**80**	**NA**	68.76	U	r
1790-9a Blk Spk B	**3/23/2004**	**4/17/2004**	**25**	**NA**	3795.58		
1790-9a-Blk Spk C	**6/15/2004**	**6/18/2004**	**3**	**NA**	3831.39		
1790-9ab-7 MS	**1/13/2004**	**1/24/2004**	**11**	**-20C**	3097.71		
1790-9a-12 MS	**2/11/2004**	**4/16/2004**	**65**	**-20C**	2910.75		r
1790-9ab-1	**12/30/2003**	**1/24/2004**	**25**	**-20C**	356.71		
1790-9ab-2	**12/30/2003**	**1/24/2004**	**25**	**-20C**	233.04		
1790-9ab-3	**12/30/2003**	**1/24/2004**	**25**	**-20C**	210.06		
1790-9ab-4	**12/30/2003**	**1/24/2004**	**25**	**-20C**	331.22		
1790-9ab-5	**1/6/2004**	**1/24/2004**	**18**	**-20C**	348.04		
1790-9ab-6	**1/6/2004**	**1/24/2004**	**18**	**-20C**	326.39		
1790-9ab-20	**1/6/2004**	**1/24/2004**	**18**	**4C**	156.75		E
1790-9ab-21	**1/6/2004**	**1/24/2004**	**18**	**4C**	285.33		
1790-9ab-8	**1/13/2004**	**1/24/2004**	**11**	**-20C**	470.99		
1790-9ab-9	**1/13/2004**	**1/24/2004**	**11**	**-20C**	364.52		
1790-9ab-22	**1/13/2004**	**1/24/2004**	**11**	**4C**	319.9		
1790-9ab-23	**1/13/2004**	**1/24/2004**	**11**	**4C**	427.45		
1790-9a-10	**1/28/2004**	**4/16/2004**	**79**	**-20C**	453.71		r
1790-9a-11	**1/28/2004**	**4/16/2004**	**79**	**-20C**	541.59		r
1790-9a-24	**1/28/2004**	**4/16/2004**	**79**	**4C**	579.88		r
1790-9a-25	**1/28/2004**	**4/16/2004**	**79**	**4C**	547.39		r
1790-9a- 26	**2/11/2004**	**4/17/2004**	**66**	**4C**	464.54		r
1790-9a-13	**2/11/2004**	**4/16/2004**	**65**	**-20C**	511.04		r
1790-9a-14	**2/11/2004**	**4/16/2004**	**65**	**-20C**	458.96		r
1790-9a-27	**2/11/2004**	**4/17/2004**	**66**	**4C**	547.97		r
1790-9a-15	**3/23/2004**	**4/17/2004**	**25**	**-20C**	511.11		r
1790-9a-16	**3/23/2004**	**4/17/2004**	**25**	**-20C**	557.24		r
1790-9a-28	**3/23/2004**	**4/17/2004**	**25**	**4C**	592.68		r
1790-9a-29	**3/23/2004**	**4/17/2004**	**25**	**4C**	639.6		r
1790-9a-17	**6/15/2004**	**6/18/2004**	**3**	**-20C**	509.04		
1790-9a-18	**6/15/2004**	**6/18/2004**	**3**	**-20C**	542.46		
1790-9a-30	**6/15/2004**	**6/18/2004**	**3**	**4C**	520.49		
1790-9a-31	**6/15/2004**	**6/18/2004**	**3**	**4C**	485.9		

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MSL Sample ID	Acenaphthalene			Acenaphthene			Fluorene			dibenzothiophene			phenanthrene			anthracene	
1790-9ab Blk A	69.41	U		77.28	U		50.43	U		15.00	U		301.85	U		74.76	U
1790-9ab Blk Spk A	1877.54			2065.63			1703.59			15.00	U		1997.00			1755.91	
1790-9a Blk B	77.13	U	r	85.89	U	r	56.04	U	r	16.67	U	r	335.46	U	r	98.96	
1790-9a Blk Spk B	3610.45		r	4001.59		r	3901.81		r	98.81		r	3976.05		r	3957.20	
1790-9a-Blk Spk C	3699.63			3754.82			3618.13			33.94			3722.66			3665.44	
1790-9ab-7 MS	3131.56			2730.23			2587.22			187.89			4747.06			3233.47	
1790-9a-12 MS	2625.71		r	2522.14		r	2448.42		r	217.12		r	4168.28		r	2828.20	
1790-9ab-1	411.49			82.44			96.77			126.44			1724.22			417.40	
1790-9ab-2	352.89			69.73	U		59.93			102.82			1307.04			321.60	
1790-9ab-3	318.61			71.24	U		46.48	U		86.46			1005.31			270.26	
1790-9ab-4	301.97			74.89	U		79.19			115.70			1705.25			361.10	
1790-9ab-5	403.31			88.39			78.98			120.24			1772.08			376.30	
1790-9ab-6	350.42			81.42	U		78.49			93.68			1327.29			308.53	
1790-9ab-20	308.37		E	72.05	U	E	47.01	U	E	13.98	U		1159.04			264.45	
1790-9ab-21	309.23			73.46	U		67.94			81.36			1278.40			284.38	
1790-9ab-8	531.97			114.91			129.41			183.49			2276.67			523.49	
1790-9ab-9	367.33			78.22	U		51.03	U		136.57			1548.46			342.12	
1790-9ab-22	322.72			82.63	U		53.91	U		128.36			1575.01			352.91	
1790-9ab-23	516.72			93.76			76.48			172.09			2145.24			466.69	
1790-9a-10	228.88		r	74.24	U	r	63.03		r	101.08		r	1769.27		r	312.3	
1790-9a-11	156.33		r	111.07		r	84.66		r	81.42		r	2094.31		r	294.54	
1790-9a-24	273.18		r	165.16		r	104.72		r	162.34		r	2417.99		r	434.74	
1790-9a-25	317.02		r	184.24		r	108.02		r	183.19		r	2326.09		r	500.22	
1790-9a- 26	344.12		r	141.91		r	85.04		r	139.84		r	1617.68		r	381.44	
1790-9a-13	391.55		r	153.66		r	126.65		r	157.68		r	1875.07		r	453.11	
1790-9a-14	354.09		r	133.34		r	90.43		r	144.74		r	1669.99		r	393.5	
1790-9a-27	411.37		r	177.51		r	136.52		r	146.00		r	1692.81		r	460.31	
1790-9a-15	420.37		r	74.88		r	97.34		r	166.26		r	1917.54		r	471.05	
1790-9a-16	411.83		r	75.33	U	r	99.5		r	162.85		r	1834.43		r	478.29	
1790-9a-28	428.63		r	99.08		r	121.14		r	199.88		r	2258.36		r	571.68	
1790-9a-29	539.83		r	79.51	U	r	118.3		r	196.16		r	2194.89		r	560.27	
1790-9a-17	522.37			90.28			113.47			180.26			2351.42			598.39	
1790-9a-18	489.63			94.48			99.21			138.97			2196.08			524.37	
1790-9a-30	450.11			96.84			90.05			160.86			2214.53			492.68	
1790-9a-31	502.42			92.28			100.57			148.68			2319.56			543.22	

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MSL Sample ID		fluoranthene			pyrene			benzo[a] anthracene			chrysene			benzo [b] fluoranthene		
1790-9ab Blk A		621.85	U	r	300.02	U	r	113.02	U	r	108.81	U	r	104.60	U	r
1790-9ab Blk Spk A		2120.15			2480.94			1730.21			2065.82			1712.54		r
1790-9a Blk B	r	691.08	U	r	333.42	U	r	125.60	U	r	120.92	U	r	116.25	U	r
1790-9a Blk Spk B	r	5073.10		r	4437.86		r	5700.57		r	4658.01		r	4698.79		r
1790-9a-Blk Spk C		3508.86			3566.22			3387.77			3440.73			2938.85		
1790-9ab-7 MS		12307.40			12483.48			9640.52			10245.19			11126.34		
1790-9a-12 MS	r	11210.46		r	10266.99		r	10897.84		r	9189.71		r	10316.46		r
1790-9ab-1		7686.81			7805.67			5471.76			5900.89			7500.36		
1790-9ab-2		6005.38		r	6195.85		r	4540.26		r	4973.34		r	6478.63		r
1790-9ab-3		5000.55		r	5260.90		r	3849.66		r	4190.35		r	5509.08		r
1790-9ab-4		7862.68		r	8143.23		r	5487.89		r	6046.56		r	8124.27		r
1790-9ab-5		7746.39		r	8292.86		r	5813.48		r	6298.97		r	7973.28		r
1790-9ab-6		5564.92			5948.03			4115.97			4478.80			5789.67		r
1790-9ab-20		5323.41			5669.79			3908.43			4288.50			5463.25		
1790-9ab-21		6038.10			6473.97			4677.71			5171.30			6752.95		r
1790-9ab-8		9622.91			10026.36			7091.81			7626.49			9583.58		
1790-9ab-9		7074.77			7608.21			5339.21			5749.16			7246.62		
1790-9ab-22		7111.59			7574.17			5359.7			5787.72			7421.37		
1790-9ab-23		9547.98			10044.03			6911.24			7533.94			9620.56		
1790-9a-10	r	7574.75		r	7582.4		r	5755.59		r	5244.74		r	5008.71		r
1790-9a-11	r	8308.18		r	8399.1		r	5177.65		r	5264.72		r	6635.7		r
1790-9a-24	r	10528.31		r	10057		r	8524.09		r	7816.97		r	8132.03		r
1790-9a-25	r	9903.44		r	9326.91		r	8589.05		r	7494.29		r	8222.01		r
1790-9a- 26	r	6904.57		r	6387.68		r	5893.57		r	5101.89		r	5821.14		r
1790-9a-13	r	8109.25		r	7481.37		r	6946.89		r	6037.52		r	7059.88		r
1790-9a-14	r	7433.89		r	6858.53		r	6649.17		r	5712.87		r	14381.88		r
1790-9a-27	r	7615.36		r	7079.51		r	6788.77		r	5821.2		r	6914.14		r
1790-9a-15	r	8729.33		r	8172.63		r	7812.02		r	6742.49		r	7246.9		r
1790-9a-16	r	8631.98		r	7977.11		r	7929.62		r	6653.69		r	7849.52		r
1790-9a-28	r	9319.07		r	8614.85		r	8338.62		r	7105.63		r	18159.77		r
1790-9a-29	r	9966.47		r	9193.17		r	8764.77		r	7577.42		r	19400.7		r
1790-9a-17		8468.45			8795.07			7091.42			7674.34			7837.37		
1790-9a-18		8148.56			8491.29			6557.53			7262.26			7305.1		
1790-9a-30		8114.49			8365.28			6371.32			7076.98			7058.63		
1790-9a-31		8089.78			8264.93			6387.88			7180.47			7096.91		

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MSL Sample ID	benzo [k] fluoranthene			benzo [a] pyrene			indeno [1,2,3-c,d] pyrene			dibenzo [a,h] anthracene		
1790-9ab Blk A	108.72	U	r	112.84	U	r	137.85	U	r	116.74	U	r
1790-9ab Blk Spk A	1839.42		r	1755.44		r	1458.95		r	1313.65		r
1790-9a Blk B	120.82	U	r	125.40	U	r	153.20	U	r	129.73	U	r
1790-9a Blk Spk B	3689.19		r	4043.96		r	4259.32		r	4067.17		r
1790-9a-Blk Spk C	3034.41			3217.64			2616.74			2781.19		
1790-9ab-7 MS	6379.44			9995.82			7478.81			3591.30		
1790-9a-12 MS	7393.42		r	10661.06		r	13883.72		r	4786.74		r
1790-9ab-1	3052.81			6347.75			4855.15			1018.65		
1790-9ab-2	2584.58		r	5446.99			4225.68			919.76		
1790-9ab-3	2198.53		r	4643.88			3598.97			780.57		
1790-9ab-4	3211.47		r	6732.79			5137.14			1077.08		
1790-9ab-5	3229.73		r	6816.61			5163.73			1090.74		
1790-9ab-6	2356.97		r	4857.24			3766.98			796.74		
1790-9ab-20	2277.27			4618.76			3566.08			748.58		
1790-9ab-21	2724.74		r	5694.93			4339.55			904.40		
1790-9ab-8	3908.2			8100.9			6147.07			1354.67		
1790-9ab-9	2870.17			6139.64			4661.41			1000.13		
1790-9ab-22	3043.93			6350.35			4808.89			1018.33		
1790-9ab-23	3828.22			8213.51			6317.43			1349.62		
1790-9a-10	5164.13		r	6768.34		r	7072.32		r	616.13		r
1790-9a-11	6452.6		r	7916.9		r	8150.99		r	357.67		r
1790-9a-24	7559.04		r	10131.73		r	11082.41		r	1080.17		r
1790-9a-25	7021.7		r	9857.93		r	11397.56		r	1271.46		r
1790-9a- 26	4663.85		r	6526.98		r	8052.33		r	1727.75		r
1790-9a-13	5500.44		r	7727.15		r	9553.32		r	499.31		r
1790-9a-14	5131.01		r	7142.18		r	8871.31		r	1996.6		r
1790-9a-27	5308.7		r	7517.12		r	9493.65		r	1317.39		r
1790-9a-15	6418.09		r	8554.36		r	10254.97		r	1179.01		r
1790-9a-16	6171.74		r	8618.45		r	10967.84		r	1461.56		r
1790-9a-28	6503.53		r	9123.51		r	11490.11		r	1575.29		r
1790-9a-29	6950.65		r	9779.33		r	12275.79		r	670.58		r
1790-9a-17	9128.14			11082.57			12300.57			1801.84		
1790-9a-18	8292.84			10175.2			11136.57			1595.37		
1790-9a-30	8154.28			10054.83			10615.47			1443.81		
1790-9a-31	8366.57			9936.05			10925.72			1494.43		

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MSL Sample ID	benzo[g,h,i] perylene			Surrogate Recovery d8 naphthalene			d10 Acenaphthene			d10 phenanthrene			d12 chrysene		
1790-9ab Blk A	127.43	U	r	81.60%			80.40%			80.80%			39.10%	#	
1790-9ab Blk Spk A	1602.09		r	65.50%			64.40%			63.50%			51.80%		
1790-9a Blk B	141.61	U	r	102.90%		r	100.50%		r	106.60%		r	217.70%	#	r
1790-9a Blk Spk B	3762.39		r	95.30%		r	99.90%		r	110.50%		r	147.90%		r
1790-9a-Blk Spk C	3161.24			102.80%			102.20%			100.40%			93.00%		
1790-9ab-7 MS	7593.96			83.20%			84.20%			89.60%			97.70%		
1790-9a-12 MS	7993.97		r	160.60%	#	r	167.10%	#	r	179.70%	#	r	191.20%	#	r
1790-9ab-1	4449.29			65.60%			64.90%			68.80%			85.80%		
1790-9ab-2	3857.71			55.40%			56.20%			59.90%			35.10%	#	
1790-9ab-3	3304.13			58.80%			54.00%			51.60%			32.00%	#	
1790-9ab-4	4738.92			84.70%			82.30%			85.20%			38.60%	#	
1790-9ab-5	4791.46			69.40%			71.10%			76.30%			290.10%	#	
1790-9ab-6	3474.15			65.10%			64.20%			59.50%			60.60%		
1790-9ab-20	3301.79			39.10%	#		46.20%	#		54.20%			102.10%		
1790-9ab-21	4018.31			63.40%			63.50%			61.00%			50.30%		
1790-9ab-8	5638.97			89.40%			92.20%			98.50%			133.90%		
1790-9ab-9	4317.52			72.60%			74.50%			74.10%			93.60%		
1790-9ab-22	4435.1			74.30%			74.30%			74.40%			92.00%		
1790-9ab-23	5785.88			80.40%			81.90%			87.00%			104.50%		
1790-9a-10	4420.88		r	88.50%		r	88.10%		r	90.30%		r	155.30%	#	r
1790-9a-11	5534.88		r	103.40%		r	98.70%		r	99.40%		r	138.70%		r
1790-9a-24	7062.56		r	108.50%		r	112.30%		r	120.20%		r	138.80%		r
1790-9a-25	6646.32		r	101.90%		r	101.90%		r	108.70%		r	270.80%	#	r
1790-9a- 26	4647.28		r	149.20%		r	154.30%	#	r	162.20%	#	r	158.90%	#	r
1790-9a-13	5608.1		r	173.90%	#	r	178.70%	#	r	187.10%	#	r	193.10%	#	r
1790-9a-14	5134.06		r	157.40%	#	r	164.20%	#	r	176.50%	#	r	171.30%	#	r
1790-9a-27	5526.72		r	162.30%	#	r	170.90%	#	r	179.00%	#	r	184.60%	#	r
1790-9a-15	6058.37		r	85.70%		r	89.70%		r	100.50%		r	117.60%		r
1790-9a-16	6319.68		r	84.70%		r	89.90%		r	96.20%		r	106.20%		r
1790-9a-28	6500.29		r	85.80%		r	90.10%		r	97.10%		r	108.00%		r
1790-9a-29	7159.8		r	91.40%		r	96.60%		r	104.30%		r	117.20%		r
1790-9a-17	8369.36			93.60%			98.40%			106.70%			137.20%		
1790-9a-18	7774.11			103.30%			107.90%			116.40%			281.50%	#	
1790-9a-30	7711.21			107.90%			112.00%			117.80%			132.20%		
1790-9a-31	7746.62			104.40%			108.20%			115.40%			144.40%		

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				Internal Std. Recovery						
MSL Sample ID	**d12 perylene**			**d8 acenaphthylene**		**d10 pyrene**		**d12 benzo [a] pyrene**		
1790-9ab Blk A	46.80%	#		151.50%		123.10%		137.30%		
1790-9ab Blk Spk A	37.70%	#		146.40%		121.10%		103.30%		
1790-9a Blk B	141.40%		r	100.00%	r	80.30%	r	90.30%		r
1790-9a Blk Spk B	89.60%		r	97.40%	r	75.90%	r	121.40%		r
1790-9a-Blk Spk C	76.00%			83.70%		58.80%		72.40%		
1790-9ab-7 MS	58.70%			139.00%		121.90%		143.10%		
1790-9a-12 MS	149.00%		r	123.70%	r	95.10%	r	177.80%		r
1790-9ab-1	85.70%			172.40%		144.10%		168.00%		
1790-9ab-2	39.60%			189.50%		157.40%		185.20%		
1790-9ab-3	35.10%	#		180.30%		151.80%		178.30%		
1790-9ab-4	45.00%	#		140.00%		117.30%		130.90%		
1790-9ab-5	151.60%	#		169.40%		142.30%		166.90%		
1790-9ab-6	40.80%	#		158.90%		134.10%		156.50%		
1790-9ab-20	75.80%			148.90%		123.10%		144.50%		
1790-9ab-21	40.30%	#		179.90%		147.40%		172.70%		
1790-9ab-8	121.30%			125.20%		108.10%		129.20%		
1790-9ab-9	71.50%			146.90%		123.90%		149.20%		
1790-9ab-22	70.00%			144.80%		121.80%		142.40%		
1790-9ab-23	92.50%			161.80%		136.20%		159.80%		
1790-9a-10	78.50%		r	120.50%	r	94.70%	r	150.30%		r
1790-9a-11	60.40%		r	87.80%	r	70.10%	r	77.20%		r
1790-9a-24	82.80%		r	96.10%	r	75.50%	r	123.50%		r
1790-9a-25	113.40%		r	105.00%	r	82.70%	r	143.20%		r
1790-9a- 26	107.70%		r	132.70%	r	100.80%	r	178.10%		r
1790-9a-13	147.10%		r	115.80%	r	88.60%	r	156.40%		r
1790-9a-14	122.20%		r	125.70%	r	96.80%	r	173.10%		r
1790-9a-27	132.70%		r	139.10%	r	103.40%	r	189.00%		r
1790-9a-15	80.10%		r	111.30%	r	86.60%	r	152.00%		r
1790-9a-16	60.30%		r	191.90%	r	141.50%	r	267.30%	#	r
1790-9a-28	62.60%		r	106.90%	r	81.00%	r	146.10%		r
1790-9a-29	67.80%		r	103.40%	r	78.70%	r	142.70%		r
1790-9a-17	111.60%			87.00%		64.20%		94.50%		
1790-9a-18	127.00%			79.50%		58.60%		85.00%		
1790-9a-30	118.80%			80.90%		60.50%		86.90%		
1790-9a-31	102.70%			81.70%		60.30%		86.80%		

