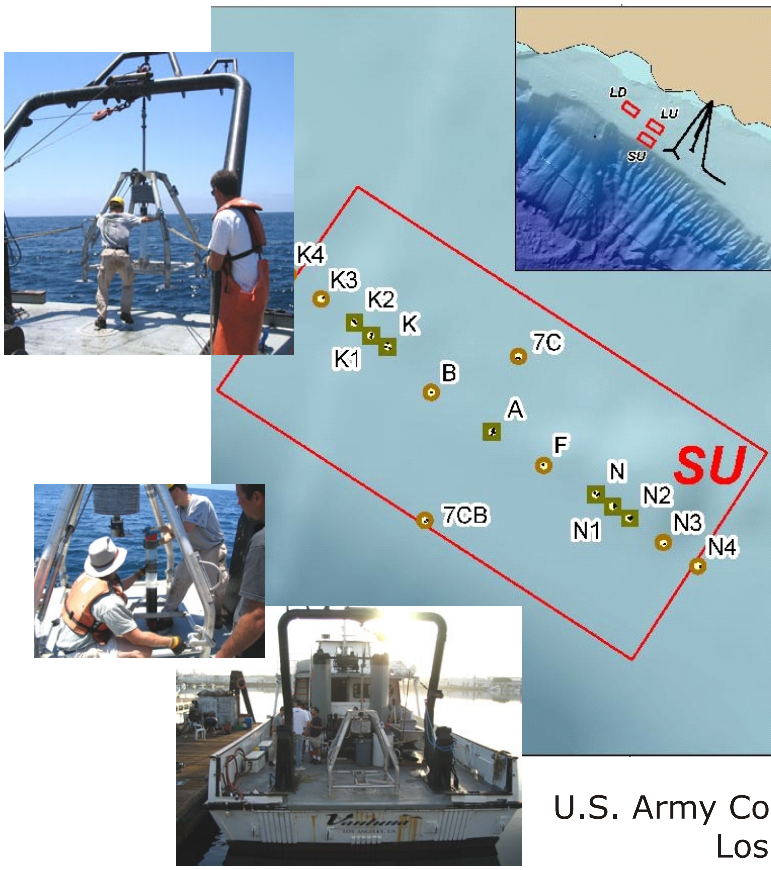
FINAL REPORT FOR THE SUMMER 2004 SEDIMENT DISPLACEMENT STUDY ON THE PALOS VERDES SHELF



July 2005

Prepared for:
U.S. Army Corps of Engineers
Los Angeles District
915 Wilshire Boulevard
Los Angeles, CA 90017

U.S. Environmental Protection Agency
Region IX
Superfund Division (SFD-7-1)
75 Hawthorne Street
San Francisco, CA 94105

Prepared by:
Science Applications International Corporation
10260 Campus Point Drive
San Diego, CA 92121

SAIC Report Number 681

FINAL REPORT FOR THE
SUMMER 2004 SEDIMENT DISPLACEMENT STUDY
CONDUCTED ON THE PALOS VERDES SHELF

PREPARED FOR:

**U.S. ARMY CORPS
OF ENGINEERS**

**Los Angeles District
915 Wilshire Boulevard
Los Angeles, CA 90017**

**U.S. ENVIRONMENTAL
PROTECTION AGENCY
Region IX
Superfund Division (SFD-7-1)
75 Hawthorne Street
San Francisco, CA 94105**

JULY 2005

PREPARED BY:

**SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
10260 CAMPUS POINT DRIVE
SAN DIEGO, CA 92121**

SAIC Report Number 681

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

The Summer 2004 Sediment Displacement Study evaluated the magnitude and extent of sediment displacement in Cell SU as a result of cap placement operations conducted in 2000 on the Palos Verdes Shelf. This study objective was addressed by collecting and analyzing a series of sediment cores from specific sites within Cell SU, located at varying distances from cap placement positions, and evaluating changes in core depths of specific DDE concentration profile markers as an indicator of scouring. A secondary objective was to evaluate the comparability of the sediment coring methods used for this study with those used by the Los Angeles County Sanitation District (LACSD) for their long-term sediment study. This objective was addressed by conducting an intercalibration exercise and comparing contaminant profiles from co-located cores.