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units are ng/g

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MSL Sample ID	Extraction Date	Analysis Date	Days held from Extraction to Analysis	Storage Temperature	PAH's naphthalene			Acenaphthalene	
BLANKS									
1790-9ab Blk A	**12/30/2003**	**1/24/2004**	**25**	**NA**	61.87	U		69.41	U
1790-9a Blk B	**1/27/2004**	**4/16/2004**	**80**	**NA**	68.76	U	r	77.13	U
BLANK SPIKES									
1790-9ab Blk Spk A	**1/6/2004**	**1/24/2004**	**18**	**NA**	2019.08			1877.54	
1790-9a Blk Spk B	**3/23/2004**	**4/17/2004**	**25**	**NA**	3795.58		r	3610.45	
1790-9a-Blk Spk C	**6/15/2004**	**6/18/2004**	**3**	**NA**	3831.39			3699.63	
Spike concentration A					3000.00			3000.00	
Spike concentration B					3333.40			3333.40	
Spike concentration C					3333.40			3333.40	
percent recovery A					67.30%			62.58%	
percent recovery B					113.87%			108.31%	
percent recovery C					114.94%			110.99%	
MATRIX SPIKES									
1790-9 Average	**NA**	**NA**	**NA**	**NA**	439.07			383.46	
1790-9ab-7 MS	**1/13/2004**	**1/24/2004**	**11**	**-20C**	3097.71			3131.56	
1790-9a-12 MS	**2/11/2004**	**4/16/2004**	**65**	**-20C**	2910.75		r	2625.71	
Spike concentration 7					3080.60			3080.60	
Spike concentration 12					3184.80			3184.80	
percent recovery 7					86.30%			89.21%	
percent recovery 12					77.61%			70.40%	

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MSL Sample ID	Acenaphthene	Fluorene	dibenzothiophene	phenanthrene	anthracene	fluoranthene
BLANKS						
1790-9ab Blk A	77.28 U	50.43 U	15.00 U	301.85 U	74.76 U	621.85 U
1790-9a Blk B	r 85.89 U	r 56.04 U	r 16.67 U	r 335.46 U	r 98.96	r 691.08 U
BLANK SPIKES						
1790-9ab Blk Spk A	2065.63	1703.59	15.00 U	1997.00	1755.91	2120.15
1790-9a Blk Spk B	r 4001.59	r 3901.81	r 98.81	r 3976.05	r 3957.20	r 5073.10
1790-9a-Blk Spk C	3754.82	3618.13	33.94	3722.66	3665.44	3508.86
Spike concentration A	3000.00	3000.00	NA	3000.00	3000.00	3000.00
Spike concentration B	3333.40	3333.40	NA	3333.40	3333.40	3333.40
Spike concentration C	3333.40	3333.40	NA	3333.40	3333.40	3333.40
percent recovery A	68.85%	56.79%	NA	66.57%	58.53%	70.67%
percent recovery B	120.05% #	117.05%	NA	119.28%	118.71%	152.19% #
percent recovery C	112.64%	108.54%	NA	111.68%	109.96%	105.26%
MATRIX SPIKES						
1790-9 Average	80.42	82.35	136.34	1841.93	419.98	7872.55
1790-9ab-7 MS	2730.23	2587.22	187.89	4747.06	3233.47	12307.40
1790-9a-12 MS	r 2522.14	r 2448.42	r 217.12	r 4168.28	r 2828.20	r 11210.46
Spike concentration 7	3080.60	3080.60	NA	3080.60	3080.60	3080.60
Spike concentration 12	3184.80	3184.80	NA	3184.80	3184.80	3184.80
percent recovery 7	86.02%	81.31%	NA	94.30%	91.33%	143.96% #
percent recovery 12	76.67%	74.29%	NA	73.05%	75.62%	104.81%

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MSL Sample ID		pyrene			benzo[a] anthracene			chrysene			benzo [b] fluoranthene			benzo [k] fluoranthene		
BLANKS																
1790-9ab Blk A	r	300.02	U	r	113.02	U	r	108.81	U	r	104.60	U	r	108.72	U	r
1790-9a Blk B	r	333.42	U	r	125.60	U	r	120.92	U	r	116.25	U	r	120.82	U	r
BLANK SPIKES																
1790-9ab Blk Spk A		2480.94			1730.21			2065.82			1712.54		r	1839.42		r
1790-9a Blk Spk B	r	4437.86		r	5700.57		r	4658.01		r	4698.79		r	3689.19		r
1790-9a-Blk Spk C		3566.22			3387.77			3440.73			2938.85			3034.41		
Spike concentration A		3000.00			3000.00			3000.00			3000.00			3000.00		
Spike concentration B		3333.40			3333.40			3333.40			3333.40			3333.40		
Spike concentration C		3333.40			3333.40			3333.40			3333.40			3333.40		
percent recovery A		82.70%			57.67%			68.86%			57.08%			61.31%		
percent recovery B		133.13%	#		171.01%	#		139.74%	#		140.96%	#		110.67%		
percent recovery C		106.98%			101.63%			103.22%			88.16%			91.03%		
MATRIX SPIKES																
1790-9 Average		7860.35			6290.90			6207.63			8271.21			5074.07		
1790-9ab-7 MS		12483.48			9640.52			10245.19			11126.34			6379.44		
1790-9a-12 MS	r	10266.99		r	10897.84		r	9189.71		r	10316.46		r	7393.42		r
Spike concentration 7		3080.60			3080.60			3080.60			3080.60			3080.60		
Spike concentration 12		3184.80			3184.80			3184.80			3184.80			3184.80		
percent recovery 7		150.07%	#		108.73%			131.06%	#		92.68%			42.37%	#	
percent recovery 12		75.57%			144.65%	#		93.63%			64.22%			72.83%		

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MSL Sample ID	benzo [a] pyrene			indeno [1,2,3-c,d] pyrene			dibenzo [a,h] anthracene			benzo[g,h,i] perylene		
BLANKS												
1790-9ab Blk A	112.84	U	r	137.85	U	r	116.74	U	r	127.43	U	r
1790-9a Blk B	125.40	U	r	153.20	U	r	129.73	U	r	141.61	U	r
BLANK SPIKES												
1790-9ab Blk Spk A	1755.44		r	1458.95		r	1313.65		r	1602.09		r
1790-9a Blk Spk B	4043.96		r	4259.32		r	4067.17		r	3762.39		r
1790-9a-Blk Spk C	3217.64			2616.74			2781.19			3161.24		
Spike concentration A	3000.00			3000.00			3000.00			3000.00		
Spike concentration B	3333.40			3333.40			3333.40			3333.4		
Spike concentration C	3333.40			3333.40			3333.40			3333.4		
percent recovery A	58.51%			48.63%			43.79%			53.40%		
percent recovery B	121.32%	#		127.78%	#		122.01%	#		112.87%		
percent recovery C	96.53%			78.50%			83.43%			94.84%		
MATRIX SPIKES												
1790-9 Average	7674.14			7865.32			1148.13			5511.91		
1790-9ab-7 MS	9995.82			7478.81			3591.30			7593.96		
1790-9a-12 MS	10661.06		r	13883.72		r	4786.74		r	7993.97		r
Spike concentration 7	3080.60			3080.60			3080.60			3080.60		
Spike concentration 12	3184.80			3184.80			3184.80			3184.80		
percent recovery 7	75.36%			-12.55%	#		79.31%			67.59%		
percent recovery 12	93.79%			188.97%	#		114.25%			77.93%		

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MSL Sample ID	Surrogate Recovery d8 naphthalene		d10 Acenaphthene		d10 phenanthrene		d12 chrysene		d12 perylene	
BLANKS										
1790-9ab Blk A	81.60%		80.40%		80.80%		39.10%	#	46.80%	#
1790-9a Blk B	102.90%	r	100.50%	r	106.60%	r	217.70%	# r	141.40%	r
BLANK SPIKES										
1790-9ab Blk Spk A	65.50%		64.40%		63.50%		51.80%		37.70%	#
1790-9a Blk Spk B	95.30%	r	99.90%	r	110.50%	r	147.90%	r	89.60%	r
1790-9a-Blk Spk C	102.80%		102.20%		100.40%		93.00%		76.00%	
Spike concentration A										
Spike concentration B										
Spike concentration C										
percent recovery A										
percent recovery B										
percent recovery C										
MATRIX SPIKES										
1790-9 Average										
1790-9ab-7 MS	83.20%		84.20%		89.60%		97.70%		58.70%	
1790-9a-12 MS	160.60%	# r	167.10%	# r	179.70%	# r	191.20%	# r	149.00%	r
Spike concentration 7										
Spike concentration 12										
percent recovery 7										
percent recovery 12										

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MSL Sample ID	Internal Std. Recovery d8 acenaphthylene		d10 pyrene		d12 benzo [a] pyrene	
BLANKS						
1790-9ab Blk A	151.50%		123.10%		137.30%	
1790-9a Blk B	100.00%	r	80.30%	r	90.30%	r
BLANK SPIKES						
1790-9ab Blk Spk A	146.40%		121.10%		103.30%	
1790-9a Blk Spk B	97.40%	r	75.90%	r	121.40%	r
1790-9a-Blk Spk C	83.70%		58.80%		72.40%	
Spike concentration A						
Spike concentration B						
Spike concentration C						
percent recovery A						
percent recovery B						
percent recovery C						
MATRIX SPIKES						
1790-9 Average						
1790-9ab-7 MS	139.00%		121.90%		143.10%	
1790-9a-12 MS	123.70%	r	95.10%	r	177.80%	r
Spike concentration 7						
Spike concentration 12						
percent recovery 7						
percent recovery 12						

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Units are ng/g

PAH Results

MSL Sample ID	Extraction Date	Days held to extraction	Analysis Date	Storage Temperature	naphthalene		1 methyl napthalene		2 methyl naphthalene		Acenaphthalene		Acenaphthene	
1790-7 Blank1	11/25/2002	0	1/17/2003	NA	30.08	U	72.44		30.08	U	30.08	U	30.08	U
1790-7 Blank 2	12/2/2002	7	1/18/2003	NA	26.77	U	46.75		26.77	U	26.77	U	26.77	U
1790-7-7 MS	12/9/2002	14	1/18/2003	-20C	1011.31		465.73		135.22		632.34		1759.96	
1790-7-12 MS	1/6/2003	42	2/5/2003	-20C	756.00		516.97		143.02		66.38		1121.60	
1790 Spike Blank B	2/17/2003	84	3/21/2003	NA	358.12		27.47	U	27.47	U	407.05		425.33	
1790-7 Spike Blank C	5/12/2003	168	5/20/2003	NA	220.93		55.12		26.94	U	173.12		217.42	
1790-7-1	11/25/2002	0	1/17/2003	-20C	414.60		393.68		109.56		96.25		885.19	
1790-7-2	11/25/2002	0	1/17/2003	-20C	540.55		503.18		142.71		108.30		1233.00	
1790-7-3	11/25/2002	0	1/17/2003	-20C	600.79		573.80		218.59		239.58		2941.64	
1790-7-4	11/25/2002	0	1/18/2003	-20C	400.87		356.90	B	105.84		87.48		943.63	
1790-7-6	12/2/2002	7	1/18/2003	-20C	548.30		469.83	B	129.73		91.81		1127.31	
1790-7-21	12/2/2002	7	1/18/2003	4C	568.24		457.21	B	122.94		59.38		1038.78	
1790-7-22	12/2/2002	7	1/18/2003	4C	365.11		319.23	B	86.74		72.78		786.28	
1790-7-8	12/9/2002	14	1/18/2003	-20C	472.49		424.58	B	129.44		119.12		1152.16	
1790-7-9	12/9/2002	14	1/18/2003	-20C	476.59		462.47	B	136.00		108.16		1191.81	
1790-7-23	12/9/2002	14	1/18/2003	4C	507.28		407.35	B	99.13		92.13		977.36	
1790-7-10	12/23/2002	28	2/5/2003	-20C	1344.00		947.59		224.22		73.08		1459.65	
1790-7-11	12/23/2002	28	2/5/2003	-20C	595.06		413.74		122.58		52.89		1031.89	
1790-7-25	12/23/2002	28	2/5/2003	4C	504.54		368.32		84.34		53.76		1108.38	
1790-7-26	12/23/2002	28	2/5/2003	4C	744.01		349.17		79.28		62.99		911.03	
1790-7-13	1/6/2003	42	2/6/2003	-20C	465.53		399.02		109.03		47.14		868.1	
1790-7-14	1/6/2003	42	2/6/2003	-20C	544.55		466.12		129.48		56.8		1029.91	
1790-7-27	1/6/2003	42	2/6/2003	4C	441.98		319.11		69.96		70.02		866.38	
1790-7-28	1/6/2003	42	2/6/2003	4C	866.39		260.15		58.48		475.89		801.03	
1790-15	2/17/2003	84	3/21/2003	-20C	251.84	E	194	E	60.83	E	68.36		583.81	
1790-16	2/17/2003	84	3/21/2003	-20C	255.26	E	206.11	E	64.68	E	74.83		694.23	
1790-29	2/17/2003	84	3/21/2003	4C	241.9		175.7		46.28		87.78		772.48	
1790-30	2/17/2003	84	3/21/2003	4C	169.48	E	128.31	E	32.17	E	76.45		525.26	
1790-7-17	5/12/2003	168	5/20/2003	-20C	561.87		470.4		133.24		44.49		1112.3	
1790-7-18	5/12/2003	168	5/20/2003	-20C	479.5		417.86		129.75		46.07		1118.02	
1790-7-31	5/12/2003	168	5/21/2003	4C	461.31		300.94		71.34		46.36		232.99	
1790-7-32	5/12/2003	168	5/21/2003	4C	340.76		237.74		56.04		33.33		206.43	

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Units are ng/g

MSL Sample ID	Extraction Date	Days held to extraction	Fluorene		dibenzothiophene		phenanthrene		anthracene		1 methyl phenanthrene		fluoranthene	
1790-7 Blank1	**11/25/2002**	**0**	30.08	U	30.08	U	30.08	U	30.08	U	30.08	U	30.08	U
1790-7 Blank 2	**12/2/2002**	**7**	26.77	U	26.77	U	26.77	U	26.77	U	26.77	U	26.77	U
1790-7-7 MS	**12/9/2002**	**14**	2134.82		505.49		6171.75		3008.51		549.64		8044.54	
1790-7-12 MS	**1/6/2003**	**42**	1301.68		435.50		4635.26		1593.60		389.70		6695.10	
1790 Spike Blank B	**2/17/2003**	**84**	497.85		27.47		500.45		476.33		27.47		559.97	
1790-7 Spike Blank C	**5/12/2003**	**168**	208.63		26.94		232.66		184.66		26.94		218.95	
1790-7-1	**11/25/2002**	**0**	1121.86		367.67		4190.02		1686.64		411.60		6462.21	
1790-7-2	**11/25/2002**	**0**	1554.81		488.07		5412.64		1756.17		477.63		7317.84	
1790-7-3	**11/25/2002**	**0**	3576.40		1684.57		19204.57		3170.17		1321.12		17596.65	
1790-7-4	**11/25/2002**	**0**	1132.80		373.65		3988.23		1234.44		370.78		5733.24	
1790-7-6	**12/2/2002**	**7**	1420.91		445.94		4961.24		1594.90		422.19		6334.23	
1790-7-21	**12/2/2002**	**7**	1338.98		437.27		4893.29		1533.30		474.32		7188.55	
1790-7-22	**12/2/2002**	**7**	985.71		323.55		3540.91		1516.32		377.41		6133.64	
1790-7-8	**12/9/2002**	**14**	1440.18		454.67		5169.25		1709.13		464.60		6824.85	
1790-7-9	**12/9/2002**	**14**	1455.52		446.17		4992.05		1731.91		457.19		6367.32	
1790-7-23	**12/9/2002**	**14**	1184.71		274.33		3413.68		1629.72		471.99		6925.52	
1790-7-10	**12/23/2002**	**28**	1865.24		567.36		6448.62		4607.50		498.64		7489.70	
1790-7-11	**12/23/2002**	**28**	1190.06		385.39		4270.59		1243.26		333.59		6113.67	
1790-7-25	**12/23/2002**	**28**	1156.54		292.87		3462.42		1305.88		417.64		7279.30	
1790-7-26	**12/23/2002**	**28**	952.09		220.85		2222.76		1361.93		376.04		6209.34	
1790-7-13	**1/6/2003**	**42**	1088.4		347.81		3923.44		1185.15		347.05		5376.97	
1790-7-14	**1/6/2003**	**42**	1202.57		349.56		4396.62		1251.94		372.09		6460.04	
1790-7-27	**1/6/2003**	**42**	797.04		210.22		2193.86		1253.47		374.45		6443.24	
1790-7-28	**1/6/2003**	**42**	890.06		135.49		1750.91		1335.66		310.85		6065.62	
1790-15	**2/17/2003**	**84**	924.98		263.77		3286.88		1042.89		304.41		5039.82	
1790-16	**2/17/2003**	**84**	1121.3		312.21		3994.97		1191.33		347.38		5684.69	
1790-29	**2/17/2003**	**84**	772.99		139.69		1760.66		1210.83		435.59		6563.86	
1790-30	**2/17/2003**	**84**	569.63		84.46		1099.66		1829.3		344.3		5635.82	
1790-7-17	**5/12/2003**	**168**	1359.36		400.07		5029.06		1946.81		454.15		6700.98	
1790-7-18	**5/12/2003**	**168**	1256.76		378.64		4385.68		1281.15		389.35		5889.1	
1790-7-31	**5/12/2003**	**168**	245.9		84.93		1006.12		492.24		297.76		2858.61	
1790-7-32	**5/12/2003**	**168**	202.52		70.61		815.84		530.64		286.39		2656.96	

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MSL Sample ID	Extraction Date	Days held to extraction	pyrene		benzo[a] anthracene	chrysene		benzo [b] fluoranthene		benzo [k] fluoranthene		benzo [a] pyrene		indeno [1,2,3-c,d] pyrene	
1790-7 Blank1	**11/25/2002**	**0**	30.08	U	30.08	30.08	U	30.08	U	30.08	U	30.08	U	30.08	U
1790-7 Blank 2	**12/2/2002**	**7**	26.77	U	26.77	26.77	U	26.77	U	26.77	U	26.77	U	26.77	U
1790-7-7 MS	**12/9/2002**	**14**	5950.21		2296.21	2606.94		3110.67	r	3063.93	r	1361.45	r	1423.83	r
1790-7-12 MS	**1/6/2003**	**42**	4752.94		1411.66	1766.36		2014.07		1716.88		713.42		404.42	
1790 Spike Blank B	**2/17/2003**	**84**	527.97		497.14	600.11		581.36		579.20		512.73		475.26	
1790-7 Spike Blank C	**5/12/2003**	**168**	228.92		190.47	207.06		189.13		197.04		163.41		132.50	E
1790-7-1	**11/25/2002**	**0**	4886.71		1714.13	2210.96		2537.48		2501.76		942.67		671.87	
1790-7-2	**11/25/2002**	**0**	5304.42		1626.99	2040.51		2225.11		2192.41		879.51		649.27	r
1790-7-3	**11/25/2002**	**0**	12472.52		2790.85	3323.71		2933.74		2889.37		1177.05		848.43	r
1790-7-4	**11/25/2002**	**0**	4229.30		1473.37	1825.36		2179.77		2148.40		862.20		689.24	r
1790-7-6	**12/2/2002**	**7**	4592.64		1356.69	1735.59		1776.00		1750.55		719.68		546.91	r
1790-7-21	**12/2/2002**	**7**	5180.74		1551.61	2181.18		2144.13		2113.28		849.18		683.92	
1790-7-22	**12/2/2002**	**7**	4503.45		1426.87	1933.55		1902.71		1877.41		771.37		643.69	r
1790-7-8	**12/9/2002**	**14**	4967.59		1612.01	1992.81		1901.67	r	1873.12	r	768.59	r	646.88	r
1790-7-9	**12/9/2002**	**14**	4631.72		1461.18	1821.34		1758.53	r	1734.44	r	706.70	r	580.14	r
1790-7-23	**12/9/2002**	**14**	5018.87		1616.48	1918.12		1948.57	r	1921.20	r	793.53	r	671.71	r
1790-7-10	**12/23/2002**	**28**	5315.51		1465.52	1917.08		2024.18		1727.24		706.98		356.75	
1790-7-11	**12/23/2002**	**28**	4309.58		1343.52	1773.36		1913.26		1629.18		671.90		378.89	
1790-7-25	**12/23/2002**	**28**	5264.50		1627.69	1944.41		2299.81		1962.53		797.85		440.86	
1790-7-26	**12/23/2002**	**28**	4545.92		1363.11	1684.47		1960.96		1670.07		684.82		393.14	
1790-7-13	**1/6/2003**	**42**	3870.80		1148.56	1432.65		1645.53		1399.59		591.47		326.04	
1790-7-14	**1/6/2003**	**42**	4685.71		1405.7	1757.31		2129.9		1815.66		717.66		418.05	
1790-7-27	**1/6/2003**	**42**	4601.16		1346.67	1703.81		1928.87		1640.08		666.7		368.15	
1790-7-28	**1/6/2003**	**42**	4854.68		1906.24	2208.55		2925.32		2506.68		1113.2		886.57	
1790-15	**2/17/2003**	**84**	3500.82		1185.63	1544.43		1889.19		1883.85		648.89		493.35	
1790-16	**2/17/2003**	**84**	3969.53		1312.3	1657.89		1854.64		1846.73		774.79		388.66	
1790-29	**2/17/2003**	**84**	4855.97		1302.99	1844.96		1972.67		1960.13		792.27		398.6	
1790-30	**2/17/2003**	**84**	4138.68		1431.05	2091.06		2024.1		2019.26		806.31		417.31	
1790-7-17	**5/12/2003**	**168**	4856.32		1412.87	1800.09		1483.94		492.82		744		464.73	
1790-7-18	**5/12/2003**	**168**	4330.06		1184.24	1776.22		1316.61		438.63		749.38		656.52	
1790-7-31	**5/12/2003**	**168**	4525.13		1386.34	1856.34		1539.25		517.94		760.98		530.57	
1790-7-32	**5/12/2003**	**168**	4160.66		1097.79	1389.18		1179.54		393.84		612.39		377.86	

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MSL Sample ID	Extraction Date	Days held to extraction	dibenzo [a,h] anthracene		benzo [g,h,i] perylene	
1790-7 Blank1	**11/25/2002**	**0**	30.08	U	30.08	U
1790-7 Blank 2	**12/2/2002**	**7**	26.77	U	26.77	U
1790-7-7 MS	**12/9/2002**	**14**	1124.54	r	1372.52	r
1790-7-12 MS	**1/6/2003**	**42**	161.52		427.05	
1790 Spike Blank B	**2/17/2003**	**84**	412.66		372.22	
1790-7 Spike Blank C	**5/12/2003**	**168**	110.56	E	95.89	E
1790-7-1	**11/25/2002**	**0**	330.48		650.95	
1790-7-2	**11/25/2002**	**0**	323.50	r	600.97	r
1790-7-3	**11/25/2002**	**0**	85.84	r	784.55	r
1790-7-4	**11/25/2002**	**0**	86.61	r	661.70	r
1790-7-6	**12/2/2002**	**7**	271.76	r	515.55	r
1790-7-21	**12/2/2002**	**7**	309.10		674.31	
1790-7-22	**12/2/2002**	**7**	309.48	r	605.58	r
1790-7-8	**12/9/2002**	**14**	324.75	r	610.77	r
1790-7-9	**12/9/2002**	**14**	287.99	r	543.59	r
1790-7-23	**12/9/2002**	**14**	328.92	r	617.80	r
1790-7-10	**12/23/2002**	**28**	136.90		366.24	
1790-7-11	**12/23/2002**	**28**	146.66		400.85	
1790-7-25	**12/23/2002**	**28**	171.41		461.66	
1790-7-26	**12/23/2002**	**28**	154.12		416.72	
1790-7-13	**1/6/2003**	**42**	120.36		347.92	
1790-7-14	**1/6/2003**	**42**	161.25		448.72	
1790-7-27	**1/6/2003**	**42**	147.77		391.87	
1790-7-28	**1/6/2003**	**42**	640.21		932.72	
1790-15	**2/17/2003**	**84**	143.83		574.36	
1790-16	**2/17/2003**	**84**	126.4		403.84	
1790-29	**2/17/2003**	**84**	134.31		437.68	
1790-30	**2/17/2003**	**84**	142.76		450.97	
1790-7-17	**5/12/2003**	**168**	103.7		357.1	
1790-7-18	**5/12/2003**	**168**	133.15		557.14	
1790-7-31	**5/12/2003**	**168**	121.29		388.35	
1790-7-32	**5/12/2003**	**168**	81.78		273.17	

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Surrogate PR

MSL Sample ID	Extraction Date	Days held to extraction	d8 naphthalene	d10 Acenaphthene	d10 phenanthrene	d12 chrysene	d12 perylene	d14 dibenzo (a,h,) anthracene
1790-7 Blank1	**11/25/2002**	**0**	97.13%	95.75%	108.25%	87.38%	58.50%	74.75%
1790-7 Blank 2	**12/2/2002**	**7**	67.13%	67.75%	72.00%	70.88%	42.25% #	74.13%
1790-7-7 MS	**12/9/2002**	**14**	91.00%	96.75%	111.63%	117.63%	60.38%	195.25% #
1790-7-12 MS	**1/6/2003**	**42**	88.25%	85.63%	92.50%	100.75%	71.13%	112.38%
1790 Spike Blank B	**2/17/2003**	**84**	63.38%	74.50%	95.13%	96.00%	101.25%	76.63%
1790-7 Spike Blank C	**5/12/2003**	**168**	73.38%	77.25%	87.63%	79.00%	57.88%	46.50% #
1790-7-1	**11/25/2002**	**0**	58.38%	59.63%	79.25%	106.88%	58.38%	144.88%
1790-7-2	**11/25/2002**	**0**	91.00%	94.75%	110.50%	111.50%	60.75%	159.88% #
1790-7-3	**11/25/2002**	**0**	90.75%	91.13%	109.00%	118.63%	61.75%	177.88% #
1790-7-4	**11/25/2002**	**0**	64.88%	65.75%	77.00%	99.13%	55.13%	152.75% #
1790-7-6	**12/2/2002**	**7**	82.13%	86.00%	102.88%	99.88%	53.00%	144.88%
1790-7-21	**12/2/2002**	**7**	83.25%	85.00%	98.75%	104.25%	54.63%	144.25%
1790-7-22	**12/2/2002**	**7**	68.38%	73.13%	89.38%	106.25%	58.25%	167.50% #
1790-7-8	**12/9/2002**	**14**	86.63%	91.88%	109.50%	116.88%	58.50%	190.00% #
1790-7-9	**12/9/2002**	**14**	88.50%	93.50%	108.38%	112.13%	55.50%	176.38% #
1790-7-23	**12/9/2002**	**14**	81.13%	86.50%	100.38%	106.50%	54.88%	179.50% #
1790-7-10	**12/23/2002**	**28**	99.13%	95.63%	100.63%	96.00%	64.50%	90.00%
1790-7-11	**12/23/2002**	**28**	86.75%	84.00%	90.63%	98.13%	70.00%	108.25%
1790-7-25	**12/23/2002**	**28**	94.00%	91.88%	100.25%	104.75%	74.13%	113.13%
1790-7-26	**12/23/2002**	**28**	87.50%	84.50%	92.13%	98.88%	70.50%	109.00%
1790-7-13	**1/6/2003**	**42**	72.50%	70.63%	75.38%	77.38%	53.38%	79.13%
1790-7-14	**1/6/2003**	**42**	94.25%	90.13%	96.13%	102.00%	71.50%	111.25%
1790-7-27	**1/6/2003**	**42**	84.13%	84.13%	90.88%	97.13%	68.00%	101.38%
1790-7-28	**1/6/2003**	**42**	82.00%	80.50%	90.75%	101.25%	71.88%	116.50%
1790-15	**2/17/2003**	**84**	40.00% #	51.00%	68.13%	73.38%	90.88%	85.00%
1790-16	**2/17/2003**	**84**	43.75% #	57.38%	81.50%	85.63%	96.25%	95.13%
1790-29	**2/17/2003**	**84**	54.75%	72.13%	99.13%	91.88%	98.88%	101.13%
1790-30	**2/17/2003**	**84**	41.50% #	54.25%	78.38%	84.25%	96.88%	96.75%
1790-7-17	**5/12/2003**	**168**	83.88%	81.88%	92.50%	93.13%	64.38%	92.63%
1790-7-18	**5/12/2003**	**168**	77.38%	76.25%	85.13%	85.13%	59.88%	87.50%
1790-7-31	**5/12/2003**	**168**	84.25%	84.00%	93.25%	98.38%	68.75%	111.00%
1790-7-32	**5/12/2003**	**168**	73.25%	74.00%	82.88%	81.63%	55.25%	77.63%

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MSL Sample ID	Extraction Date	Days held to extraction	Internal Standard PR d8 acenaphthylene	d10 pyrene	d12 benzo [a] pyrene	
1790-7 Blank1	**11/25/2002**	**0**	95.40%	110.70%	88.10%	
1790-7 Blank 2	**12/2/2002**	**7**	106.00%	117.80%	134.50%	
1790-7-7 MS	**12/9/2002**	**14**	111.20%	128.80%	215.50%	#
1790-7-12 MS	**1/6/2003**	**42**	126.20%	128.10%	148.20%	
1790 Spike Blank B	**2/17/2003**	**84**	93.00%	100.10%	92.70%	
1790-7 Spike Blank C	**5/12/2003**	**168**	102.40%	110.10%	101.70%	
1790-7-1	**11/25/2002**	**0**	97.30%	115.80%	160.00%	
1790-7-2	**11/25/2002**	**0**	105.30%	121.30%	178.40%	
1790-7-3	**11/25/2002**	**0**	101.20%	115.40%	181.40%	
1790-7-4	**11/25/2002**	**0**	104.40%	122.50%	181.80%	
1790-7-6	**12/2/2002**	**7**	102.60%	119.10%	178.10%	
1790-7-21	**12/2/2002**	**7**	102.80%	118.90%	183.90%	
1790-7-22	**12/2/2002**	**7**	108.20%	121.70%	189.20%	
1790-7-8	**12/9/2002**	**14**	101.30%	122.20%	212.20%	#
1790-7-9	**12/9/2002**	**14**	110.40%	131.30%	227.00%	#
1790-7-23	**12/9/2002**	**14**	115.40%	137.20%	234.10%	#
1790-7-10	**12/23/2002**	**28**	110.00%	115.80%	129.10%	
1790-7-11	**12/23/2002**	**28**	120.40%	123.10%	140.60%	
1790-7-25	**12/23/2002**	**28**	116.50%	119.60%	136.50%	
1790-7-26	**12/23/2002**	**28**	121.70%	123.60%	139.90%	
1790-7-13	**1/6/2003**	**42**	119.50%	121.20%	139.40%	
1790-7-14	**1/6/2003**	**42**	119.90%	119.80%	135.40%	
1790-7-27	**1/6/2003**	**42**	120.20%	119.10%	136.50%	
1790-7-28	**1/6/2003**	**42**	128.40%	125.80%	147.90%	
1790-15	**2/17/2003**	**84**	98.00%	107.30%	99.40%	
1790-16	**2/17/2003**	**84**	94.60%	104.90%	98.00%	
1790-29	**2/17/2003**	**84**	86.50%	101.60%	92.30%	
1790-30	**2/17/2003**	**84**	95.00%	107.60%	98.10%	
1790-7-17	**5/12/2003**	**168**	105.90%	113.70%	113.70%	
1790-7-18	**5/12/2003**	**168**	113.30%	119.20%	122.40%	
1790-7-31	**5/12/2003**	**168**	112.20%	119.30%	125.60%	
1790-7-32	**5/12/2003**	**168**	108.60%	116.00%	116.40%	

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MSL Sample ID	Extraction Date	Days held to extraction	Analysis Date	Storage Temperature	PAH Results naphthalene		1 methyl napthalene		2 methyl naphthalene	
BLANKS										
1790-7 Blank1	**11/25/2002**	**0**	**1/17/2003**	**NA**	30.08	U	72.44		30.08	U
1790-7 Blank 2	**12/2/2002**	**7**	**1/18/2003**	**NA**	26.77	U	46.75		26.77	U
BLANK SPIKES										
1790 Spike Blank B	**2/17/2003**	**84**	**3/21/2003**	**NA**	358.12		27.47	U	27.47	U
1790-7 Spike Blank C	**5/12/2003**	**168**	**5/20/2003**	**NA**	220.93		55.12		26.94	U
BS B concentration					576.70		NA		NA	
BS C concentration					538.80		NA		NA	
PR BS B					62.10%		NA		NA	
PR BS C					41.00%		NA		NA	
MATRIX SPIKES										
1790-7-7 MS	**12/9/2002**	**14**	**1/18/2003**	**-20C**	1011.31		465.73	B	135.22	
1790-7-12 MS	**1/6/2003**	**42**	**2/5/2003**	**-20C**	756.00		516.97		143.02	
1790-7 (ave)					506.26		385.48		105.86	
1790-7-7MS concentration					495.00		NA		NA	
1790-7-12MS concentration					469.50		NA		NA	
PR 7-MS					102.02%		NA		NA	
PR 12-MS					53.19%		NA		NA	

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MSL Sample ID	Extraction Date	Days held to extraction	Acenaphthalene		Acenaphthene		Fluorene		dibenzothiophene	
BLANKS										
1790-7 Blank1	**11/25/2002**	**0**	30.08	U	30.08	U	30.08	U	30.08	U
1790-7 Blank 2	**12/2/2002**	**7**	26.77	U	26.77	U	26.77	U	26.77	U
BLANK SPIKES										
1790 Spike Blank B	**2/17/2003**	**84**	407.05		425.33		497.85		27.47	U
1790-7 Spike Blank C	**5/12/2003**	**168**	173.12		217.42		208.63		26.94	U
BS B concentration			576.70		576.70		576.70		NA	
BS C concentration			538.80		538.80		538.80		NA	
PR BS B			70.58%		73.75%		86.33%		NA	
PR BS C			32.13%	#	40.35%		38.72%	#	NA	
MATRIX SPIKES										
1790-7-7 MS	**12/9/2002**	**14**	632.34		1759.96		2134.82		505.49	
1790-7-12 MS	**1/6/2003**	**42**	66.38		1121.60		1301.68		435.50	
1790-7 (ave)			94.05		984.58		1184.90		366.92	
1790-7-7MS concentration			495.00		495.00		495.00		NA	
1790-7-12MS concentration			469.50		469.50		469.50		NA	
PR 7-MS			108.74%		156.63%	#	191.88%	#	NA	
PR 12-MS			-5.89%	#	29.19%	#	24.87%	#	NA	

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MSL Sample ID	Extraction Date	Days held to extraction	phenanthrene		anthracene		1 methyl phenanthrene		fluoranthene	
BLANKS										
1790-7 Blank1	**11/25/2002**	**0**	30.08	U	30.08	U	30.08	U	30.08	U
1790-7 Blank 2	**12/2/2002**	**7**	26.77	U	26.77	U	26.77	U	26.77	U
BLANK SPIKES										
1790 Spike Blank B	**2/17/2003**	**84**	500.45		476.33		27.47	U	559.97	
1790-7 Spike Blank C	**5/12/2003**	**168**	232.66		184.66		26.94	U	218.95	
BS B concentration			576.70		576.70		NA		576.70	
BS C concentration			538.80		538.80		NA		538.80	
PR BS B			86.78%		82.60%		NA		97.10%	
PR BS C			43.18%		34.27%	#	NA		40.64%	
MATRIX SPIKES										
1790-7-7 MS	**12/9/2002**	**14**	6171.75		3008.51		549.64		8044.54	
1790-7-12 MS	**1/6/2003**	**42**	4635.26		1593.60		389.70		6695.10	
1790-7 (ave)			4223.61		1562.80		428.40		6513.53	
1790-7-7MS concentration			495.00		495.00		NA		495.00	
1790-7-12MS concentration			469.50		469.50		NA		469.50	
PR 7-MS			393.52%	#	292.03%	#	NA		309.26%	#
PR 12-MS			87.68%		6.56%	#	NA		38.67%	#

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MSL Sample ID	Extraction Date	Days held to extraction	pyrene		benzo[a] anthracene		chrysene		benzo [b] fluoranthene		benzo [k] fluoranthene	
BLANKS												
1790-7 Blank1	**11/25/2002**	**0**	30.08	U	30.08	U	30.08	U	30.08	U	30.08	U
1790-7 Blank 2	**12/2/2002**	**7**	26.77	U	26.77	U	26.77	U	26.77	U	26.77	U
BLANK SPIKES												
1790 Spike Blank B	**2/17/2003**	**84**	527.97		497.14		600.11		581.36		579.20	
1790-7 Spike Blank C	**5/12/2003**	**168**	228.92		190.47		207.06		189.13		197.04	
BS B concentration			576.70		576.70		576.70		576.70		576.70	
BS C concentration			538.80		538.80		538.80		538.80		538.80	
PR BS B			91.55%		86.20%		104.06%		100.81%		100.43%	
PR BS C			42.49%		35.35%	#	38.43%	#	35.10%	#	36.57%	#
MATRIX SPIKES												
1790-7-7 MS	**12/9/2002**	**14**	5950.21		2296.21		2606.94		3110.67	r	3063.93	r
1790-7-12 MS	**1/6/2003**	**42**	4752.94		1411.66		1766.36		2014.07		1716.88	
1790-7 (ave)			4906.65		1482.71		1898.65		1976.75		1727.16	
1790-7-7MS concentration			495.00		495.00		495.00		495.00		495.00	
1790-7-12MS concentration			469.50		469.50		469.50		469.50		469.50	
PR 7-MS			210.80%	#	164.33%	#	143.07%	#	229.05%	#	270.03%	#
PR 12-MS			-32.74%	#	-15.13%	#	-28.18%	#	7.95%	#	-2.19%	#

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MSL Sample ID	Extraction Date	Days held to extraction	benzo [a] pyrene		indeno [1,2,3-c,d] pyrene		dibenzo [a,h] anthracene		benzo [g,h,i] perylene		Surrogate PR d8 naphthalene
BLANKS											
1790-7 Blank1	**11/25/2002**	**0**	30.08	U	30.08	U	30.08	U	30.08	U	97.13%
1790-7 Blank 2	**12/2/2002**	**7**	26.77	U	26.77	U	26.77	U	26.77	U	67.13%
BLANK SPIKES											
1790 Spike Blank B	**2/17/2003**	**84**	512.73		475.26		412.66		372.22		63.38%
1790-7 Spike Blank C	**5/12/2003**	**168**	163.41		132.50	E	110.56	E	95.89	E	73.38%
BS B concentration			576.70		576.70		576.70		576.70		
BS C concentration			538.80		538.80		538.80		538.80		
PR BS B			88.91%		82.41%		71.56%		64.54%		
PR BS C			30.33%	#	24.59%	#	20.52%	#	17.80%	#	
MATRIX SPIKES											
1790-7-7 MS	**12/9/2002**	**14**	1361.45	r	1423.83	r	1124.54	r	1372.52	r	91.00%
1790-7-12 MS	**1/6/2003**	**42**	713.42		404.42		161.52		427.05		88.25%
1790-7 (ave)			781.16		535.70		204.78		518.27		
1790-7-7MS concentration			495.00		495.00		495.00		495.00		
1790-7-12MS concentration			469.50		469.50		469.50		469.50		
PR 7-MS			117.22%		179.40%	#	185.79%	#	172.56%	#	
PR 12-MS			-14.43%	#	-27.96%	#	-9.21%	#	-19.43%	#	

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MSL Sample ID	Extraction Date	Days held to extraction	d10 Acenaphthene	d10 phenanthrene	d12 chrysene	d12 perylene	d14 dibenzo (a,h,) anthracene
BLANKS							
1790-7 Blank1	**11/25/2002**	**0**	95.75%	108.25%	87.38%	58.50%	74.75%
1790-7 Blank 2	**12/2/2002**	**7**	67.75%	72.00%	70.88%	42.25% #	74.13%
BLANK SPIKES							
1790 Spike Blank B	**2/17/2003**	**84**	74.50%	95.13%	96.00%	101.25%	76.63%
1790-7 Spike Blank C	**5/12/2003**	**168**	77.25%	87.63%	79.00%	57.88%	46.50% #
BS B concentration							
BS C concentration							
PR BS B							
PR BS C							
MATRIX SPIKES							
1790-7-7 MS	**12/9/2002**	**14**	96.75%	111.63%	117.63%	60.38%	195.25% #
1790-7-12 MS	**1/6/2003**	**42**	85.63%	92.50%	100.75%	71.13%	112.38%
1790-7 (ave)							
1790-7-7MS concentration							
1790-7-12MS concentration							
PR 7-MS							
PR 12-MS							