The depths of subsurface DDE peak concentrations, which were used as markers in sediment cores, exhibited some variability with distance from cap placement locations K and N in Cell SU. Nevertheless, the depths of the DDE peaks were slightly greater within 50 m of a placement site than at distances of 100 to 150 m from the placement site. The greater depth to the subsurface DDE peak near the placement site reflected the presence of a thicker cap layer than at locations 100 to 150 m from the placement site. The results suggested that scouring of effluent-affected sediments caused by cap placement at these locations was relatively minimal, with estimated maximum scouring depths up to 5 cm. This was consistent with the original cap placement strategy that attempted to overlap each successive cap placement to minimize potentials for resuspension and displacement from dumping cap materials directly on the contaminated surface sediments. In contrast, the results for a site in the center of Cell SU (Station A) that received the initial five placement loads were different from those observed near Stations K and N. Core profiles from Station A showed considerable replicate variability. In one core, the peak DDE concentrations occurred at a depth that was up to 17 cm shallower than at the K and N stations, whereas another core contained uniformly low DDE concentrations with no subsurface peaks. These results probably reflected localized scouring due to cap placement directly on top of shelf sediments, combined with relatively large spatial variability in the distribution and thickness of the cap layer at this site.

Results from the intercalibration exercise showed general agreement between the DDE concentration profiles obtained using the LACSD gravity core and the piston core that was used to collect cores for the sediment displacement portion of the study. The lengths of cores obtained using both methods were comparable. On average, sediment cores collected using the piston core had peak DDE concentrations that were slightly deeper than those in profiles of cores obtained using the gravity core. However, the magnitude of the differences between the two methods was comparable to differences among replicate cores, which appeared to be related to small-scale spatial variability. Overall, the results indicated that the coring methods used for the present study should provide data that are directly comparable to data collected by the LACSD long term sediment study.

1.0 INTRODUCTION

1.1 BACKGROUND

The U.S. Environmental Protection Agency (EPA) Region 9 is evaluating alternatives for remediation of contaminated sediments on the Palos Verdes (PV) Shelf off the coast of Los Angeles, California. One remediation alternative under consideration is in-situ capping, which involves placement of a covering or cap of clean material over contaminated sediment, thereby isolating the contaminated material. EPA is collaborating with the U.S. Army Corps of Engineers (USACE) to conduct field studies related to the evaluation of the capping alternatives.

During recent technical meetings of the EPA-sponsored, interagency PV Shelf project team, it was determined that additional field measurements, data analyses, and modeling efforts are needed to support EPA's ongoing review and interpretation of the results from the PV Pilot Cap Monitoring Program (Fredette et al. 2002), as well as to provide input during preparation of the Remedial Investigation and Feasibility Study (RI/FS). To focus these efforts, data quality objectives (DQOs) were drafted and technical experts were assembled in discipline-specific meetings to prioritize significant data gaps. As a result of these planning activities, four field studies were identified as high-priority activities to be initiated in 2004. One of these was a sediment displacement study that required collection and analyses of sediment cores within an existing pilot capping cell to assess the degree of scouring or displacement of Effluent-Affected (EA) material that occurred during cap placement operations.

A Preliminary Study Plan (PSP) (SAIC 2004a) was developed for this study in consultation with key technical representatives from the Federal Government (EPA, USACE, and United States Geological Survey [USGS]) who are presently involved in the PV studies program and/or were involved in prior scientific studies on the PV Shelf. A subset of these government representatives also represent the group of scientists that is likely to conduct numerical modeling of resuspension and transport of sediments on the PV Shelf, which is a separate but key element of EPA's assessment of remedial alternatives.

An Investigation Work Plan (IWP) was prepared by SAIC (2004b) and approved by EPA and USACE. The IWP detailed the problem statement and DQOs, as well as the field investigation and analyses needed to evaluate the extent of sediment displacement associated with cap placement in Cell SU. The problem statement and DQOs for this study are described below.

1.2 PROBLEM DEFINITION

The primary objective of EPA's pilot capping project was to demonstrate whether a cap could be placed on the PV Shelf as intended by the design (Fredette et al. 2002). Therefore, the capping demonstration project was primarily an engineering test to assess cap placement feasibility using a variety of material types and placement techniques, at sites having different water depths and bottom slopes. Although valuable information was obtained from this pilot capping study, other questions concerning the feasibility and effectiveness of capping on the PV Shelf have been identified that were not addressed as part of the capping demonstration study.