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MSL Sample ID	Extraction Date	Analysis Date	Days held from Extraction to Analysis	Storage Temperature	PAH Results naphthalene		Acenaphthylene		Acenaphthene	
1790-8b-Blk Spk A	**12/8/2003**	**1/22/2004**	**45**	**NA**	70.53		61.48		68.13	
1790-8b Blk A	**12/15/2003**	**1/23/2004**	**39**	**NA**	0.52		0.51	U	0.57	U
1790-8b Blk B	**1/5/2004**	**1/23/2004**	**18**	**NA**	0.46	U	0.51	U	0.57	U
1790-8ab Blk Spk B	**3/1/2004**	**4/17/2004**	**47**	**NA**	45.18		49.09		52.07	
1790-8b Blk Spk C	**5/24/2004**	**6/17/2004**	**24**	**NA**	71.81		65.91		71.34	
1790-8b-7 Spk	**12/22/2003**	**1/23/2004**	**32**	**-20C**	130.94		96.10		179.21	
1790-8b-12 spk	**1/19/2004**	**1/23/2004**	**4**	**-20C**	151.97		68.51		166.57	
1790-8b-1	**12/8/2003**	**1/22/2004**	**45**	**-20C**	42.52		4.28		45.87	
1790-8b-2	**12/8/2003**	**1/22/2004**	**45**	**-20C**	87.81		9.20		108.70	
1790-8b-3	**12/8/2003**	**1/22/2004**	**45**	**-20C**	91.32		10.75		119.29	
1790-8b-4 (20)	**12/8/2003**	**1/23/2004**	**46**	**-20C**	103.22		8.34		113.94	
1790-8b-5	**12/15/2003**	**1/23/2004**	**39**	**-20C**	71.01		10.20		96.18	
1790-8b-6	**12/15/2003**	**1/23/2004**	**39**	**-20C**	64.03	r	9.92		87.52	
1790-8b-21	**12/15/2003**	**1/23/2004**	**39**	**4C**	65.27		8.92		86.58	
1790-8b-22	**12/15/2003**	**1/23/2004**	**39**	**4C**	67.70		9.74		93.60	
1790-8b-8	**12/22/2003**	**1/23/2004**	**32**	**-20C**	94.83		13.04		99.33	
1790-8b-9	**12/22/2003**	**1/23/2004**	**32**	**-20C**	86.59		14.08		107.12	
1790-8b-23	**12/22/2003**	**1/23/2004**	**32**	**4C**	56.73		9.03		90.57	
1790-8b-24	**12/22/2003**	**1/23/2004**	**32**	**4C**	78.27		10.39		100.89	
1790-8b-10	**1/5/2004**	**1/23/2004**	**18**	**-20C**	62.91		7.98		71.84	
1790-8b-11	**1/5/2004**	**1/23/2004**	**18**	**-20C**	53.78		9.8		77.89	
1790-8b-25	**1/5/2004**	**1/23/2004**	**18**	**4C**	85.01		7.54		88.65	
1790-8b-26	**1/5/2004**	**1/23/2004**	**18**	**4C**	74.05		8.47		91.23	
1790-8b-13	**1/19/2004**	**1/23/2004**	**4**	**-20C**	80.38		8.82		92.54	
1790-8b-14	**1/19/2004**	**1/23/2004**	**4**	**-20C**	78.83		10.69		95.32	
1790-8b-27	**1/19/2004**	**1/23/2004**	**4**	**4C**	95.09		9.72		110.05	
1790-8b-28	**1/19/2004**	**1/23/2004**	**4**	**4C**	66.3		6.55		75.19	
1790-8ab-15	**3/1/2004**	**4/17/2004**	**47**	**-20C**	83.41		10.77		104.28	
1790-8ab-16	**3/1/2004**	**4/17/2004**	**47**	**-20C**	46.77		8.56		83.71	
1790-8ab-29	**3/1/2004**	**4/17/2004**	**47**	**4C**	61.86		8.41		94.48	
1790-8ab-30	**3/1/2004**	**4/17/2004**	**47**	**4C**	69.46		8.82		93.94	
1790-8b-17	**5/24/2004**	**6/18/2004**	**25**	**-20C**	142.49	r	14.78	r	145.28	
1790-8b-18	**5/24/2004**	**6/18/2004**	**25**	**-20C**	133.53	r	13.73	r	122.72	
1790-8b-31	**5/24/2004**	**6/18/2004**	**25**	**4C**	83.43	r	11.88	r	119.39	
1790-8b-32	**5/24/2004**	**6/18/2004**	**25**	**4C**	72.27	r	10.02	r	97.77	

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Sequim-1 PAH Data

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MSL Sample ID	Fluorene	dibenzothiophene	phenanthrene	anthracene	fluoranthene	pyrene	benzo[a] anthracene
1790-8b-Blk Spk A	55.40	9.26	63.73	54.29	69.56	78.23	51.61
1790-8b Blk A	0.66	2.71	16.29	1.52	29.73	12.00	0.87
1790-8b Blk B	0.37 U	2.22 U	2.24 U	0.55 U	4.61 U	2.22 U	0.84
1790-8ab Blk Spk B	54.75	51.73	52.01	51.52	80.41	70.33	89.07
1790-8b Blk Spk C	75.41	70.86	79.70	82.31	87.07	80.13	86.11
1790-8b-7 Spk	178.61	65.60	226.43	195.46	280.54	254.81	217.18
1790-8b-12 spk	161.43	70.95	238.02	157.21	293.86	264.44	228.89
1790-8b-1	44.17	3.58	79.02	40.03	103.91	83.93	59.83
1790-8b-2	99.15	6.20	175.56	79.18	171.33	156.29	102.27
1790-8b-3	116.11	7.08	200.30	97.22	185.16	161.45	120.27
1790-8b-4 (20)	100.68	6.81	191.49	69.96	164.29	152.99	93.38
1790-8b-5	96.49	6.26	169.96	104.03	188.89	164.45	143.43
1790-8b-6	88.39	5.42	147.35	89.88	171.29	147.09	129.64
1790-8b-21	85.14	5.54	143.66	88.99	187.45	161.98	148.56
1790-8b-22	93.24	5.53	150.63	95.48	179.49	154.13	133.61
1790-8b-8	91.59	6.11	161.94	104.1	202.7	176.34	152.98
1790-8b-9	106.89	6.35	164.9	112.08	210	183.83	162.63
1790-8b-23	90.55	5.29	149.42	88.08	192.27	168.56	149.33
1790-8b-24	94.16	5.52	154.82	94.12	191.02	167.88	130.98
1790-8b-10	71.1	4.31	119.27	72.57	154.41	132.82	105.22
1790-8b-11	79.09	4.76	128.67	79.59	165.54	143.09	122.38
1790-8b-25	78.57	5	140.81	82.23	172.87	151.96	117.8
1790-8b-26	89.28	5.19	143.71	85.23	184.24	156.48	123.98
1790-8b-13	91.05	5.68	151.82	87.32	179.79	154.98	128.02
1790-8b-14	97.39	5.56	150.62	96.09	175.25	151.95	126.94
1790-8b-27	112.64	7.08	183.15	108.69	216.52	187.65	150.72
1790-8b-28	74.5	4.56	121.46	69.61	142.59	123.03	93.75
1790-8ab-15	107.84	6.29	154.54	81.4	215.76	169.9	159.54
1790-8ab-16	96.46	6.39	140.67	83.91	190.5	150.79	152.96
1790-8ab-29	101.53	6.18	145.22	80.69	196.88	156.57	149.28
1790-8ab-30	100.38	6.07	142.11	79.43	204.85	163.26	156.67
1790-8b-17 r	143.27 r	6.98 r	229.2 r	118.95 r	228.93 r	185.25 r	88.86
1790-8b-18 r	121.07 r	7.01 r	230.51 r	123.79 r	259.9 r	207.07 r	107
1790-8b-31 r	126.61 r	7.49 r	198.19 r	120.92 r	221.98 r	187.67 r	169.48
1790-8b-32 r	107.66 r	6.49 r	186.5 r	108.22 r	218.61 r	182.27 r	162.43

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MSL Sample ID		chrysene		benzo [b] fluoranthene		benzo [a] pyrene		indeno [1,2,3-c,d] pyrene		dibenzo [a,h] anthracene	
1790-8b-Blk Spk A		55.91		56.39	r	57.76	r	50.34	r	38.95	r
1790-8b Blk A		1.54		0.77	U r	0.84	U r	1.02	U r	0.86	U r
1790-8b Blk B	U	0.81	U	0.77	U	0.84	U	1.02	U	0.86	U
1790-8ab Blk Spk B		66.64		66.17		52.87		74.00		59.43	
1790-8b Blk Spk C		83.24		71.87		73.26		64.40		69.45	
1790-8b-7 Spk		232.65		169.44	E	175.18	E	58.75	E	168.52	E
1790-8b-12 spk		232.99		166.99		147.66		57.28		136.11	
1790-8b-1		66.71		39.99		35.82		2.10		34.40	
1790-8b-2		119.05		99.47		80.00		4.04		65.08	
1790-8b-3		141.14		108.52		84.04		4.99		86.64	
1790-8b-4 (20)		116.67		116.91		81.96		4.33		70.86	
1790-8b-5		153.03		111.74	E	98.83	E	4.31	E	90.89	E
1790-8b-6		138.15		108.33	E	90.82	E	4.06	E	86.90	E
1790-8b-21		157.29		124.31	E	104.28	E	4.69	E	99.12	E
1790-8b-22		140.85		114.71	E	98.26	E	4.16	E	98.56	E
1790-8b-8		169		138.55	E	122.89	E	5.17	E	110.2	E
1790-8b-9		177.53		137.88	E	124.65	E	5.11	E	124.1	E
1790-8b-23		159.73		134.4	E	112.11	E	5.04	E	98.16	E
1790-8b-24		142.86		113.35	E	89.51	E	4.18	E	71.63	E
1790-8b-10		111.22		90.43		75.51		3		54.57	
1790-8b-11		130.29		106.58		91.61		4.12		71.94	
1790-8b-25		127.78		98.86		82.97		3.33		62.87	
1790-8b-26		135.26		105.24		84.78		3.93		66.81	
1790-8b-13		137.2		99.4		88.35		4.51		85.98	
1790-8b-14		133.56		98.06		91		4.3		89.34	
1790-8b-27		162.92		124.92		107.9		5.66		98.05	
1790-8b-28		102.34		79.27		62.64		2.79		52.68	
1790-8ab-15		136.97		185.14		118		7.68		94.98	
1790-8ab-16		130.35		148.4		100.96		6.85		82.32	
1790-8ab-29		128.79		162.17		108.92		7.75		93.85	
1790-8ab-30		132.85		195.98		128.03		9.07		106.84	
1790-8b-17	r	105.09	r	99.48	r	58.99	r	1.08	r	16.13	r
1790-8b-18	r	122.62	r	115.8	r	68.8	r	1.32	r	20.78	r
1790-8b-31	r	172.93	r	198.45	r	145.78	r	4.63	r	78.65	r
1790-8b-32	r	164.39	r	196.12	r	131.43	r	4.24	r	72.68	r

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			Surrogate Recovery								
MSL Sample ID	benzo[g,h,i] perylene		d8 naphthalene		d10 Acenaphthene		d10 phenanthrene		d12 chrysene		d12 perylene
1790-8b-Blk Spk A	55.78	r	104.00%		94.30%		93.70%		81.60%		65.80%
1790-8b Blk A	0.94 U	r	62.00%		66.50%		83.70%		112.50%		79.70%
1790-8b Blk B	0.94 U		66.70%		69.70%		78.70%		92.50%		73.50%
1790-8ab Blk Spk B	49.49		76.30%		83.80%		92.00%		128.00%		77.10%
1790-8b Blk Spk C	70.58		98.80%		100.20%		115.30%		128.70%		120.40%
1790-8b-7 Spk	157.03	E	68.60%		74.90%		90.20%		110.90%		91.50%
1790-8b-12 spk	135.07		86.70%		90.50%		103.70%		122.90%		88.90%
1790-8b-1	34.46		64.30%		65.50%		75.50%		96.60%		67.30%
1790-8b-2	82.08		87.00%		86.30%		95.70%		86.40%		59.90%
1790-8b-3	95.43		99.20%		100.00%		123.50%		125.50%		83.50%
1790-8b-4 (20)	95.38		93.80%		92.40%		108.90%		87.40%		60.70%
1790-8b-5	88.93	E	65.50%		68.40%		94.20%		106.30%		80.60%
1790-8b-6	83.97	E	60.70%		66.30%		85.80%		95.60%		73.10%
1790-8b-21	95.06	E	60.90%		64.40%		81.80%		105.80%		82.20%
1790-8b-22	95.44	E	70.20%		73.80%		89.50%		103.90%		82.60%
1790-8b-8	91.53	E	74.20%		79.20%		95.00%		111.30%		92.80%
1790-8b-9	102.82	E	73.60%		78.60%		93.80%		116.30%		91.70%
1790-8b-23	77.54	E	62.20%		76.70%		90.10%		113.20%		89.60%
1790-8b-24	54.94	E	80.30%		82.20%		92.80%		103.10%		77.40%
1790-8b-10	47.56		51.90%		54.60%		66.80%		74.60%		59.60%
1790-8b-11	65.52		57.50%		61.90%		75.30%		89.80%		71.60%
1790-8b-25	52.64		67.80%		68.90%		77.60%		84.20%		65.10%
1790-8b-26	61.85		67.50%		71.20%		82.60%		93.50%		72.90%
1790-8b-13	84.12		70.90%		76.00%		93.90%		111.80%		85.70%
1790-8b-14	86.36		73.70%		78.10%		91.50%		106.90%		82.30%
1790-8b-27	98.35		86.70%		90.30%		107.80%		122.90%		95.60%
1790-8b-28	52.55		83.20%		84.70%		95.40%		106.10%		81.10%
1790-8ab-15	86.96		81.80%		87.60%		93.90%		109.70%		83.00%
1790-8ab-16	76.01		60.10%		72.10%		86.10%		112.20%		77.30%
1790-8ab-29	89.21		75.50%		85.00%		94.70%		114.40%		82.00%
1790-8ab-30	96.6		71.20%		79.80%		86.10%		105.90%		83.90%
1790-8b-17	11.54	r	116.20%	r	120.50%	r	131.00%	r	75.50%	r	43.40%
1790-8b-18	14.31	r	100.70%	r	107.20%	r	121.40%	r	71.30%	r	40.00%
1790-8b-31	62.99	r	100.70%	r	106.60%	r	114.30%	r	112.90%	r	93.10%
1790-8b-32	51.39	r	61.10%	r	80.70%	r	100.30%	r	106.00%	r	82.60%

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MSL Sample ID		Internal Std. Recovery d8 acenaphthylene		d10 pyrene		d12 benzo [a] pyrene		
1790-8b-Blk Spk A		81.30%		64.80%		47.40%	#	
1790-8b Blk A		174.40%		144.60%		219.70%	#	
1790-8b Blk B		171.60%		139.90%		168.40%		
1790-8ab Blk Spk B		106.70%		92.30%		142.70%		
1790-8b Blk Spk C		85.90%		76.20%		73.30%		
1790-8b-7 Spk		187.10%		149.70%		176.70%		
1790-8b-12 spk		133.10%		115.40%		149.00%		
1790-8b-1		168.10%		135.80%		191.50%		
1790-8b-2		109.50%		120.50%		118.20%		
1790-8b-3		118.80%		135.90%		156.90%		
1790-8b-4 (20)		118.10%		132.40%		108.20%		
1790-8b-5		182.60%		178.60%		233.30%	#	
1790-8b-6		208.20%	#	189.00%		240.00%	#	
1790-8b-21		165.90%		142.40%		179.70%		
1790-8b-22		148.20%		123.10%		149.80%		
1790-8b-8		139.40%		113.50%		131.40%		
1790-8b-9		146.10%		118.70%		144.10%		
1790-8b-23		199.60%		163.90%		194.30%		
1790-8b-24		144.90%		119.50%		144.50%		
1790-8b-10		165.60%		135.40%		157.20%		
1790-8b-11		174.60%		143.30%		171.00%		
1790-8b-25		166.70%		135.40%		157.70%		
1790-8b-26		166.70%		133.80%		157.30%		
1790-8b-13		152.60%		128.50%		166.00%		
1790-8b-14		183.50%		152.70%		194.20%		
1790-8b-27		152.00%		120.40%		143.20%		
1790-8b-28		144.30%		116.40%		137.10%		
1790-8ab-15		140.00%		107.80%		131.20%		
1790-8ab-16		118.90%		95.70%		132.90%		
1790-8ab-29		158.00%		128.20%		166.00%		
1790-8ab-30		123.80%		95.30%		113.50%		
1790-8b-17	r	78.30%	r	81.20%	r	26.70%	#	r
1790-8b-18	r	73.30%	r	70.50%	r	24.10%	#	r
1790-8b-31	r	88.60%	r	82.00%	r	67.00%		r
1790-8b-32	r	89.00%	r	86.00%	r	64.00%		r

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MSL Sample ID	Extraction Date	Analysis Date	Days held from Extraction to Analysis	Storage Temperature	PAH Results naphthalene		Acenaphthylene	
BLANKS								
1790-8b Blk A	**12/15/2003**	**1/23/2004**	**39**	**NA**	0.52		0.51	U
1790-8b Blk B	**1/5/2004**	**1/23/2004**	**18**	**NA**	0.46	U	0.51	U
BLANK SPIKES								
1790-8b-Blk Spk A	**12/8/2003**	**1/22/2004**	**45**	**NA**	70.53		61.48	
1790-8ab Blk Spk B	**3/1/2004**	**4/17/2004**	**47**	**NA**	45.18		49.09	
1790-8b Blk Spk C	**5/24/2004**	**6/17/2004**	**24**	**NA**	71.81		65.91	
spk concentration A					66.90		NA	
spk concentration B					62.50		NA	
spk concentration C					69.40		NA	
percent recovery A					105.4%		NA	
percent recovery B					72.3%		NA	
percent recovery C					103.5%		NA	
MATRIX SPIKES								
1790-8b-7 Spk	**12/22/2003**	**1/23/2004**	**32**	**-20C**	130.94		96.10	
1790-8b-12 Spk	**1/19/2004**	**1/23/2004**	**4**	**-20C**	151.97		68.51	
1790-8b- Ave	**NA**	**NA**	**NA**	**NA**	73.04		9.37	
spk concentration 7					69.00		NA	
spk concentration 12					68.00		NA	
percent recovery 7 Spk					83.9%		NA	
percent recovery 12 Spk					116.1%		NA	

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MSL Sample ID	Acenaphthene		Fluorene		dibenzothiophene		phenanthrene		anthracene		fluoranthene		pyrene	
BLANKS														
1790-8b Blk A	0.57	U	0.66		2.71		16.29		1.52		29.73		12.00	
1790-8b Blk B	0.57	U	0.37	U	2.22	U	2.24	U	0.55	U	4.61	U	2.22	U
BLANK SPIKES														
1790-8b-Blk Spk A	68.13		55.40		9.26		63.73		54.29		69.56		78.23	
1790-8ab Blk Spk B	52.07		54.75		51.73		52.01		51.52		80.41		70.33	
1790-8b Blk Spk C	71.34		75.41		70.86		79.70		82.31		87.07		80.13	
spk concentration A	66.90		66.90		NA		66.90		66.90		66.90		66.90	
spk concentration B	62.50		62.50		NA		62.50		62.50		62.50		62.50	
spk concentration C	69.40		69.40		NA		69.40		69.40		69.40		69.40	
percent recovery A	101.8%		82.8%		NA		95.3%		81.2%		104.0%		116.9%	
percent recovery B	83.3%		87.6%		NA		83.2%		82.4%		128.7%	#	112.5%	
percent recovery C	102.8%		108.7%		NA		114.8%		118.6%		125.5%	#	115.5%	
MATRIX SPIKES														
1790-8b-7 Spk	179.21		178.61		65.60		226.43		195.46		280.54		254.81	
1790-8b-12 Spk	166.57		161.43		70.95		238.02		157.21		293.86		264.44	
1790-8b- Ave	92.78		92.75		5.72		149.65		86.75		178.92		154.50	
spk concentration 7	69.00		69.00		NA		69.00		69.00		69.00		69.00	
spk concentration 12	68.00		68.00		NA		68.00		68.00		68.00		68.00	
percent recovery 7 Spk	125.3%	#	124.4%	#	NA		111.3%		157.6%	#	147.3%	#	145.4%	#
percent recovery 12 Spk	108.5%		101.0%		NA		130.0%	#	103.6%		169.0%	#	161.7%	#

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MSL Sample ID	benzo[a] anthracene		chrysene		benzo [b] fluoranthene			benzo [a] pyrene			indeno [1,2,3-c,d] pyrene		
BLANKS													
1790-8b Blk A	0.87		1.54		0.77	U	r	0.84	U	r	1.02	U	r
1790-8b Blk B	0.84	U	0.81	U	0.77	U		0.84	U		1.02	U	
BLANK SPIKES													
1790-8b-Blk Spk A	51.61		55.91		56.39		r	57.76		r	50.34		r
1790-8ab Blk Spk B	89.07		66.64		66.17			52.87			74.00		
1790-8b Blk Spk C	86.11		83.24		71.87			73.26			64.40		
spk concentration A	66.90		66.90		66.90			66.90			66.90		
spk concentration B	62.50		62.50		62.50			62.50			62.50		
spk concentration C	69.40		69.40		69.40			69.40			69.40		
percent recovery A	77.1%		83.6%		84.3%			86.3%			75.2%		
percent recovery B	142.5%	#	106.6%		105.9%			84.6%			118.4%		
percent recovery C	124.1%	#	119.9%		103.6%			105.6%			92.8%		
MATRIX SPIKES													
1790-8b-7 Spk	217.18		232.65		169.44		E	175.18		E	58.75		E
1790-8b-12 Spk	228.89		232.99		166.99			147.66			57.28		
1790-8b- Ave	132.27		135.89		118.33			93.68			4.83		
spk concentration 7	69.00		69.00		69.00			69.00			69.00		
spk concentration 12	68.00		68.00		68.00			68.00			68.00		
percent recovery 7 Spk	123.1%	#	140.2%	#	74.1%			118.1%			78.1%		
percent recovery 12 Spk	142.1%	#	142.8%	#	71.6%			79.4%			77.1%		