As mentioned, this Sediment Displacement Study addresses questions pertaining to the degree of EA sediment disturbance that occurred during cap placement. The key question for this measurement element, identified in the DQO matrix table for the PV Shelf RI/FS, is as follows:

Question FS-6 of the Feasibility Study: What is the thickness of surface EA sediment displaced and what is the spatial extent of EA displacement associated with a placement event?

Accurate assessments of whether EA sediments were displaced as a result of conventional (point dump) placement events during the pilot capping project are important requirements for evaluating the constructability of a full-scale sediment cap on the PV Shelf. At present, sufficient data for assessing the potential magnitude and spatial extent of this impact are unavailable, and the key question of whether disturbances to in-place sediments can be minimized cannot be completely resolved. These data gaps were addressed by: (1) collecting sediment cores from specific locations within Cell SU using methods that do not disturb sediments or introduce significant sampling artifacts; (2) analyzing core layers for geotechnical and chemical properties; and (3) comparing these profiles for locations at varying distances from sites experiencing single and multiple placement events. The data obtained from the Sediment Displacement Study will be used in conjunction with the data obtained from the other multidisciplinary surveys, and sediment transport and cap stability modeling, to assess the feasibility of capping contaminated sediments to isolate them from the environment. This investigation will greatly benefit both the FS and the engineering design of a cap for the PV Shelf.

This study included the following primary tasks:

- Demonstrate the performance of the hydraulically-damped piston corer, and collect and analyze cores that can be used to intercalibrate the present sampling methods with the gravity coring method used in the Los Angeles County Sanitation District's (LACSD) long-term study of contaminated shelf sediments;
- Collect undisturbed sediment cores at selected sites within and adjacent to a pilot capping cell, and analyze specific geotechnical and chemical characteristics of the sediment cores;
- Review core data collected by LACSD and USGS prior to and after placement of the pilot cap; and
- Review the post-capping side-scan sonar records and sediment-profile image (SPI) data for the pilot capping cells to support interpretations of the sediment core data.

1.3 DQOs FOR THE EA SEDIMENT DISPLACEMENT INVESTIGATION

DQOs are qualitative and quantitative statements that clarify the study objectives; define the most appropriate types of data to collect to address the study objectives; determine the most appropriate conditions under which to collect data; and specify acceptable levels of decision errors that are used to establish the quantity and quality of data needed for decision-making (USEPA 1994). Implementation of the DQO planning process is intended to ensure an adequate quantity and quality of data to achieve project objectives, without unnecessary, duplicative, or overly precise data to minimize project costs.

In accordance with EPA guidance (USEPA 1994), Table 1-1 outlines the seven steps in the DQO planning process for the Sediment Displacement Study. Substantial coordination of the technical team went into developing the survey approach, as finalized in the IWP (SAIC 2004b), to ensure the type, quantity, and quality of data collected were appropriate for answering questions about remedial alternatives, including the feasibility of capping contaminated sediments to isolate them from human and ecological receptors.

Information in the table is supported by additional details pertaining to the decision inputs (survey elements); limits on decision errors (measures to ensure reasonable quality data); and study design optimization for each survey element (coring survey, laboratory analysis). The objectives and approach for the Sediment Displacement Study are summarized in Table 1-2.

Table 1-1. DQO Process for the Sediment Displacement Study.