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MSL Sample ID	dibenzo [a,h] anthracene			benzo[g,h,i] perylene			Surrogate Recovery d8 naphthalene	d10 Acenaphthene	d10 phenanthrene
BLANKS									
1790-8b Blk A	0.86	U	r	0.94	U	r	62.00%	66.50%	83.70%
1790-8b Blk B	0.86	U		0.94	U		66.70%	69.70%	78.70%
BLANK SPIKES									
1790-8b-Blk Spk A	38.95		r	55.78		r	104.00%	94.30%	93.70%
1790-8ab Blk Spk B	59.43			49.49			76.30%	83.80%	92.00%
1790-8b Blk Spk C	69.45			70.58			98.80%	100.20%	115.30%
spk concentration A	66.90			66.90					
spk concentration B	62.50			62.50					
spk concentration C	69.40			69.40					
percent recovery A	58.2%			83.4%					
percent recovery B	95.1%			79.2%					
percent recovery C	100.1%			101.7%					
MATRIX SPIKES									
1790-8b-7 Spk	168.52		E	157.03		E	68.60%	74.90%	90.20%
1790-8b-12 Spk	136.11			135.07			86.70%	90.50%	103.70%
1790-8b- Ave	83.23			78.47					
spk concentration 7	69.00			69.00					
spk concentration 12	68.00			68.00					
percent recovery 7 Spk	123.6%	#		113.9%					
percent recovery 12 Spk	77.8%			83.2%					

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	Internal Std. Recovery					
MSL Sample ID	d12 chrysene	d12 perylene	d8 acenaphthylene	d10 pyrene	d12 benzo [a] pyrene	
BLANKS						
1790-8b Blk A	112.50%	79.70%	174.40%	144.60%	219.70%	#
1790-8b Blk B	92.50%	73.50%	171.60%	139.90%	168.40%	
BLANK SPIKES						
1790-8b-Blk Spk A	81.60%	65.80%	81.30%	64.80%	47.40%	#
1790-8ab Blk Spk B	128.00%	77.10%	106.70%	92.30%	142.70%	
1790-8b Blk Spk C	128.70%	120.40%	85.90%	76.20%	73.30%	
spk concentration A						
spk concentration B						
spk concentration C						
percent recovery A						
percent recovery B						
percent recovery C						
MATRIX SPIKES						
1790-8b-7 Spk	110.90%	91.50%	187.10%	149.70%	176.70%	
1790-8b-12 Spk	122.90%	88.90%	133.10%	115.40%	149.00%	
1790-8b- Ave						
spk concentration 7						
spk concentration 12						
percent recovery 7 Spk						
percent recovery 12 Spk						

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MSL Sample ID	Extraction Date	Storage Temperature	Analysis Date	Days held from Extraction to Analysis	a-BHC		d-BHC		HEPTACLOR		ALDRIN	
1790-9ab blk A	**12/30/2003**	**NA**	**1/18/2004**	**19**	16.67	U	16.67	U	16.67	U	16.67	U
1790-9ab-1	**12/30/2003**	**-20C**	**1/18/2004**	**19**	14.84	U	14.84	U	14.84	U	14.84	U
1790-9ab-2	**12/30/2003**	**-20C**	**1/18/2004**	**19**	13.55	U	19.16		13.55	U	13.55	U
1790-9ab-3	**12/30/2003**	**-20C**	**1/18/2004**	**19**	13.81	U	20.62		13.81	U	13.81	U
1790-9ab-4	**12/30/2003**	**-20C**	**1/18/2004**	**19**	14.53	U	14.53	U	14.53	U	14.53	U
1790-9ab spk blk A	**1/6/2004**	**NA**	**1/19/2004**	**13**	16.67	U	16.67	U	163.62		320.43	
1790-9ab-5	**1/6/2004**	**-20C**	**1/19/2004**	**13**	14.97	U	21.76		14.97	U	14.97	U
1790-9ab-6	**1/6/2004**	**-20C**	**1/19/2004**	**13**	15.82	U	15.82	U	15.82	U	15.82	U
1790-9ab-20	**1/6/2004**	**4C**	**1/19/2004**	**13**	13.97	U	13.97	U	13.97	U	13.97	U
1790-9ab-21	**1/6/2004**	**4C**	**1/19/2004**	**13**	14.25	U	14.25	U	14.25	U	14.62	
1790-9ab-7 MS	**1/13/2004**	**-20C**	**1/19/2004**	**6**	15.38	U	29.83		311.46		337.65	
1790-9ab-8	**1/13/2004**	**-20C**	**1/19/2004**	**6**	14.16	U	24.85		14.16	U	14.16	U
1790-9ab-9	**1/13/2004**	**-20C**	**1/19/2004**	**6**	15.20	U	15.20	U	15.20	U	16.77	
1790-9ab-22	**1/13/2004**	**4C**	**1/19/2004**	**6**	16.03	U	24.11		16.03	U	16.03	U
1790-9ab-23	**1/13/2004**	**4C**	**1/19/2004**	**6**	15.38	U	15.38	U	15.38	U	19.25	
1790-9ab blk B	**1/27/2004**	**NA**	**3/4/2004**	**37**	16.67	U	16.67	U	16.67	U	16.67	U
1790-9ab-10	**1/28/2004**	**-20C**	**3/5/2004**	**37**	14.41	U	14.41	U	14.41	U	14.41	U
1790-9ab-11	**1/28/2004**	**-20C**	**3/5/2004**	**37**	14.33	U	14.33	U	14.33	U	14.33	U
1790-9ab-24	**1/28/2004**	**4C**	**3/5/2004**	**37**	15.48	U	15.48	U	15.48	U	15.48	U
1790-9ab-25	**1/28/2004**	**4C**	**3/5/2004**	**37**	14.84	U	14.84	U	14.84	U	14.84	U
1790-9ab-26	**2/11/2004**	**4C**	**3/5/2004**	**23**	14.97	U	14.97	U	14.97	U	14.97	U
1790-9ab-13	**2/11/2004**	**-20C**	**3/5/2004**	**23**	13.55	U	13.55	U	13.55	U	13.55	U
1790-9ab-14	**2/11/2004**	**-20C**	**3/5/2004**	**23**	14.16	U	14.16	U	14.16	U	14.16	U
1790-9ab-12 MS	**2/11/2004**	**-20C**	**3/5/2004**	**23**	15.92	U	15.92	U	277.16		294.98	
1790-9ab-27	**2/11/2004**	**4C**	**3/5/2004**	**23**	14.58	U	18.78		14.58	U	14.58	U
1790-9 Spk Blank B	**3/23/2004**	**NA**	**4/16/2004**	**24**	14.29	U	14.29	U	132.35		293.66	
1790-9-15	**3/23/2004**	**-20C**	**4/17/2004**	**25**	13.97	U	13.97	U	13.97	U	13.97	U
1790-9-16	**3/23/2004**	**-20C**	**4/17/2004**	**25**	14.62	U	14.62	U	14.62	U	14.62	U
1790-9-28	**3/23/2004**	**4C**	**4/17/2004**	**25**	15.63	U	15.63	U	15.63	U	15.63	U
1790-9-29	**3/23/2004**	**4C**	**4/17/2004**	**25**	15.43	U	15.43	U	15.43	U	15.43	U
1790-9a- Blk Spk C	**6/15/2004**	**NA**	**6/18/2004**	**3**	16.67	U	16.67	U	301.52		299.67	
1790-9a-17	**6/15/2004**	**-20C**	**6/18/2004**	**3**	13.77	U	13.77	U	13.77	U	13.77	U
1790-9a-18	**6/15/2004**	**-20C**	**6/18/2004**	**3**	14.53	U	14.53	U	14.53	U	14.53	U
1790-9a-30	**6/15/2004**	**4C**	**6/18/2004**	**3**	13.30	U	13.30	U	13.30	U	13.30	U
1790-9a-31	**6/15/2004**	**4C**	**6/18/2004**	**3**	13.48	U	13.48	U	13.48	U	13.48	U
Average					14.59		16.10		23.92		24.76	

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Sequim, Washington 98382
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MSL Sample ID	HEPT EPOXIDE	a-CHLORDANE	TRANS NONA	DIELDRIN	4,4'-DDE	2,4-DDD	ENDRIN	ENDO II	4,4'-DDD
1790-9ab blk A	16.67 U	16.67 U	16.67 U	16.67 U	16.67 U	16.67 U	16.67 U	16.67 U	16.67
1790-9ab-1	14.84 U	14.84 U	14.84 U	14.84 U	14.84 U	102.94	14.84 U	14.84 U	357.40
1790-9ab-2	13.55 U	13.55 U	13.55 U	13.55 U	13.55 U	95.05	13.55 U	13.55 U	344.98
1790-9ab-3	13.81 U	16.49	13.81 U	13.81 U	13.81 U	86.06	13.81 U	13.81 U	363.96
1790-9ab-4	14.53 U	14.53 U	14.53 U	14.53 U	14.53 U	87.89	14.53 U	14.53 U	353.79
1790-9ab spk blk A	16.67 U	16.67 U	16.67 U	588.89	16.67 U	16.67 U	683.66	16.67 U	16.67
1790-9ab-5	14.97 U	14.97 U	14.97 U	14.97 U	14.97 U	99.61	14.97 U	14.97 U	392.42
1790-9ab-6	15.82 U	15.82 U	15.82 U	15.82 U	15.82 U	103.58	15.82 U	15.82 U	377.25
1790-9ab-20	13.97 U	13.97 U	13.97 U	13.97 U	13.97 U	88.72	13.97 U	13.97 U	341.74
1790-9ab-21	14.25 U	14.25 U	14.25 U	14.25 U	14.25 U	98.46	14.25 U	14.25 U	353.07
1790-9ab-7 MS	15.38 U	15.38 U	15.38 U	610.92	43.16	116.82	716.50	15.38 U	461.76
1790-9ab-8	14.16 U	14.16 U	14.16 U	14.16 U	14.16 U	110.77	14.16 U	14.16 U	427.51
1790-9ab-9	15.20 U	15.20 U	15.20 U	15.20 U	15.20 U	116.56	15.20 U	15.20 U	429.04
1790-9ab-22	16.03 U	16.03 U	16.03 U	16.03 U	16.03 U	129.47	16.03 U	16.03 U	414.33
1790-9ab-23	15.38 U	15.38 U	15.38 U	15.38 U	15.38 U	118.65	17.13	15.38 U	444.23
1790-9ab blk B	16.67 U	16.67 U	16.67 U	16.67 U	36.93	16.67 U	16.67 U	16.67 U	16.67
1790-9ab-10	14.41 U	14.41 U	14.41 U	14.41 U	44.43	70.04	14.41 U	14.41 U	452.00
1790-9ab-11	14.33 U	14.33 U	14.33 U	14.33 U	40.13	67.03	14.33 U	14.33 U	465.74
1790-9ab-24	15.48 U	15.48 U	15.48 U	15.48 U	38.84	66.19	15.48 U	15.48 U	470.02
1790-9ab-25	14.84 U	14.84 U	14.84 U	14.84 U	43.83 U	67.99	14.84 U	14.84 U	459.90
1790-9ab-26	14.97 U	14.97 U	14.97 U	14.97 U	42.96	61.62	14.97 U	14.97 U	425.31
1790-9ab-13	13.55 U	13.55 U	13.55 U	13.55 U	13.55 U	65.56	13.55 U	15.06	380.39
1790-9ab-14	14.16 U	14.16 U	14.16 U	14.16 U	35.86	64.54	14.16 U	14.16 U	424.02
1790-9ab-12 MS	15.92 U	15.92 U	15.92 U	609.59	25.61	66.99	646.96	15.92 U	445.22
1790-9ab-27	14.58 U	14.58 U	14.58 U	14.58 U	14.58 U	77.39	14.58 U	14.58 U	428.25
1790-9 Spk Blank B	14.29 U	14.29 U	14.29 U	746.85	14.29 U	14.29 U	766.45	14.29 U	14.29
1790-9-15	13.97 U	13.97 U	13.97 U	38.44	13.97 U	117.61	13.97 U	13.97 U	394.12
1790-9-16	14.62 U	14.62 U	14.62 U	36.60	14.62 U	113.32	15.84	14.62 U	382.67
1790-9-28	15.63 U	15.63 U	15.63 U	15.63 U	15.63 U	114.42	16.46	15.63 U	387.89
1790-9-29	15.43 U	15.43 U	15.43 U	39.99	15.43 U	122.52	15.43 U	15.43 U	418.93
1790-9a- Blk Spk C	16.67 U	16.67 U	16.67 U	811.32	16.67 U	16.67 U	844.29	16.67 U	70.24
1790-9a-17	13.77 U	13.77 U	13.77 U	41.32	13.77 U	123.55	17.92	13.77 U	445.76
1790-9a-18	14.53 U	14.53 U	14.53 U	35.13	14.53 U	104.01	14.53 U	14.53 U	370.30
1790-9a-30	13.30 U	13.30 U	13.30 U	33.96	13.30 U	105.68	13.30 U	13.30 U	398.56
1790-9a-31	13.48 U	13.48 U	13.48 U	33.14	13.48 U	100.96	13.48 U	13.48 U	364.45
Average	14.59	14.69	14.59	41.49	19.57	95.91	37.41	14.64	403.14

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BATTELLE MARINE SCIEN
1529 West Sequim Bay Roa
Sequim, Washington 98382
360-681-4583

MSL Sample ID		2,4-DDT		ENDRIN ALDY.		ENDO SULFATE		4,4'-DDT		ENDRIN KET.		METHOXYCLOR		MIREX		PCB-103 Surr
1790-9ab blk A	U	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U	83.98%
1790-9ab-1		14.84	U	14.84	U	14.84	U	60.41		14.84	U	14.84	U	14.84	U	88.47%
1790-9ab-2		13.55	U	13.55	U	13.55	U	57.21		13.55	U	13.55	U	13.55	U	84.11%
1790-9ab-3		13.81	U	13.81	U	13.81	U	72.13		13.81	U	13.81	U	13.81	U	90.03%
1790-9ab-4		14.53	U	14.53	U	14.53	U	66.18		14.53	U	14.53	U	14.53	U	79.90%
1790-9ab spk blk A	U	16.67	U	16.67	U	16.67	U	677.25		16.67	U	16.67	U	16.67	U	97.46%
1790-9ab-5		14.97	U	14.97	U	14.97	U	65.02		14.97	U	14.97	U	14.97	U	90.64%
1790-9ab-6		15.82	U	15.82	U	15.82	U	60.43		15.82	U	15.82	U	15.82	U	91.91%
1790-9ab-20		13.97	U	13.97	U	13.97	U	56.24		13.97	U	13.97	U	13.97	U	88.61%
1790-9ab-21		14.25	U	14.25	U	14.25	U	60.16		14.25	U	14.25	U	14.25	U	94.34%
1790-9ab-7 MS		15.38	U	15.38	U	15.38	U	837.29		15.38	U	15.38	U	15.38	U	108.79%
1790-9ab-8		14.16	U	14.16	U	14.16	U	79.19		14.16	U	14.16	U	14.16	U	101.43%
1790-9ab-9		15.20	U	15.20	U	15.20	U	74.55		15.20	U	15.20	U	15.20	U	103.20%
1790-9ab-22		16.03	U	16.03	U	16.03	U	74.14		16.03	U	16.03	U	16.03	U	98.86%
1790-9ab-23		15.38	U	15.38	U	15.38	U	118.10		20.96		15.38	U	15.38	U	116.95%
1790-9ab blk B	U	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U	126.00		16.67	U	68.53%
1790-9ab-10		14.41	U	14.41	U	14.41	U	121.40		14.41	U	14.41	U	14.41	U	72.72%
1790-9ab-11		14.33	U	14.33	U	14.33	U	126.02		14.33	U	14.33	U	14.33	U	73.13%
1790-9ab-24		15.48	U	15.48	U	15.48	U	131.03		15.48	U	15.48	U	15.48	U	68.17%
1790-9ab-25		14.84	U	14.84	U	14.84	U	115.46		25.81		14.84	U	14.84	U	71.36%
1790-9ab-26		14.97	U	14.97	U	14.97	U	133.51		27.72		14.97	U	14.97	U	65.37%
1790-9ab-13		13.55	U	13.55	U	13.55	U	87.87		13.55	U	13.55	U	13.55	U	47.60%
1790-9ab-14		14.16	U	14.16	U	14.16	U	113.44		25.36		14.16	U	14.16	U	63.33%
1790-9ab-12 MS		15.92	U	15.92	U	15.92	U	704.31		15.92	U	15.92	U	15.92	U	49.06%
1790-9ab-27		14.58	U	14.58	U	14.58	U	119.21		14.58	U	14.58	U	14.58	U	55.13%
1790-9 Spk Blank B	U	14.29	U	14.29	U	14.29	U	751.26		14.29	U	14.29	U	14.29	U	98.70%
1790-9-15		13.97	U	13.97	U	13.97	U	103.11		41.51		13.97	U	13.97	U	112.38%
1790-9-16		14.62	U	14.62	U	14.62	U	99.90		14.62	U	14.62	U	14.62	U	104.38%
1790-9-28		15.63	U	15.63	U	15.63	U	101.05		32.89		15.63	U	15.63	U	103.05%
1790-9-29		15.43	U	15.43	U	15.43	U	109.26		40.63		15.43	U	15.43	U	106.13%
1790-9a- Blk Spk C		16.67	U	16.67	U	16.67	U	667.53		54.52		16.67	U	16.67	U	96.82%
1790-9a-17		13.77	U	13.77	U	13.77	U	80.40		65.74		13.77	U	13.77	U	106.86%
1790-9a-18		14.53	U	14.53	U	14.53	U	99.32		54.49		14.53	U	14.53	U	97.43%
1790-9a-30		13.30	U	13.30	U	13.30	U	71.24		61.11		13.30	U	13.30	U	104.75%
1790-9a-31		13.48	U	13.48	U	13.48	U	61.28		13.48	U	13.48	U	13.48	U	100.06%
Average		14.59		14.59		14.59		110.29		23.07		14.59		14.59		

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Sequim, Washington 98382
360-681-4583

MSL Sample ID	PCB-198 Surr	TCMX ris	HBB ris	OCN ris
1790-9ab blk A	99.33%	125.44%	113.92%	120.56%
1790-9ab-1	98.56%	125.80%	116.25%	97.72%
1790-9ab-2	96.98%	127.45%	113.49%	101.69%
1790-9ab-3	111.14%	119.80%	105.81%	95.05%
1790-9ab-4	97.34%	120.53%	107.12%	98.13%
1790-9ab spk blk A	102.13%	105.36%	103.62%	120.46%
1790-9ab-5	100.06%	111.24%	105.65%	96.69%
1790-9ab-6	99.02%	109.12%	108.50%	102.18%
1790-9ab-20	97.79%	114.94%	110.95%	103.79%
1790-9ab-21	97.25%	108.29%	110.46%	103.51%
1790-9ab-7 MS	116.95%	89.63%	85.39%	82.45%
1790-9ab-8	112.22%	86.41%	81.14%	80.72%
1790-9ab-9	113.69%	90.86%	89.34%	87.12%
1790-9ab-22	108.22%	90.68%	87.76%	86.59%
1790-9ab-23	115.26%	78.96%	86.04%	83.06%
1790-9ab blk B	122.72%	109.41%	63.51%	63.75%
1790-9ab-10	123.30%	110.74%	65.01%	62.92%
1790-9ab-11	121.69%	108.44%	63.39%	58.61%
1790-9ab-24	119.96%	124.09%	72.20%	69.29%
1790-9ab-25	119.33%	116.13%	69.15%	67.40%
1790-9ab-26	126.62%	113.76%	67.59%	60.50%
1790-9ab-13	104.30%	160.52%	86.14%	71.38%
1790-9ab-14	129.76%	133.85%	80.92%	72.50%
1790-9ab-12 MS	116.15%	161.34%	83.75%	76.20%
1790-9ab-27	130.15%	149.57%	80.27%	72.31%
1790-9 Spk Blank B	111.06%	97.66%	99.03%	98.58%
1790-9-15	132.05%	90.62%	80.43%	78.74%
1790-9-16	120.69%	97.94%	88.69%	84.96%
1790-9-28	119.72%	101.56%	91.87%	87.48%
1790-9-29	122.25%	99.38%	88.49%	84.77%
1790-9a- Blk Spk C	114.96%	92.12%	94.90%	95.44%
1790-9a-17	135.12%	84.54%	76.64%	84.19%
1790-9a-18	119.20%	93.23%	86.49%	96.37%
1790-9a-30	140.58%	87.73%	78.13%	86.73%
1790-9a-31	128.00%	95.97%	89.97%	102.02%
Average				

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1529 West Sequim Bay Road
Sequim, Washington 98382
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MSL Sample ID	Extraction Date	Storage Temperature	Analysis Date	Days held from Extraction to Analysis	a-BHC		d-BHC		HEPTACLOR	
BLANKS										
1790-9ab blk A	**12/30/2003**	**NA**	**1/18/2004**	**19**	16.67	U	16.67	U	16.67	U
1790-9ab blk B	**1/27/2004**	**NA**	**3/4/2004**	**37**	16.67	U	16.67	U	16.67	U
BLANK SPIKES										
1790-9ab Blk Spk A	**1/6/2004**	**NA**	**1/19/2004**	**13**	16.67	U	16.67	U	163.62	
1790-9 Blk Spk B	**3/23/2004**	**NA**	**4/16/2004**	**24**	14.29	U	14.29	U	132.35	
1790-9a- Blk Spk C	**6/15/2004**	**NA**	**6/18/2004**	**3**	16.67	U	16.67	U	301.52	
Spike concentration A									333.33	
Spike concentration B									285.71	
Spike concentration C									333.33	
percent recovery A									49.09%	#
percent recovery B									46.32%	#
percent recovery C									90.46%	
MATRIX SPIKES										
1790-9ab Average									0.00	
1790-9ab-7 MS	**1/13/2004**	**-20C**	**1/19/2004**	**6**	15.38	U	29.83		311.46	
1790-9ab-12 MS	**2/11/2004**	**-20C**	**3/5/2004**	**23**	15.92	U	15.92	U	277.16	
Spike concentration 7									307.69	
Spike concentration 12									299.40	
percent recovery 7									101.23%	
percent recovery 12									92.57%	

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BATTELLE MARINE SCIEI
1529 West Sequim Bay Roa
Sequim, Washington 98382
360-681-4583

MSL Sample ID	ALDRIN		HEPT EPOXIDE		a-CHLORDANE		TRANS NONA		DIELDRIN		4,4'-DDE		2,4-DDD		ENDRIN
BLANKS															
1790-9ab blk A	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U	16.67
1790-9ab blk B	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U	36.93		16.67	U	16.67
BLANK SPIKES															
1790-9ab Blk Spk A	320.43		16.67	U	16.67	U	16.67	U	588.89		16.67	U	16.67	U	683.66
1790-9 Blk Spk B	293.66		14.29	U	14.29	U	14.29	U	746.85		14.29	U	14.29	U	766.45
1790-9a- Blk Spk C	299.67		16.67	U	16.67	U	16.67	U	811.32		16.67	U	16.67	U	844.29
Spike concentration A	333.33								666.66						666.66
Spike concentration B	285.71								571.42						571.42
Spike concentration C	333.33								666.66						666.66
percent recovery A	96.13%								88.33%						102.55%
percent recovery B	102.78%								130.70%						134.13%
percent recovery C	89.90%								121.70%	#					126.65%
MATRIX SPIKES															
1790-9ab Average	0.00								21.11						0.00
1790-9ab-7 MS	337.65		15.38	U	15.38	U	15.38	U	610.92		43.16		116.82		716.50
1790-9ab-12 MS	294.98		15.92	U	15.92	U	15.92	U	609.59		25.61		66.99		646.96
Spike concentration 7	307.69								615.38						615.38
Spike concentration 12	299.40								598.80						598.80
percent recovery 7	109.74%								95.84%						116.43%
percent recovery 12	98.52%								98.28%						108.04%

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BATTELLE MARINE SCIEI
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MSL Sample ID		ENDO II		4,4'-DDD		2,4-DDT		ENDRIN ALDY.		ENDO SULFATE		4,4'-DDT		ENDRIN KET.	
BLANKS															
1790-9ab blk A	U	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U
1790-9ab blk B	U	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U	16.67	U
BLANK SPIKES															
1790-9ab Blk Spk A		16.67	U	16.67	U	16.67	U	16.67	U	16.67	U	677.25		16.67	U
1790-9 Blk Spk B		14.29	U	14.29	U	14.29	U	14.29	U	14.29	U	751.26		14.29	U
1790-9a- Blk Spk C		16.67	U	70.24		16.67	U	16.67	U	16.67	U	667.53		54.52	
Spike concentration A												666.66			
Spike concentration B												571.42			
Spike concentration C												666.66			
percent recovery A												101.59%			
percent recovery B	#											131.47%			
percent recovery C	#											100.13%			
MATRIX SPIKES															
1790-9ab Average												110.29			
1790-9ab-7 MS		15.38	U	461.76		15.38	U	15.38	U	15.38	U	837.29		15.38	U
1790-9ab-12 MS		15.92	U	445.22		15.92	U	15.92	U	15.92	U	704.31		15.92	U
Spike concentration 7												615.38			
Spike concentration 12												598.80			
percent recovery 7												118.14%			
percent recovery 12												99.20%			

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Sequim, Washington 98382
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MSL Sample ID	METHOXYCLOR		MIREX		PCB-103 Surr	PCB-198 Surr	TCMX ris	HBB ris	OCN ris
BLANKS									
1790-9ab blk A	16.67	U	16.67	U	83.98%	99.33%	125.44%	113.92%	120.56%
1790-9ab blk B	126.00		16.67	U	68.53%	122.72%	109.41%	63.51%	63.75%
BLANK SPIKES									
1790-9ab Blk Spk A	16.67	U	16.67	U	97.46%	102.13%	105.36%	103.62%	120.46%
1790-9 Blk Spk B	14.29	U	14.29	U	98.70%	111.06%	97.66%	99.03%	98.58%
1790-9a- Blk Spk C	16.67	U	16.67	U	96.82%	114.96%	92.12%	94.90%	95.44%
Spike concentration A									
Spike concentration B									
Spike concentration C									
percent recovery A									
percent recovery B									
percent recovery C									
MATRIX SPIKES									
1790-9ab Average									
1790-9ab-7 MS	15.38	U	15.38	U	108.79%	116.95%	89.63%	85.39%	82.45%
1790-9ab-12 MS	15.92	U	15.92	U	49.06%	116.15%	161.34%	83.75%	76.20%
Spike concentration 7									
Spike concentration 12									
percent recovery 7									
percent recovery 12									

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1529 West Sequim Bay Road
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MSL Sample ID	Extraction date	Days held to extraction	Aroclor analysis date	Aroclor 1254 Days held from extraction to analysis	Aroclor 1260 analysis date	Aroclor 1260 Days held from extraction to analysis	Pesticide analysis date	Pesticides Days held from extraction to analysis	Storage Temp	4,4'-DDE	4,4'-DDD	2,4-DDT	4,4'-DDT	Arochlor 1254	Arochlor 1260
17901 Blank	**10/30/2002**	0	12/16/02	47	12/16/02	47	12/16/02	47	NA	15.63 U	15.63 U	15.63 U	15.63 U	312.5 U	312.5
1790-2-1	**10/30/2002**	0	12/16/02	47	12/16/02	47	12/16/02	47	-20C	141.77	48.29	209.80	1116.78	7150.9	25304.4
1790-2-2	**10/30/2002**	0	12/16/02	47	12/16/02	47	12/16/02	47	-20C	138.89	27.27	191.05	1084.52	6509.9	25532.1
1790-2-3	**10/30/2002**	0	12/16/02	47	12/16/02	47	12/16/02	47	-20C	142.03	23.18	197.18	1168.03	6877.5	25257.6
1790-2-4	**10/30/2002**	0	12/16/02	47	12/16/02	47	12/16/02	47	-20C	134.47	46.78	188.75	1059.90	7282.6	23427.9
17902 Blank	**11/6/2002**	7	12/16/02	40	12/16/02	40	12/16/02	40	NA	15.63 U r	15.63 U r	15.63 U r	15.63 U r	312.5 U E	312.5
1790-2-21	**11/6/2002**	7	12/16/02	40	12/16/02	40	12/16/02	40	4C	148.27	21.13	211.92	1224.81	6586.7	26637.2
1790-2-22	**11/6/2002**	7	12/16/02	40	12/16/02	40	12/16/02	40	4C	146.23	18.83	210.81	1201.60	6757.7	26835.7
1790-2-5	**11/6/2002**	7	12/16/02	40	12/16/02	40	12/16/02	40	-20C	147.49	51.42	206.94	1107.43	7738.4	26521.5
1790-2-6	**11/6/2002**	7	12/16/02	40	12/16/02	40	12/16/02	40	-20C	145.86	20.13	193.05	1118.97	6696.3	25270.3
1790-2-23	**11/13/2002**	14	12/16/02	33	12/16/02	33	12/16/02	33	4C	123.78	18.53	169.73	1028.16	5029.9	22670.5
1790-2-24	**11/13/2002**	14	12/16/02	33	12/16/02	33	12/16/02	33	4C	119.16	18.30	169.19	951.87	5470.9	22384.9
1790-2-7 MS	**11/13/2002**	14	12/16/02	33	12/16/02	33	12/16/02	33	-20C	138.31 r	16.90 r	198.38 r	1051.99 r	11556.2 E	26645.6
1790-2-8	**11/13/2002**	14	12/16/02	33	12/16/02	33	12/16/02	33	-20C	141.26 r	17.55 r	213.93 r	1008.30 r	5725.5 E	24050.2
1790-2-9	**11/13/2002**	14	12/16/02	33	12/16/02	33	12/16/02	33	-20C	131.52 r	16.82 r	187.39 r	990.56 r	5843.1 E	24279.8
1790-2-10	**11/27/2002**	28	12/16/02	19	12/16/02	19	12/16/02	19	-20C	126.78	18.85	173.80	1021.18	5572.4	22775.2
1790-2-11	**11/27/2002**	28	12/16/02	19	12/16/02	19	12/16/02	19	-20C	127.20	18.88	181.75	1073.64	5754.5	25859.6
1790-2-25	**11/27/2002**	28	12/16/02	19	12/16/02	19	12/16/02	19	4C	125.98	21.78 U	174.65	1031.98	5820.2	22657.6
1790-2-26	**11/27/2002**	28	12/16/02	19	12/16/02	19	12/16/02	19	4C	136.68	20.21	186.33	1078.65	5908.6	23641.3
1790-2-Blank Spike	**11/27/2002**	28	12/16/02	19	12/16/02	19	12/16/02	19	NA	15.63 U	15.63 U	15.63 U	15.63 U	6524.4	312.5
1790-2-12 MS	**12/11/2002**	42	12/16/02	5	12/16/02	5	12/16/02	5	-20C	119.78	16.98	163.57	941.60	10170.0	20816.3
1790-2-13	**12/11/2002**	42	12/16/02	5	12/16/02	5	12/16/02	5	-20C	118.59	18.21	162.06	963.83	4882.4	21563.5
1790-2-27	**12/11/2002**	42	12/16/02	5	12/16/02	5	12/16/02	5	4C	149.51	25.41	215.38	1228.06	6162.9	26962.7
1790-2-28	**12/11/2002**	42	12/16/02	5	12/16/02	5	12/16/02	5	4C	113.82	17.52	153.26	909.31	5069.0	20355.4
1790 Spk Blk B	**1/22/2003**	84	03/14/03	51	03/14/03	51	03/14/03	51	NA	15.63 U	15.63 U	15.63 U	15.63 U	6173.1	312.5
1790-2-15	**1/22/2003**	84	03/14/03	51	03/14/03	51	03/14/03	51	-20C	122.28	35.37	161.43	874.17	5332.0	19066.0
1790-2-16	**1/22/2003**	84	03/14/03	51	03/14/03	51	03/14/03	51	-20C	124.89	36.06	170.30	993.10	5224.3	20390.8
1790-2-29	**1/22/2003**	84	03/14/03	51	03/14/03	51	03/14/03	51	4C	111.72	32.22	151.04	838.74	4917.3	18607.5
1790-2-30	**1/22/2003**	84	03/14/03	51	03/14/03	51	03/14/03	51	4C	114.35	31.34	158.46	840.51	5063.0	18245.1
1790 Spk Blk C	**4/16/2003**	168	04/09/04	359	04/09/04	359	04/09/04	359	NA	15.63 U	15.63 U	15.63 U	15.63 U	4840.6	328.6
1790-2-17	**4/16/2003**	168	04/09/04	359	04/09/04	359	04/09/04	359	-20C	152.90	53.32	211.46	1194.21	4726.0	24026.3
1790-2-18	**4/16/2003**	168	04/09/04	359	04/09/04	359	04/09/04	359	-20C	149.31	50.31	219.02	1135.42	4668.4	22600.1
1790-2-31	**4/16/2003**	168	04/09/04	359	04/09/04	359	04/09/04	359	4C	144.33	50.25	203.67	1109.43	4566.7	23418.8
1790-2-32	**4/16/2003**	168	04/09/04	359	04/09/04	359	04/09/04	359	4C	149.17	52.82	199.47	1097.43	4814.4	24137.7

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MSL Sample ID	Extraction date	Days held to extraction		PCB-103 Surr	PCB-198 Surr	TCMX ris	HBB ris	OCN ris
17901 Blank	**10/30/2002**	0	U	72.74%	68.41%	76.41%	58.13%	85.43%
1790-2-1	**10/30/2002**	0		73.11%	70.60%	79.47%	59.38%	89.74%
1790-2-2	**10/30/2002**	0		77.47%	76.59%	69.62%	54.51%	77.62%
1790-2-3	**10/30/2002**	0		76.28%	73.22%	76.72%	57.80%	86.42%
1790-2-4	**10/30/2002**	0		70.72%	72.46%	74.52%	57.56%	87.82%
17902 Blank	**11/6/2002**	7	U E	76.65%	70.37%	60.72%	46.97% #	66.19%
1790-2-21	**11/6/2002**	7		74.80%	76.62%	74.43%	54.78%	86.45%
1790-2-22	**11/6/2002**	7		83.10%	79.59%	70.66%	55.94%	85.84%
1790-2-5	**11/6/2002**	7		80.23%	77.59%	68.13%	51.65%	78.97%
1790-2-6	**11/6/2002**	7		76.40%	64.27%	70.79%	52.47%	81.41%
1790-2-23	**11/13/2002**	14		67.12%	71.84%	90.18%	71.57%	107.74%
1790-2-24	**11/13/2002**	14		69.64%	72.02%	78.64%	63.13%	92.10%
1790-2-7 MS	**11/13/2002**	14	E	71.81%	76.61%	53.45%	40.61% ##	66.65%
1790-2-8	**11/13/2002**	14	E	78.28%	73.22%	59.79%	47.17% #	70.39%
1790-2-9	**11/13/2002**	14	E	72.24%	67.90%	58.44%	43.16% #	65.11%
1790-2-10	**11/27/2002**	28		79.57%	78.36%	71.73%	62.48%	93.19%
1790-2-11	**11/27/2002**	28		73.01%	74.40%	88.17%	69.91%	113.19%
1790-2-25	**11/27/2002**	28		69.12%	69.81%	93.00%	71.72%	111.35%
1790-2-26	**11/27/2002**	28		71.90%	73.41%	86.75%	69.21%	105.66%
1790-2-Blank Spike	**11/27/2002**	28	U	66.45%	71.06%	88.34%	67.85%	103.73%
1790-2-12 MS	**12/11/2002**	42		68.87%	75.79%	90.20%	73.33%	107.38%
1790-2-13	**12/11/2002**	42		71.70%	72.58%	88.27%	70.13%	105.34%
1790-2-27	**12/11/2002**	42		60.70%	70.08%	72.13%	50.24%	80.27%
1790-2-28	**12/11/2002**	42		71.80%	66.88%	93.56%	74.82%	116.04%
1790 Spk Blk B	**1/22/2003**	84	U	68.40%	58.13%	104.42%	82.79%	116.95%
1790-2-15	**1/22/2003**	84		70.00%	61.97%	97.48%	77.34%	116.48%
1790-2-16	**1/22/2003**	84		65.88%	59.18%	104.84%	78.25%	125.51%
1790-2-29	**1/22/2003**	84		62.63%	57.52%	107.48%	84.03%	125.68%
1790-2-30	**1/22/2003**	84		65.75%	57.74%	106.44%	86.62%	135.63%
1790 Spk Blk C	**4/16/2003**	168	U	113.28%	116.56%	111.20%	104.24%	104.70%
1790-2-17	**4/16/2003**	168		105.58%	114.64%	116.08%	104.80%	137.22%
1790-2-18	**4/16/2003**	168		101.50%	111.39%	117.94%	110.91%	142.54%
1790-2-31	**4/16/2003**	168		100.24%	107.70%	120.46%	109.66%	140.25%
1790-2-32	**4/16/2003**	168		108.32%	113.37%	99.24%	94.18%	119.75%

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MSL Sample ID	Extraction date	Days held to extraction	Aroclor analysis date	Aroclor 1254 Days held from extraction to analysis	Aroclor 1260 analysis date	Aroclor 1260 Days held from extraction to analysis	Pesticide analysis date	Pesticides Days held from extraction to analysis	Storage Temp	4,4'-DDE	
BLANKS											
17901 Blank	**10/30/2002**	0	12/16/02	47	12/16/02	47	12/16/02	47	NA	15.63 U	
17902 Blank	**11/6/2002**	7	12/16/02	40	12/16/02	40	12/16/02	40	NA	15.63 U	r
BLANK SPIKES (Aroclor 1254)											
1790-2-Blank Spike	**11/27/2002**	28	12/16/02	19	12/16/02	19	12/16/02	19	NA	15.63 U	
1790 Spk Blk B	**1/22/2003**	84	03/14/03	51	03/14/03	51	03/14/03	51	NA	15.63 U	
1790 Spk Blk C	**4/16/2003**	168	04/09/04	359	04/09/04	359	04/09/04	359	NA	15.63 U	
Spike concentration BS											
Spike concentration BS B											
Spike concentration BS C											
Percent Recovery BS											
Percent Recovery BS B											
Percent Recovery BS C											
MATRIX SPIKES (Aroclor 1254)											
1790-2-7 MS	**11/13/2002**	14	12/16/02	33	12/16/02	33	12/16/02	33	-20C	138.31	r
1790-2-12 MS	**12/11/2002**	42	12/16/02	5	12/16/02	5	12/16/02	5	-20C	119.78	
1790-2 (ave)											
Spike concentration 7-MS											
Spike concentration 12-MS											
Percent Recovery 7-MS											
Percent Recovery 12-MS											

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MSL Sample ID	Extraction date	Days held to extraction	4,4'-DDD		2,4-DDT		4,4'-DDT		Arochlor 1254		Arochlor 1260		PCB-103 Surr	PCB-198 Surr
BLANKS														
17901 Blank	**10/30/2002**	0	15.63 U		15.63 U		15.63 U		312.5 U		312.5 U		72.74%	68.41%
17902 Blank	**11/6/2002**	7	15.63 U	r	15.63 U	r	15.63 U	r	312.5 U	E	312.5 U	E	76.65%	70.37%
BLANK SPIKES (Aroclor 1254)														
1790-2-Blank Spike	**11/27/2002**	28	16.18		15.63 U		15.63 U		6524.4		312.5 U		66.45%	71.06%
1790 Spk Blk B	**1/22/2003**	84	15.63 U		15.63 U		15.63 U		6173.1		312.5 U		68.40%	58.13%
1790 Spk Blk C	**4/16/2003**	168	15.63 U		15.63 U		15.63 U		4840.6		328.6 U		113.28%	116.56%
Spike concentration BS									6250.0					
Spike concentration BS B									6250.0					
Spike concentration BS C									6250.0					
Percent Recovery BS									104.4					
Percent Recovery BS B									98.8					
Percent Recovery BS C									77.5					
MATRIX SPIKES (Aroclor 1254)														
1790-2-7 MS	**11/13/2002**	14	16.90	r	198.38	r	1051.99	r	11556.2	E	26645.6	E	71.81%	76.61%
1790-2-12 MS	**12/11/2002**	42	16.98		163.57		941.60		10170.0		20816.3		68.87%	75.79%
1790-2 (ave)									6433.3					
Spike concentration 7-MS									6068.0					
Spike concentration 12-MS									5800.0					
Percent Recovery 7-MS									84.4					
Percent Recovery 12-MS									64.4					