DQO Process	
State the problem	EPA has insufficient data from the PV Pilot Cap Monitoring Program to evaluate whether capping will successfully isolate EA sediment to prepare a FS. Comparisons of previously conducted post-capping surveys suggest that EA sediment displacement and/or erosion of cap material may be occurring which would compromise the integrity and functionality of the cap.
Identify the decision to be made	Information on sediment displacement in the pilot capping cells will be used to decide the feasibility of alternatives presented in the FS (e.g., is it feasible to cap contaminated sediments in-situ and will this achieve the desired isolation of contaminants?).
Identify inputs to the decision	1) Cores collected at specific sampling locations will be evaluated to ensure the validity of the coring methods; 2) Information obtained from cores collected at cap placement sites and successive distances away from the cap placement sites will be assessed for EA sediment displacement; 3) Cores will be analyzed for standard geotechnical properties (grain size, bulk density, water content, total organic content) and sediment chemistry (DDT and metabolites) to distinguish between EA sediments and cap material.
Define boundaries of the study	The study region shown in Figure 1-1 encompasses the pilot capping cells and immediate vicinity. Temporal boundaries are determined based on the validity of using previous data sets for comparisons. A one-time intercalibration exercise with LACSD is included in the current effort.
Specify limits on decision errors	Professional judgment is used in conjunction with standard data collection methods to ensure data are of reasonable quality for these assessments. Specific data quality assessments are provided for each survey element in the following sections of the report.
Develop a decision rule	The decision is what is the thickness of surface EA sediment displaced during capping and what is the spatial extent of EA displacement associated with a placement event. Results from this investigation will be evaluated in conjunction with numerical modeling of sediment transport, including the effect of bioturbation on sediment stability, to develop a decision rule regarding capping feasibility.
Optimize the design for obtaining the data	1) The first phase of the field survey program consists of a coring intercalibration exercise to determine if the coring method collects representative and suitable-length cores. 2) The second phase of the field survey program consists of collecting cores within the pilot capping cell to assess the extent of EA sediment displacement with distance from each placement site. 3) Geotechnical properties and contaminant concentrations is used to distinguish cap material and EA sediment.

Table 1-2. Objectives and Approach for the Sediment Displacement Study.

Survey Objectives	End Use of Data: Feasibility Study Question 6*	Survey Approach/Design Optimization	Limits on Decision Errors
(1a) Determine whether the OSU piston corer can collect sediment cores of adequate length and quality to achieve other study measurement objectives.	This objective ensures that the proper coring equipment is used for objective (2) below and to achieve the overall program objectives in support of fully addressing FS Question 6.	Collect 27 cores at 13 sampling locations in Cell SU. Measure core lengths; split and photograph individual cores, and evaluate visually for evidence of disturbance of core features (e.g., surface layer disruption, washing, smearing) by the corer.	Samples must be collected within 5 m of target coordinates and navigational accuracy should be ± 3 m. Minimum core penetration of 50 cm or depth of the base of EA sediment layer and undisturbed core surface and subsurface layers.
(1b) Determine whether core DDE profiles obtained using the OSU piston corer are comparable to those obtained using the LACSD gravity corer.	Sediment chemistry (DDE) profiles in cores collected with different coring devices at the same locations were compared following completion of laboratory analysis to confirm the representativeness and comparability of the data sets.	Collect paired cores and analyze for DDE concentrations at 2-cm intervals to a depth of 60 cm. Based on field schedules for coring, results were not available prior to the start of survey element (2); however, this provides useful information.	Chemical (DDE concentration) profiles from the paired cores are compared qualitatively.
(2) Determine the thickness and spatial extent of surface EA sediment displaced laterally by point cap placement event(s).	Results directly address Question FS-6.	Collect cores at specific transect locations associated with individual cap placement events. Subsample cores at 4-cm intervals for DDT compounds, bulk density, total organic carbon (TOC), and grain size.	Sample location accuracy as described above. Minimum core penetration of 50 cm or depth of the base of EA sediment layer and undisturbed core surface and subsurface layers. Chemical profiles, particularly the depth of the subsurface DDE peak, from cores from different locations are assessed as a function of distance from specific cap placement sites.

*** Question FS-6 of the Feasibility Study:** What is the thickness of surface EA sediment displaced and what is the spatial extent of EA displacement associated with a placement event?

1.4 SITE DESCRIPTION

The following sections provide a brief description of site history and site characteristics that are related to this study element.

The PV Shelf is located within the Southern California Bight (an area of the coastal Pacific Ocean between Point Conception, California and Cape Colnett, Baja California), and offshore from Point Fermin to the northwest side of the PV peninsula (Figure 1-1). Contaminated sediments are present on the continental shelf and adjacent slope. The continental shelf in this region is narrow, with a width of 1.5 to 4 kilometers (km) and a bottom slope of 1 to 4 degrees. A shelf break (i.e., a zone of transition from the relatively flat shelf to the steeper slope) occurs at water depths of 70 to 100 meters (m). The continental slope extends seaward from the shelf, with a width of approximately 3 km and a mean slope of 13 degrees (Lee 1994), to a depth of approximately 800 m.

In 1937, LACSD initiated wastewater discharges to the PV Shelf from an outfall off White Point. As wastewater flows to the Joint Water Pollution Control Plant (JWPCP) increased over the years, LACSD constructed additional outfalls that extended approximately 3 km offshore from White Point to a water depth of 63 m (Drake et al. 1994). The JWPCP outfalls have discharged approximately 4 million tons of suspended solids since 1937, 50 percent of which was discharged between 1964 and 1976. Starting in 1947, Montrose Chemical Corporation produced the organochlorine pesticide 1,1,1-trichloro-2,2-bis(p-chlorophenyl) ethane (DDT) at a manufacturing plant in Los Angeles County. Wastes from the manufacturing process, containing DDT residues, were discharged to the JWPCP until 1971, and a large amount of the DDT was subsequently released with the effluent from the JWPCP to the ocean. Similarly, polychlorinated biphenyls (PCBs) were discharged to the municipal sewage system from several sources within the Los Angeles area and subsequently released to the marine environment with wastewater from the sewage treatment plant. Peak annual mass emissions of effluent solids (167,000 metric tons), DDT (21.1 metric tons), and PCBs (5.2 metric tons) occurred in 1971.

Subsequent improvements to treatment processes and better source control, along with cessation of these discharge practices by Montrose Chemical Corporation and others, reduced the mass emissions and supply of organochlorines to the marine environment (Eganhouse and Venkatesan 1993). DDT discharges declined to 0.03 tons per year in 1985 (Drake et al. 1994). By 1995, the solids mass emission was less than one fifth of that discharged in 1971, and trace contaminant discharges were a few percent of 1971 values (Stull 1995). By the end of 2002, LACSD had achieved full secondary treatment at the JWPCP, and DDT and PCB concentrations in the final effluent have been below the respective reporting limits since then.

Since the period of peak emissions in 1971, the heavily contaminated sediments in the area of the outfalls have been gradually buried by less contaminated effluent solids and natural sediment. As of 1992, the 44 square-kilometer area of the PV Shelf characterized by USGS contained an estimated 100 metric tons of DDT and 10 metric tons of PCBs (Lee 1994). These mass estimates are lower than those calculated previously based on sampling conducted by LACSD since the 1980s. This suggests that contaminant concentrations and masses are decreasing with time, although accurate determinations of these changes are difficult to make given the high spatial variability in contaminant distributions. Additionally, rates of change over time in concentrations of DDT in surface sediments have been smaller than reductions in mass emission rates from the JWPCP. This suggests that contaminants in historically deposited sediments are being remobilized and contribute to concentrations in the more recently deposited materials.