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MSL Sample ID	Extraction Date	Storage Temp	Pesticides Analysis Date	Pesticides: Days held from Extraction to Analysis	Arolchlor 1254 Analysis Date	Arolchlor 1254: Days held from Extraction to Analysis	a-BHC	g-BHC
1790-8b blk spk A	**12/8/2003**	**NA**	**1/16/2004**	**39**	**1/16/2004**	**39**	0.11 U r	0.50
1790-8b-1	**12/8/2003**	**-20C**	**1/16/2004**	**39**	**1/16/2004**	**39**	0.64 E	0.69
1790-8b-2	**12/8/2003**	**-20C**	**1/16/2004**	**39**	**1/16/2004**	**39**	0.65 E	0.55
1790-8b-3	**12/8/2003**	**-20C**	**1/16/2004**	**39**	**1/16/2004**	**39**	0.69 E	0.68
1790-8b-4 (20)	**12/8/2003**	**-20C**	**1/17/2004**	**40**	**1/17/2004**	**40**	0.33 r	0.22
1790-8b blk	**12/15/2003**	**NA**	**1/17/2004**	**33**	**1/17/2004**	**33**	0.11 U	0.11 U
1790-8b-5	**12/15/2003**	**-20C**	**1/17/2004**	**33**	**1/17/2004**	**33**	0.78	0.63
1790-8b-6	**12/15/2003**	**-20C**	**1/17/2004**	**33**	**1/17/2004**	**33**	0.75	0.68
1790-8b-21	**12/15/2003**	**4C**	**1/17/2004**	**33**	**1/17/2004**	**33**	0.54	0.57
1790-8b-22	**12/15/2003**	**4C**	**1/17/2004**	**33**	**1/17/2004**	**33**	0.66	0.74
1790-8b-7 Spk	**12/22/2003**	**-20C**	**1/21/2004**	**30**	**1/21/2004**	**30**	6.55	5.59
1790-8b-8	**12/22/2003**	**-20C**	**1/21/2004**	**30**	**1/21/2004**	**30**	1.12	1.11
1790-8b-9	**12/22/2003**	**-20C**	**1/21/2004**	**30**	**1/21/2004**	**30**	1.29	1.25
1790-8b-23	**12/22/2003**	**4C**	**1/22/2004**	**31**	**1/22/2004**	**31**	1.15 r	1.15
1790-8b-24	**12/22/2003**	**4C**	**1/22/2004**	**31**	**1/22/2004**	**31**	1.06	1.17
1790-8b blk 2	**1/5/2004**	**NA**	**1/22/2004**	**17**	**1/22/2004**	**17**	0.11 U r	0.11 U
1790-8b-10	**1/5/2004**	**-20C**	**1/22/2004**	**17**	**1/22/2004**	**17**	0.73	0.67
1790-8b-11	**1/5/2004**	**-20C**	**1/22/2004**	**17**	**1/22/2004**	**17**	1.07	1.07
1790-8b-25	**1/5/2004**	**4C**	**1/22/2004**	**17**	**1/22/2004**	**17**	1.14 r	1.85
1790-8b-26	**1/5/2004**	**4C**	**1/22/2004**	**17**	**1/22/2004**	**17**	1.03 r	1.14
1790-8b-12 Spk	**1/19/2004**	**-20C**	**1/28/2004**	**9**	**1/28/2004**	**9**	8.20	8.13
1790-8b-13	**1/19/2004**	**-20C**	**1/28/2004**	**9**	**1/28/2004**	**9**	1.31	1.37
1790-8b-14	**1/19/2004**	**-20C**	**1/28/2004**	**9**	**1/28/2004**	**9**	1.31	1.26
1790-8b-27	**1/19/2004**	**4C**	**1/29/2004**	**10**	**1/29/2004**	**10**	1.57	1.55
1790-8b-28	**1/19/2004**	**4C**	**1/29/2004**	**10**	**1/29/2004**	**10**	0.88	0.97
1790-8b blk Spk B	**3/1/2004**	**NA**	**3/5/2004**	**4**	**3/5/2004**	**4**	3.71	3.64
1790-8b-15	**3/1/2004**	**-20C**	**3/5/2004**	**4**	**3/5/2004**	**4**	1.42	0.87
1790-8b-16	**3/1/2004**	**-20C**	**3/5/2004**	**4**	**3/5/2004**	**4**	1.29	0.98
1790-8b-29	**3/1/2004**	**4C**	**3/6/2004**	**5**	**3/6/2004**	**5**	1.35	1.05
1790-8b-30	**3/1/2004**	**4C**	**3/6/2004**	**5**	**3/6/2004**	**5**	1.36	1.06
1790-8b- Blk Spk C	**5/24/2004**	**NA**	**6/3/2004**	**10**	**6/3/2004**	**10**	5.16	5.67
1790-8b-17	**5/24/2004**	**-20C**	**6/4/2004**	**11**	**6/4/2004**	**11**	1.44	1.57
1790-8b-18	**5/24/2004**	**-20C**	**6/4/2004**	**11**	**6/4/2004**	**11**	1.44	1.61
1790-8b-31	**5/24/2004**	**4C**	**6/4/2004**	**11**	**6/4/2004**	**11**	1.59	1.67
1790-8b-32	**5/24/2004**	**4C**	**6/4/2004**	**11**	**6/4/2004**	**11**	1.35	1.77

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MSL Sample ID	Extraction Date		2,4-DDE		a-CHLORDANE		TRANS NONA		4,4'-DDE		2,4-DDD		4,4'-DDD		2,4-DDT	
1790-8b blk spk A	**12/8/2003**	r	0.11 U	r	0.20	r	0.15	r	0.21	r	0.88	r	0.11	r	0.11 U	r
1790-8b-1	**12/8/2003**	E	0.88	E	2.99	E	0.67	E	0.88	E	0.40	E	0.70	E	0.25	E
1790-8b-2	**12/8/2003**	E	1.35	E	4.99	E	1.27	E	1.64	E	0.60	E	1.12	E	0.53	E
1790-8b-3	**12/8/2003**	E	1.51	E	5.31	E	1.20	E	1.57	E	0.46	E	1.31	E	0.44	E
1790-8b-4 (20)	**12/8/2003**	r	0.32	r	1.23	r	0.43	r	0.45	r	0.29	r	0.32	r	0.24	r
1790-8b blk	**12/15/2003**		0.11 U		0.22		0.17		0.17		0.11 U		0.11 U		0.11 U	
1790-8b-5	**12/15/2003**		1.63		5.60		1.18		1.35		0.56		1.12	r	0.39	r
1790-8b-6	**12/15/2003**		1.66		4.47		0.96		1.04		0.35		0.87	r	0.32	r
1790-8b-21	**12/15/2003**		1.51		3.17		0.79		0.74		0.27		0.64		0.22	
1790-8b-22	**12/15/2003**		2.12		4.28		0.94		1.01		0.29		0.83	r	0.30	r
1790-8b-7 Spk	**12/22/2003**		7.81		14.93		7.45		9.72		5.96		8.99		6.23	
1790-8b-8	**12/22/2003**		3.15		8.49		1.86		2.48		0.59		2.62		0.77	
1790-8b-9	**12/22/2003**		3.89		9.81		2.21		2.87		0.72		2.65		0.92	
1790-8b-23	**12/22/2003**	r	3.27	r	8.81	r	1.94	r	2.74	r	0.61	r	2.42	r	0.90	r
1790-8b-24	**12/22/2003**		3.28		8.62		1.91		2.46		0.48		2.16		0.92	
1790-8b blk 2	**1/5/2004**	r	0.11 U	r	0.13	r	0.11 U	r	0.13	r	0.11 U	r	0.11		0.11 U	
1790-8b-10	**1/5/2004**		2.84		6.98		1.55		1.85		0.36		1.65		0.61	
1790-8b-11	**1/5/2004**		5.69		8.64		1.89		2.44		0.59		1.77	r	0.69	r
1790-8b-25	**1/5/2004**	r	2.56	r	7.05	r	1.56	r	1.92	r	0.33	r	1.82		0.63	
1790-8b-26	**1/5/2004**	r	4.45	r	8.29	r	1.72	r	2.21	r	1.02	r	1.99		0.86	
1790-8b-12 Spk	**1/19/2004**		7.00		18.14		8.90		9.33		10.91		13.75		7.83	
1790-8b-13	**1/19/2004**		3.76		9.30		2.08		2.75		2.48		1.90		0.74	
1790-8b-14	**1/19/2004**		4.35		9.06		2.00		2.63		2.49		1.74		0.65	
1790-8b-27	**1/19/2004**		4.55		11.75		2.48		3.47		2.97		1.84		0.96	
1790-8b-28	**1/19/2004**		3.29		6.37		1.40		1.94		1.67		1.52		0.61	
1790-8b blk Spk B	**3/1/2004**		3.39		5.05		4.93		5.31		4.73		5.08		5.15	
1790-8b-15	**3/1/2004**		3.78		11.29		2.33		3.37		2.75		3.27		0.89	
1790-8b-16	**3/1/2004**		2.99		8.58		1.73		2.35		2.05		2.37		0.69	
1790-8b-29	**3/1/2004**		3.82		9.89		2.01		2.85		2.33		3.14		1.05	
1790-8b-30	**3/1/2004**		5.25		11.03		2.30		3.38		2.64		3.24		1.23	
1790-8b- Blk Spk C	**5/24/2004**		6.49		6.47		6.46		6.77		6.84		6.06		6.24	
1790-8b-17	**5/24/2004**		5.75		11.76		1.81		3.32		2.67		2.48		0.95	
1790-8b-18	**5/24/2004**		6.98		14.34		2.15		4.13		3.31		3.25		1.12	
1790-8b-31	**5/24/2004**		7.23		14.55		2.02		4.09		3.06		3.07		1.48	
1790-8b-32	**5/24/2004**		7.30		14.30		2.04		4.14		3.22		3.16		1.31	

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MSL Sample ID	Extraction Date	MIREX		Arochlor 1254		PCB-103 Surr	PCB-198 Surr	TCMX ris	HBB ris	OCN ris
1790-8b blk spk A	**12/8/2003**	0.11	U r	16.4	r	63.37%	66.31%	168.22% #	174.34% #	189.38% #
1790-8b-1	**12/8/2003**	0.47	E	28.7	E	70.58%	66.73%	149.38%	168.28% #	187.58% #
1790-8b-2	**12/8/2003**	0.93	E	54.4	E	74.45%	71.61%	140.54%	153.13% #	170.25% #
1790-8b-3	**12/8/2003**	0.99	E	57.4	E	63.32%	61.05%	134.20%	145.27%	161.00% #
1790-8b-4 (20)	**12/8/2003**	0.28	r	14.2	r	56.24%	63.83%	162.63% #	165.07% #	181.93% #
1790-8b blk	**12/15/2003**	0.11	U	4.2		79.00%	96.45%	131.23%	126.71%	140.22%
1790-8b-5	**12/15/2003**	0.78	r	47.44	E	91.29%	79.94%	140.73%	159.47% #	181.57% #
1790-8b-6	**12/15/2003**	0.63	r	35.29	E	85.88%	71.38%	136.43%	153.12% #	171.04% #
1790-8b-21	**12/15/2003**	0.48		29.75		81.61%	60.66%	130.39%	146.27%	164.37% #
1790-8b-22	**12/15/2003**	0.63	r	34.75	E	98.12%	82.35%	136.61%	151.97% #	168.53% #
1790-8b-7 Spk	**12/22/2003**	7.13		92.25		100.98%	85.97%	126.83%	137.58%	157.15% #
1790-8b-8	**12/22/2003**	1.94		128.15		78.24%	95.25%	138.01%	109.67%	114.42%
1790-8b-9	**12/22/2003**	1.81		121.9		99.15%	89.84%	121.89%	120.53%	141.34%
1790-8b-23	**12/22/2003**	1.64	r	112.11	r	96.07%	90.67%	162.71% #	158.79% #	191.08% #
1790-8b-24	**12/22/2003**	1.67		115.87		102.59%	94.09%	136.34%	124.55%	147.36%
1790-8b blk 2	**1/5/2004**	0.11	U	2.22	E	73.90%	91.85%	156.91% #	147.82%	170.18% #
1790-8b-10	**1/5/2004**	1.25		78.66	E	67.76%	61.43%	142.75%	141.34%	158.49% #
1790-8b-11	**1/5/2004**	1.28	r	84.9	E	87.61%	65.55%	129.22%	153.28% #	175.24% #
1790-8b-25	**1/5/2004**	1.43		86.44	E	58.84%	75.56%	171.81% #	144.95%	58.61%
1790-8b-26	**1/5/2004**	1.41		91.15	E	75.87%	75.92%	152.48% #	141.82%	160.22% #
1790-8b-12 Spk	**1/19/2004**	8.09		152.93		116.63%	131.88%	84.06%	70.16%	79.08%
1790-8b-13	**1/19/2004**	1.47		94.67		105.87%	94.08%	98.85%	109.02%	122.42%
1790-8b-14	**1/19/2004**	1.36		88.19		102.76%	80.42%	105.73%	122.09%	138.05%
1790-8b-27	**1/19/2004**	1.69		115.16		127.79%	106.15%	85.50%	97.95%	110.97%
1790-8b-28	**1/19/2004**	1.13		73.5		95.94%	103.89%	110.99%	104.88%	120.65%
1790-8b blk Spk B	**3/1/2004**	6.22		9.6		97.29%	133.23%	86.91%	76.70%	83.39%
1790-8b-15	**3/1/2004**	1.91		133.1		113.89%	104.98%	83.40%	81.07%	90.43%
1790-8b-16	**3/1/2004**	1.54		100.0		87.54%	88.24%	88.05%	83.34%	94.40%
1790-8b-29	**3/1/2004**	1.66		109.7		106.16%	105.29%	86.78%	82.28%	91.10%
1790-8b-30	**3/1/2004**	1.93		125.6		102.21%	95.50%	80.16%	78.71%	75.59%
1790-8b- Blk Spk C	**5/24/2004**	6.62		25.4		106.81%	122.68%	79.01%	88.13%	93.11%
1790-8b-17	**5/24/2004**	2.03		144.8		99.14%	109.34%	84.76%	91.31%	95.56%
1790-8b-18	**5/24/2004**	2.53		192.4		91.19%	115.15%	76.70%	78.14%	82.12%
1790-8b-31	**5/24/2004**	2.36		168.8		99.30%	113.26%	84.60%	91.31%	97.81%
1790-8b-32	**5/24/2004**	2.48		192.1		91.07%	112.28%	76.69%	85.41%	90.73%

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MSL Sample ID	Extraction Date	Storage Temp	Pesticides Analysis Date	Pesticides: Days held from Extraction to Analysis	Arolchlor 1254 Analysis Date	Arolchlor 1254: Days held from Extraction to Analysis	a-BHC		
BLANKS									
1790-8b blk	**12/15/2003**	**NA**	**1/17/2004**	**33**	**1/17/2004**	**33**	0.11	U	
1790-8b blk 2	**1/5/2004**	**NA**	**1/22/2004**	**17**	**1/22/2004**	**17**	0.11	U	
BLANK SPIKES									
1790-8b blk spk A	**12/8/2003**	**NA**	**1/16/2004**	**39**	**1/16/2004**	**39**	0.11	U	r
1790-8b blk Spk B	**3/1/2004**	**NA**					3.71		
1790-8b- Blk Spk C	**5/24/2004**	**NA**	**6/3/2004**	**10**	**6/3/2004**	**10**	5.16		
Spike Concentration A							5.55		
Spike Concentration B							5.55		
Spike Concentration C							5.55		
Percent Recovery A							0.00%	#	
Percent Recovery B							64.78%		
Percent Recovery C							92.95%		
MATRIX SPIKES									
1780-8 Ave							1.21		
1790-8b-7 Spk	**12/22/2003**	**-20C**	**1/21/2004**	**30**	**1/21/2004**	**30**	6.55		
1790-8b-12 Spk	**1/19/2004**	**-20C**	**1/28/2004**	**9**	**1/28/2004**	**9**	8.20		
Spike Concentration 7							5.52		
Spike Concentration 12							5.44		
Percent Recovery 7							96.66%		
Percent Recovery 12							128.42%	#	

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MSL Sample ID	Extraction Date	g-BHC		2,4-DDE		a-CHLORDANE		TRANS NONA		4,4'-DDE		2,4-DDD	
BLANKS													
1790-8b blk	**12/15/2003**	0.11 U		0.11 U		0.22		0.17		0.17		0.11 U	
1790-8b blk 2	**1/5/2004**	0.11 U		0.11 U		0.13		0.11 U		0.13		0.11 U	
BLANK SPIKES													
1790-8b blk spk A	**12/8/2003**	0.50	r	0.11 U	r	0.20	r	0.15	r	0.21	r	0.88	r
1790-8b blk Spk B	**3/1/2004**	3.64		3.39		5.05		4.93		5.31		4.73	
1790-8b- Blk Spk C	**5/24/2004**	5.67		6.49		6.47		6.46		6.77		6.84	
Spike Concentration A		5.55		5.55		5.55		5.55		5.55		5.55	
Spike Concentration B		5.55		5.55		5.55		5.55		5.55		5.55	
Spike Concentration C		5.55		5.55		5.55		5.55		5.55		5.55	
Percent Recovery A		8.95% #		0.00% #		1.19% #		2.72% #		1.49% #		15.92% #	
Percent Recovery B		65.57%		61.05%		88.69%		88.77%		93.29%		85.31%	
Percent Recovery C		102.10%		116.94%		116.59%		116.36%		121.94% #		123.20% #	
MATRIX SPIKES													
1780-8 Ave		1.23		3.69		9.03		1.99		2.67		1.26	
1790-8b-7 Spk	**12/22/2003**	5.59		7.81		14.93		7.45		9.72		5.96	
1790-8b-12 Spk	**1/19/2004**	8.13		7.00		18.14		8.90		9.27		7.17	
Spike Concentration 7		5.52		5.52		5.52		5.52		5.52		5.52	
Spike Concentration 12		5.44		5.44		5.44		5.44		5.44		5.44	
Percent Recovery 7		79.05%		74.72%		106.90%		98.98%		127.77% #		85.08%	
Percent Recovery 12		126.81% #		60.92%		167.52% #		127.11% #		121.32% #		108.64%	

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MSL Sample ID	Extraction Date	4,4'-DDD	2,4-DDT	MIREX	Arochlor 1254	PCB-103 Surr	PCB-198 Surr
BLANKS							
1790-8b blk	**12/15/2003**	0.11 U	0.11 U	0.11 U	4.2	79.00%	96.45%
1790-8b blk 2	**1/5/2004**	0.11 U	0.11 U	0.11 U	2.22	73.90%	91.85%
BLANK SPIKES							
1790-8b blk spk A	**12/8/2003**	0.11 r	0.11 U r	0.11 U r	16.4 r	63.37%	66.31%
1790-8b blk Spk B	**3/1/2004**	5.08	5.15	6.22	9.6	97.29%	133.23%
1790-8b- Blk Spk C	**5/24/2004**	6.06	6.24	6.62	25.4	106.81%	122.68%
Spike Concentration A		5.55	5.55	5.55			
Spike Concentration B		5.55	5.55	5.55			
Spike Concentration C		5.55	5.55	5.55			
Percent Recovery A		0.00% #	0.00% #	0.00% #			
Percent Recovery B		91.57%	92.80%	112.03%			
Percent Recovery C		109.13%	112.39%	119.25%			
MATRIX SPIKES							
1780-8 Ave		2.11	0.81	1.59			
1790-8b-7 Spk	**12/22/2003**	8.99	6.23	7.13	92.25	100.98%	85.97%
1790-8b-12 Spk	**1/19/2004**	13.75	7.83	8.09	152.93	116.63%	131.88%
Spike Concentration 7		5.52	5.52	5.52			
Spike Concentration 12		5.44	5.44	5.44			
Percent Recovery 7		124.57% #	98.16%	100.44%			
Percent Recovery 12		213.94% #	129.01% #	119.48%			

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MSL Sample ID	Extraction Date	TCMX ris	HBB ris	OCN ris
BLANKS				
1790-8b blk	**12/15/2003**	131.23%	126.71%	140.22%
1790-8b blk 2	**1/5/2004**	156.91% #	147.82%	170.18% #
BLANK SPIKES				
1790-8b blk spk A	**12/8/2003**	168.22% #	174.34% #	189.38% #
1790-8b blk Spk B	**3/1/2004**	86.91%	76.70%	83.39%
1790-8b- Blk Spk C	**5/24/2004**	79.01%	88.13%	93.11%
Spike Concentration A				
Spike Concentration B				
Spike Concentration C				
Percent Recovery A				
Percent Recovery B				
Percent Recovery C				
MATRIX SPIKES				
1780-8 Ave				
1790-8b-7 Spk	**12/22/2003**	126.83%	137.58%	157.15% #
1790-8b-12 Spk	**1/19/2004**	84.06%	70.16%	79.08%
Spike Concentration 7				
Spike Concentration 12				
Percent Recovery 7				
Percent Recovery 12				