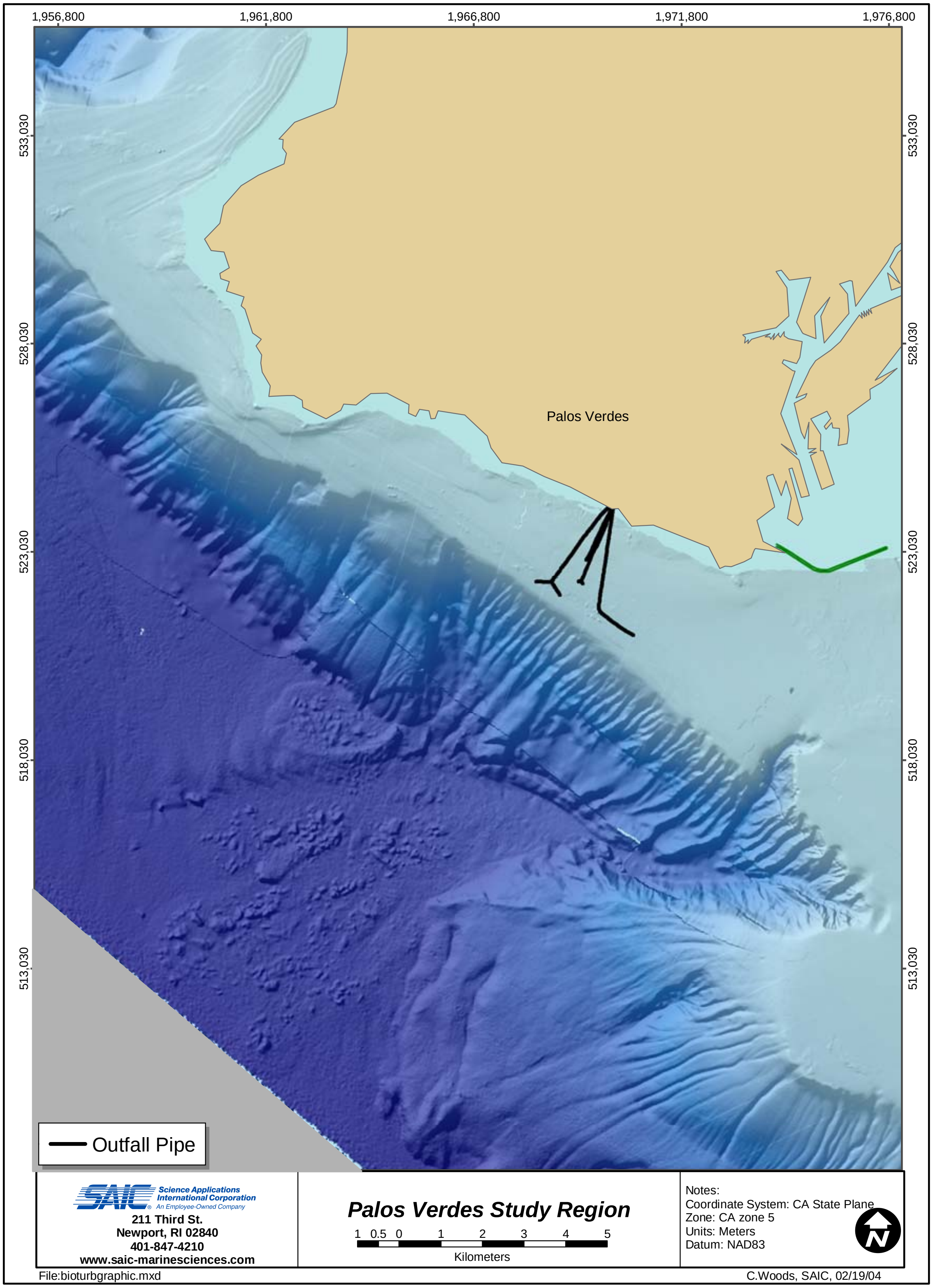


Figure 1-1. Physiography of the PV Shelf region illustrating the narrow continental shelf and relatively steep topography of the continental slope. The JWPCP outfalls are shown extending from White Point.

Distribution of Effluent-Affected Sediments

Effluent-affected (EA) sediments in the vicinity of the JWPCP outfalls serve as a primary repository for contaminants. The EA sediment deposit covers “clean” native sediments that were present prior to the start of wastewater discharges from JWPCP outfalls, and the EA sediment deposit is characterized by a surface layer of more recently deposited and moderately contaminated materials covering a buried layer of highly contaminated materials that were deposited prior to 1980.

The spatial distributions of DDT, DDT metabolites, and PCB concentrations and contaminant masses in shelf and slope sediments were evaluated extensively as part of the site investigation for the Natural Resource Damage Assessment (NRDA; Lee 1994). The EA sediment deposit is characterized by a lower density and finer grain size than the native sediment. The deposit ranges in thickness from 5 centimeters (cm) to greater than 70 cm, and is underlain by firmer native shelf sediments. The total volume of the EA deposit within the USGS study area is over 9 million cubic meters, with approximately 70 percent of this volume lying on the shelf and the remainder on the slope. Virtually all of the deposit is contaminated with DDT (and its metabolites) and PCBs. Sediments containing total DDT concentrations greater than 1 part per million (ppm) within the USGS study area on the PV Shelf cover a seafloor surface area of approximately 42 square kilometers. Within this region, the areas of the Shelf and Slope with surficial (top 0 to 4 cm) sediment concentrations of 1,1,1-trichloro-2,2-bis (p-chlorophenyl) ethylene (*p,p'*-DDE), the primary DDT metabolite, exceeding 5 parts per million (ppm) and 10 ppm cover approximately 12 km^2 and 3 km^2, respectively.

The highest DDT concentrations in sediments occur near the JWPCP outfall, then decrease with increasing distance from the outfall (Figure 1-2). Concentrations decrease rapidly from the outfall in northeasterly and southeasterly directions, whereas horizontal changes to the northwest of the outfall, in the direction of predominant current flow, are relatively smaller. Sediments from nearshore locations in water depths shallower than approximately 30 m presently contain DDT concentrations below 1 ppm. Spatial and vertical distributions of PCB are generally similar to those for DDT, although the magnitude of the total PCB concentrations is consistently lower than that of DDT. Maximum total DDT and PCB concentrations in the buried layer exceed 200 ppm and 40 ppm, respectively. On the shelf, these peak concentrations occur at depths of 30 to 40 cm in the sediment, while on the slope they are much closer to the sediment surface. Concentrations in the surface layer on the shelf are lower than the peak concentrations but still significantly elevated compared to other locations within the Southern California Bight. This vertical distribution of contaminant concentrations generally reflects the history of effluent deposition, with some post-depositional alterations due to physical and biological mixing.

Recent assessments of the inventory of DDT in the PV Shelf study area and throughout the Southern California Bight have been conducted for the Ecological Risk Assessment (USEPA 2003). Figure 1-3 illustrates the total DDT concentration in the upper 15 cm of the sediment column throughout the greater PV area. Highest DDT inventories are associated with the PV Shelf study area, whereas DDT inventories inshore of the 200-m isobath elsewhere in the Bight are much lower. It is also apparent that elevated DDT levels extend well beyond the 200-m isobath west and north of the PV peninsula. Figure 1-4 presents a closer view of DDT inventories in the PV Shelf study area and its spatial correspondence with elevated DDT concentrations delineated by USGS.

Previous Investigations

The magnitude and distributions of chemical contaminants in PV Shelf sediments have been studied and monitored for more than three decades. The most comprehensive sources of chemical contaminant data are from biennial sediment coring surveys conducted by LACSD and from the NRDA studies in 1992 to