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MSL Sample ID	Extraction Date	Storage Temperature	Aroclor 1260 Analysis Date	Aroclor 1242 Analysis Date	Pesticide Analysis Date	g-CHLORDANE		a-CHLORDANE		TRANS NONA	
2056 Blank 1	9/25/2003	-20C	10/2/2003	10/2/2003	10/2/2003	62.50	U	62.50	U	62.50	U
2056-1-1	9/25/2003	-20C	10/2/2003	10/2/2003	10/2/2003	4506.70		5111.45		3063.27	
2056-1-2	9/25/2003	-20C	10/2/2003	10/2/2003	10/2/2003	4153.74		4685.38		2865.40	
2056-1-3	9/25/2003	-20C	10/2/2003	10/2/2003	10/2/2003	5988.78		6595.08		4079.23	
2056-1-4	9/25/2003	-20C	10/2/2003	10/2/2003	10/2/2003	6656.28		7493.35		4705.70	
2056-1-5	10/02/03	-20C	10/31/2003	10/31/2003	10/31/2003	5219.43		5844.65		3648.83	
2056-1-6	10/02/03	-20C	10/31/2003	10/31/2003	10/31/2003	2348.28	E	2821.81	E	1690.18	
2056-1-21	10/02/03	4C	10/31/2003	10/31/2003	10/31/2003	5397.90		6021.90		3768.89	
2056-1-22	10/02/03	4C	10/31/03	10/31/2003	10/31/2003	5107.54		5715.59		3569.86	
2056-1 Spk Blk A	10/02/03	NA	10/31/03	10/31/2003	10/31/2003	1964.27		2706.45		62.50	U
2056-1-7 MS	10/9/2003	-20C	11/1/2003	11/1/2003	11/1/2003	9684.58		10758.57		4824.32	
2056-1-8	10/9/2003	-20C	11/1/2003	11/1/2003	11/1/2003	5533.67		6176.27		3804.62	
2056-1-9	10/9/2003	-20C	11/1/2003	11/1/2003	11/1/2003	7260.37		7995.00		4985.15	
2056-1-23	10/9/2003	4C	11/1/2003	11/1/2003	11/1/2003	5374.99		6065.01		3773.27	
2056-1-24	10/9/2003	4C	11/1/2003	11/1/2003	11/1/2003	3574.41	r	4088.98	r	2534.55	
2056-1 Blank 2	10/23/2003	NA	11/1/2003	11/1/2003	11/1/2003	62.50	U	62.50	U	62.50	U
2056-1-10	10/23/2003	-20C	11/1/2003	11/1/2003	11/1/2003	5827.50		6526.00		4042.63	
2056-1-11	10/23/2003	-20C	11/1/2003	11/1/2003	11/1/2003	7363.31		8091.35		5180.12	
2056-1-25	10/23/2003	4C	11/1/2003	11/1/2003	11/1/2003	4947.25		5555.65		3475.13	
2056-1-26	10/23/2003	4C	11/1/2003	11/1/2003	11/1/2003	3779.94	r	4308.55	r	2694.14	
2056-1 Spk Blk B	12/18/2003	NA	1/24/2004	1/24/2004	1/24/2004	2605.84		3223.06		55.56	U
2056-1-15	12/18/2003	-20C	1/24/2004	1/24/2004	1/24/2004	7795.42		8182.71		5310.80	
2056-1-16	12/18/2003	-20C	1/24/2004	1/24/2004	1/24/2004	7729.30		8052.02		5246.33	
2056-1-29	12/18/2003	4C	1/24/2004	1/24/2004	1/24/2004	8137.04		8493.33		5521.57	
2056-1-30	12/18/2003	4C	1/24/2004	1/24/2004	1/24/2004	7594.36		7959.89		5252.04	
2056-1-12 MS	11/6/2003	-20C	11/19/2003	11/19/2003	11/19/2003	9066.92		10168.05		4118.55	
2056-1-13	11/6/2003	-20C	11/19/2003	11/19/2003	11/19/2003	6020.98		6602.86		4145.63	
2056-1-14	11/6/2003	-20C	11/19/2003	11/19/2003	11/19/2003	7646.19		7896.78		5054.39	
2056-1-27	11/6/2003	4C	11/19/2003	11/19/2003	11/19/2003	6859.77		7068.64		4486.34	
2056-1-28	11/6/2003	4C	11/19/2003	11/19/2003	11/19/2003	6003.33		6289.87		3967.55	
2056-1 Spk Blk C	3/11/2004	NA	3/16/2004	3/16/2004	3/16/2004	2456.92	r	3204.48	r	62.50	U
2056-1-17	3/11/2004	-20C	3/16/2004	3/16/2004	3/16/2004	6383.76	r	7513.58	r	4609.32	
2056-1-18	3/11/2004	-20C	3/16/2004	3/16/2004	3/16/2004	5882.05	r	6143.78	r	4181.56	
2056-1-31	3/11/2004	4C	3/17/2004	3/17/2004	3/17/2004	5830.76	r	6162.69	r	4144.59	
2056-1-32	3/11/2004	4C	3/17/2004	3/17/2004	3/17/2004	5533.64	r	5840.46	r	3978.01	

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BATTELLE MARINE SCIENCES LAI
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360-681-4583

MSL Sample ID		Arochlor 1242		Arochlor 1260		PCB-103 Surr		PCB-198 Surr		TCMX ris	HBB ris	OCN ris	PCB 8			PCB 52
2056 Blank 1		1250.0	U	1250.0	U	87.30%		88.85%		118.79%	120.73%	144.73%	62.50	U		125.65
2056-1-1		24177.9		8207.6		84.80%		76.16%		125.21%	134.51%	163.35% #	344.05			645.93
2056-1-2		24518.1		10114.8		78.71%		73.51%		115.35%	121.71%	145.01%	319.97			635.95
2056-1-3		29845.8		12763.2		105.32%		103.34%		107.52%	111.49%	134.99%	536.22			864.27
2056-1-4		26415.3		11526.1		88.63%		86.82%		116.41%	126.58%	152.67% #	470.63			721.73
2056-1-5		26728.2		10937.8		89.86%		91.24%		121.84%	119.66%	143.13%	475.15			884.05
2056-1-6	E	21027.2	E	7013.5	E	46.61%	#	45.08%	#	138.29%	131.71%	153.58% #	249.54	E		852.48
2056-1-21		26392.6		13975.1		98.76%		92.23%		114.61%	122.09%	144.38%	506.50			929.65
2056-1-22		26845.4		10450.0		93.23%		85.62%		124.67%	132.86%	158.74% #	488.05			874.47
2056-1 Spk Blk A		1250.0	U	12033.6		95.04%		94.68%		128.73%	115.87%	136.68%	62.50	U		62.50
2056-1-7 MS		27922.98		24759.00		122.14%		123.63%		99.99%	97.39%	121.73%	58.48	U		1124.50
2056-1-8		31721.71		11647.60		109.03%		99.39%		84.77%	90.28%	107.14%	580.47			1012.57
2056-1-9		36796.08		13394.13		134.26%		121.68%		92.76%	102.21%	124.21%	758.80			1287.46
2056-1-23		25479.28	E	10838.90		96.41%		82.60%		143.23%	159.72% #	188.46% #	565.98			860.36
2056-1-24	r	23057.99	r	7494.27	r	63.54%	#	61.68%		204.55% #	206.48% #	244.82% #	438.13		r	580.22
2056-1 Blank 2		1250.00		1250.00		102.97%		97.50%		120.04%	121.08%	138.29%	62.50	U		62.50
2056-1-10		28725.92		14207.29		106.18%		108.44%		113.91%	110.55%	134.35%	525.77			977.03
2056-1-11		29429.26		14082.39		111.80%		105.21%		112.59%	118.00%	144.16%	595.27			1029.13
2056-1-25		29211.35		11774.98		87.11%		90.59%		147.49%	136.58%	167.49% #	519.05			786.35
2056-1-26	r	21316.36	r	8312.50	r	70.77%	#	62.70%		175.51% #	191.71% #	225.87% #	356.97		r	617.37
2056-1 Spk Blk B		1111.11	E	11226.50		103.01%		89.10%		135.16%	162.36% #	165.37% #	55.56	U		55.56
2056-1-15		30426.96		14759.55		116.99%		105.66%		119.99%	127.19%	148.90%	604.52			748.84
2056-1-16		32165.07		15208.49		107.08%		103.20%		141.59%	149.52%	175.79% #	630.89			721.57
2056-1-29		35173.17		14953.08		108.40%		100.49%		126.59%	133.07%	152.28% #	759.89			789.99
2056-1-30		29957.54		15394.04		105.12%		98.28%		128.70%	138.11%	166.70% #	638.27			731.26
2056-1-12 MS		22741.5		24370.9		126.93%		118.39%		96.46%	94.45%	120.91%	60.02	U		1077.81
2056-1-13		25819.9		12073.4		102.96%		97.44%		107.95%	102.97%	130.39%	438.10			899.05
2056-1-14		32912.7		16397.6		131.60%		112.63%		95.64%	92.32%	117.31%	857.29			1036.66
2056-1-27		36196.0		16126.0		118.94%		107.43%		99.33%	98.18%	124.12%	924.87			959.20
2056-1-28		28566.1		13855.8		101.66%		82.27%		123.25%	126.45%	156.55% #	749.01			805.84
2056-1 Spk Blk C	r	1250.0	E	11965.1	E	56.32%		85.49%		161.52% #	80.38%	74.73%	62.50	U	r	62.50
2056-1-17	r	25112.0	E	12822.9	E	103.63%		98.78%		167.88% #	86.21%	91.02%	806.97		r	769.05
2056-1-18	r	20028.8	E	11096.7	E	97.43%		95.85%		168.68% #	86.01%	90.46%	741.23		r	769.63
2056-1-31	r	21524.7	E	14464.8	E	100.43%		97.00%		174.43% #	88.33%	93.42%	653.58		r	750.94
2056-1-32	r	20921.4	E	8733.6	E	97.37%		96.37%		176.45% #	93.73%	96.16%	682.93		r	737.07

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Sequim, Washington 98382
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MSL Sample ID			PCB 153			PCB 138			PCB 187			PCB 180			PCB 170		
2056 Blank 1			62.50	U		62.50	U		62.50	U		0.00	U		62.50	U	
2056-1-1			1305.78			810.53			391.43			773.24			473.89		
2056-1-2			1308.52			819.01			379.16			741.56			491.66		
2056-1-3			1764.89			1130.71			512.68			1052.74			657.81		
2056-1-4			1474.30			948.19			415.17			858.46			553.53		
2056-1-5			1767.88			1082.88			487.15			1049.53			627.82		
2056-1-6	E		1176.45		E	630.07		E	287.94		E	657.63		E	407.40		E
2056-1-21			2139.99			1286.96			611.01			1230.17			776.04		
2056-1-22			1659.67			1004.16			450.22			957.10			581.95		
2056-1 Spk Blk A	U		62.50	U		62.50	U		704.60			1400.50			62.50		
2056-1-7 MS			4622.27			58.48	U		1389.57			2896.37			58.48	U	
2056-1-8			1850.59			1098.73			481.89			969.55			653.04		
2056-1-9			2259.72			1330.44			585.80			1151.24			762.82		
2056-1-23			1732.18		r	975.87		r	429.11		r	921.43		r	564.38		r
2056-1-24		r	1222.95		r	700.26		r	329.72		r	675.06		r	424.49		r
2056-1 Blank 2	U		62.50	U		62.50	U		62.50	U		62.50	U		62.50	U	
2056-1-10			2223.33			1345.07			648.13			1274.69			844.06		
2056-1-11			2216.04			1350.79			633.97			1309.61			804.48		
2056-1-25			1923.18			1160.59			524.35			1032.52			682.92		
2056-1-26		r	1352.42		r	789.80		r	374.59		r	731.30		r	492.40		r
2056-1 Spk Blk B	U		55.56	U	r	55.56	U	r	638.98		r	874.60		r	55.56	U	r
2056-1-15			986.03			1179.78			662.25			933.21			466.95		
2056-1-16			1035.37			1240.57			706.91			1014.39			511.99		
2056-1-29			842.04			1058.50			618.32			857.80			414.84		
2056-1-30			994.05			1252.81			735.05			1118.62			568.83		
2056-1-12 MS			3831.40			60.02	U		1288.26			2324.86			60.02	U	
2056-1-13			1665.03			1006.33			468.88			1018.82			586.30		
2056-1-14			1967.13			1432.37			494.68			1193.48			660.19		
2056-1-27			1349.31			1062.19			309.23			787.20			459.36		
2056-1-28			1496.73			1098.84			402.35			957.85			517.46		
2056-1 Spk Blk C	U	r	62.50	U		62.50	U		778.33			1070.41			62.50	U	
2056-1-17		r	1197.08			1317.54			685.32			1146.17			916.88		
2056-1-18		r	1027.55			1138.21			586.23			929.75			750.49		
2056-1-31		r	1372.50			1477.99			842.96			1710.43			908.81		
2056-1-32		r	789.75			934.10			460.69			805.26			633.30		

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BATTELLE MARINE SCIENCES LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382
360-681-4583

	MSL Sample ID	Extraction Date	Storage Temperature	Aroclor 1260 Analysis Date	Aroclor 1242 Analysis Date
BLANKS					
	2056 Blank 1	**9/25/2003**	**-20C**	**10/2/2003**	**10/2/2003**
	2056-1 Blank 2	**10/23/2003**	**NA**	**11/1/2003**	**11/1/2003**
BLANK SPIKES					
	2056-1 Spk Blk A	**10/02/03**	**NA**	**10/31/03**	**10/31/2003**
	2056-1 Spk Blk B	**12/18/2003**	**NA**	**1/24/2004**	**1/24/2004**
	2056-1 Spk Blk C	**3/11/2004**	**NA**	**3/16/2004**	**3/16/2004**
Spike Concentration BSA					
Spike Concentration BSB					
Spike concentration BSC					
Perceny Recovery BSA					
Perceny Recovery BSB					
Perceny Recovery BSC					
MATRIX SPIKES					
	2056-1-7 MS	**10/9/2003**	**-20C**	**11/1/2003**	**11/1/2003**
	2056-1-12 MS	**11/6/2003**	**-20C**	**11/19/2003**	**11/19/2003**
2056-1 (ave)					
Spike Concentration 7-MS					
Spike Concentration 12-MS					
Percent Recovery 7-MS					
Percent Recovery 12-MS					

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MSL Sample ID	Pesticide Analysis Date	g-CHLORDANE		a-CHLORDANE		TRANS NONA		
BLANKS								
2056 Blank 1	**10/2/2003**	62.50	U	62.50	U	62.50	U	
2056-1 Blank 2	**11/1/2003**	62.50	U	62.50	U	62.50	U	
BLANK SPIKES								
2056-1 Spk Blk A	**10/31/2003**	1964.27		2706.45		62.50	U	
2056-1 Spk Blk B	**1/24/2004**	2605.84		3223.06		55.56	U	
2056-1 Spk Blk C	**3/16/2004**	2456.92	r	3204.48	r	62.50	U	r
Spike Concentration BSA		3125.00		3125.00		NS		
Spike Concentration BSB		2777.78		2777.78		NS		
Spike concentration BSC		3125.00		3125.00		NS		
Perceny Recovery BSA		62.86		86.61				
Perceny Recovery BSB		93.81		116.03				
Perceny Recovery BSC		78.62		102.54				
MATRIX SPIKES								
2056-1-7 MS	**11/1/2003**	9684.58		10758.57		4824.32		
2056-1-12 MS	**11/19/2003**	9066.92		10168.05		4118.55		
2056-1 (ave)		5873.45		6403.67		4063.54		
Spike Concentration 7-MS		2923.98		2923.98		NS		
Spike Concentration 12-MS		3001.20		3001.20		NS		
Percent Recovery 7-MS		130.34	#	148.94	#			
Percent Recovery 12-MS		106.41		125.43	#			

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MSL Sample ID	Arochlor 1242			Arochlor 1260		PCB-103 Surr		PCB-198 Surr	
BLANKS									
2056 Blank 1	1250.0	U		1250.0	U	87.30%		88.85%	
2056-1 Blank 2	1250.00			1250.00		102.97%		97.50%	
BLANK SPIKES									
2056-1 Spk Blk A	1250.0	U		12033.6		95.04%		94.68%	
2056-1 Spk Blk B	1111.11		E	11226.50		103.01%		89.10%	
2056-1 Spk Blk C	1250.0		E	11965.1	E	56.32%		85.49%	
Spike Concentration BSA									
Spike Concentration BSB									
Spike concentration BSC									
Perceny Recovery BSA									
Perceny Recovery BSB									
Perceny Recovery BSC									
MATRIX SPIKES									
2056-1-7 MS	27922.98			24759.00		122.14%		123.63%	
2056-1-12 MS	22741.5			24370.9		126.93%		118.39%	
2056-1 (ave)									
Spike Concentration 7-MS									
Spike Concentration 12-MS									
Percent Recovery 7-MS									
Percent Recovery 12-MS									

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MSL Sample ID	TCMX ris	HBB ris	OCN ris	PCB 8			PCB 52			PCB 153		PCB 138	
BLANKS													
2056 Blank 1	118.79%	120.73%	144.73%	62.50	U		125.65			62.50	U	62.50	U
2056-1 Blank 2	120.04%	121.08%	138.29%	62.50	U		62.50	U		62.50	U	62.50	U
BLANK SPIKES													
2056-1 Spk Blk A	128.73%	115.87%	136.68%	62.50	U		62.50	U		62.50	U	62.50	U
2056-1 Spk Blk B	135.16%	162.36% #	165.37% #	55.56	U		55.56	U		55.56	U	55.56	U
2056-1 Spk Blk C	161.52% #	80.38%	74.73%	62.50	U	r	62.50	U	r	62.50	U	62.50	U
Spike Concentration BSA				NA			NA			NA		NA	
Spike Concentration BSB				NA			NA			NA		NA	
Spike concentration BSC				NA			NA			NA		NA	
Perceny Recovery BSA													
Perceny Recovery BSB													
Perceny Recovery BSC													
MATRIX SPIKES													
2056-1-7 MS	99.99%	97.39%	121.73%	58.48	U		1124.50			4622.27		58.48	U
2056-1-12 MS	96.46%	94.45%	120.91%	60.02	U		1077.81			3831.40		60.02	U
2056-1 (ave)													
Spike Concentration 7-MS				NA			NA			NA		NA	
Spike Concentration 12-MS				NA			NA			NA		NA	
Percent Recovery 7-MS													
Percent Recovery 12-MS													

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Sequim, Washington 98382
360-681-4583

	MSL Sample ID	PCB 187		PCB 180		PCB 170	
BLANKS							
	2056 Blank 1	62.50	U	0.00	U	62.50	U
	2056-1 Blank 2	62.50	U	62.50	U	62.50	U
BLANK SPIKES							
	2056-1 Spk Blk A	704.60		1400.50		62.50	
	2056-1 Spk Blk B	638.98		874.60		55.56	U
	2056-1 Spk Blk C	778.33		1070.41		62.50	U
Spike Concentration BSA		NA		NA		NA	
Spike Concentration BSB		NA		NA		NA	
Spike concentration BSC		NA		NA		NA	
Perceny Recovery BSA							
Perceny Recovery BSB							
Perceny Recovery BSC							
MATRIX SPIKES							
	2056-1-7 MS	1389.57		2896.37		58.48	U
	2056-1-12 MS	1288.26		2324.86		60.02	U
2056-1 (ave)							
Spike Concentration 7-MS		NA		NA		NA	
Spike Concentration 12-MS		NA		NA		NA	
Percent Recovery 7-MS							
Percent Recovery 12-MS							

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Appendix F

Metals Data for the Sinclair Sediment and Wilmington Soil

Sinclair Sediment

Age of Sediment days	Dry As	Dry Cu	Dry Pb	Dry Zn	Wet As	Wet Cu	Wet Pb	Wet Zn
	μg/g				μg/g			
0	23.4	548	DR[1]	456	23.4	548	DR[1]	456
0	24.4	542	149	515	24.4	542	149	515
0	22.1	517	191	437	22.1	517	191	437
0	21.6	496	180	473	21.6	496	180	473
0	20.8	419	135	469	20.8	419	135	469
92	22.7	490	151	481	22.3	642	167	484
92	17.5	487	167	422	21.1	454	142	445
182	19.3	508	151	448	23.6	574	179	512
216	16.2	511	134	414	17.9	538	156	456
283	23.2	490	258	465	24.5	447	154	476
283	21.0	454	249	440	26.0	535	228	485
391	18.3	414	232	403	20.2	462	147	429
391	18.9	453	160	407	24.0	460	151	455
mean	20.7	486.9	179.7	448.4	22.5	510.4	164.9	468.6
STD	2.51	41.77	43.70	32.61	2.18	61.80	26.08	26.12
CV	12.09	8.58	24.32	7.27	9.69	12.11	15.82	5.57

[1] DR = Data removed because of possible contamination

Wilmington Soil

Age of Sediment days	Dry As	Dry Cu	Dry Pb	Dry Zn	Wet As	Wet Cu	Wet Pb	Wet Zn
	µg/g				µg/g			
0	60.6	128	5140	DR[1]	60.6	128	5140	DR[1]
0	63.4	129	5700	57.1	63.4	129	5700	57.1
0	65.0	111	5280	66.2	65.0	111	5280	66.2
0	60.5	121	6010	65.0	60.5	121	6010	65.0
0	67.7	120	6250	57.5	67.7	120	6250	57.5
90	66.0	131	7270	60.6	71.8	141	7440	77.2
90	59.3	116	5960	52.2	61.4	121	5750	67.9
183	71.6	144	8139	65.0	62.3	125	7020	63.0
183	61.2	123	6883	68.0	63.0	123	6160	61.1
280	56.9	146	5820	70.9	62.2	133	4980	55.9
280	54.2	129	5600	65.4	58.9	138	6570	74.6
392	60.2	127	4874	69.4	59.9	122	4484	56.3
392	59.9	124	4804	66.6	68.8	113	4660	50.9
mean	62.0	126.8	5979.2	63.7	63.5	125.0	5803.4	62.7
STD	4.64	9.84	968.90	5.62	3.83	8.77	893.00	7.89
CV	7.48	7.76	16.20	8.83	6.03	7.02	15.39	12.57

[1] DR = Data removed because of possible contamination

United States
Environmental Protection
Agency

Office of Research
and Development (8101R)
Washington, DC 20460

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