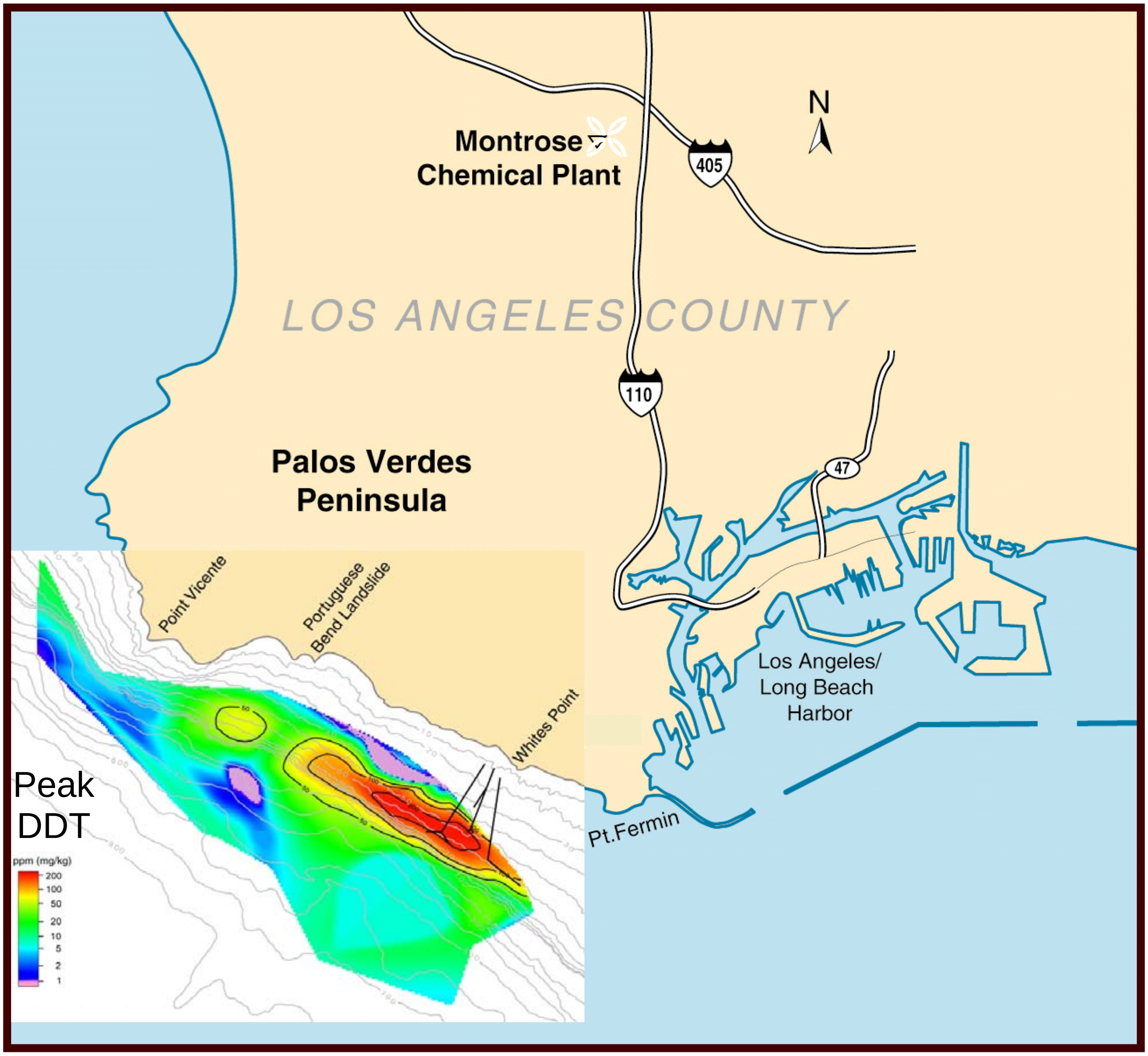


Figure 1-2. Peak DDT levels in sediments (independent of depth) within the USGS study area adjacent to the PV peninsula.

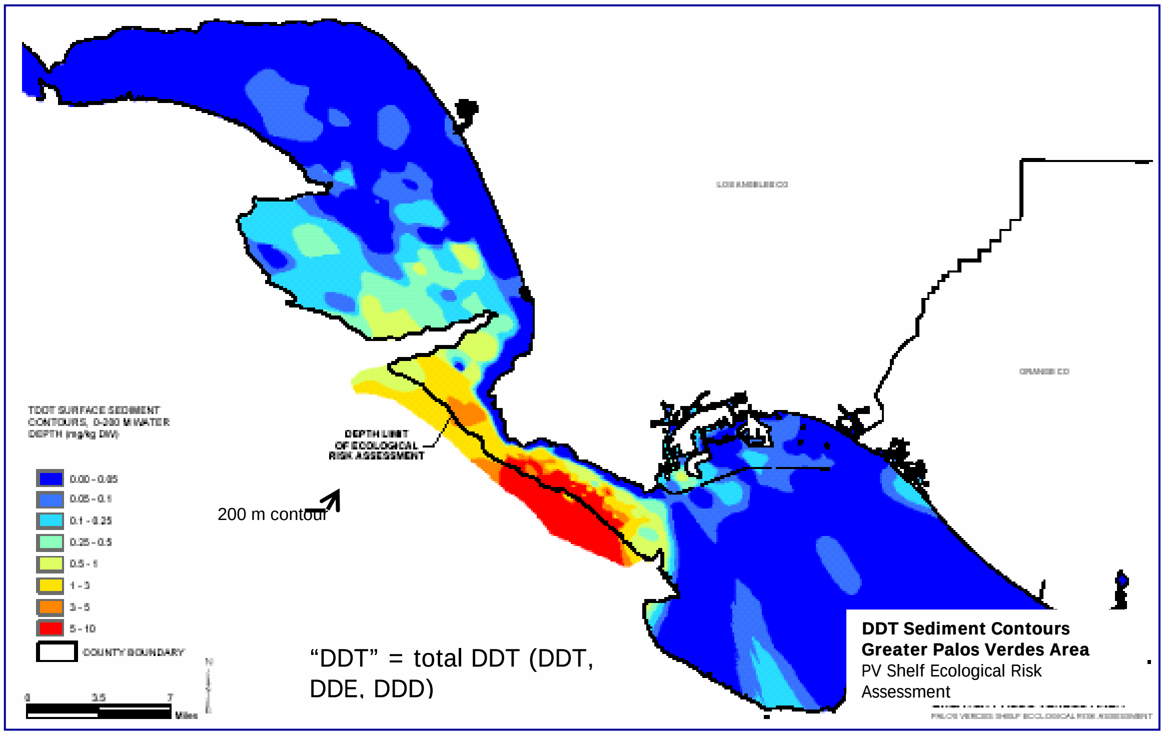


Figure 1-3. Total DDT concentration in the upper 15 cm of the sediment-profile in the greater PV Shelf area, as compiled for the Ecological Risk Assessment (USEPA 2003).

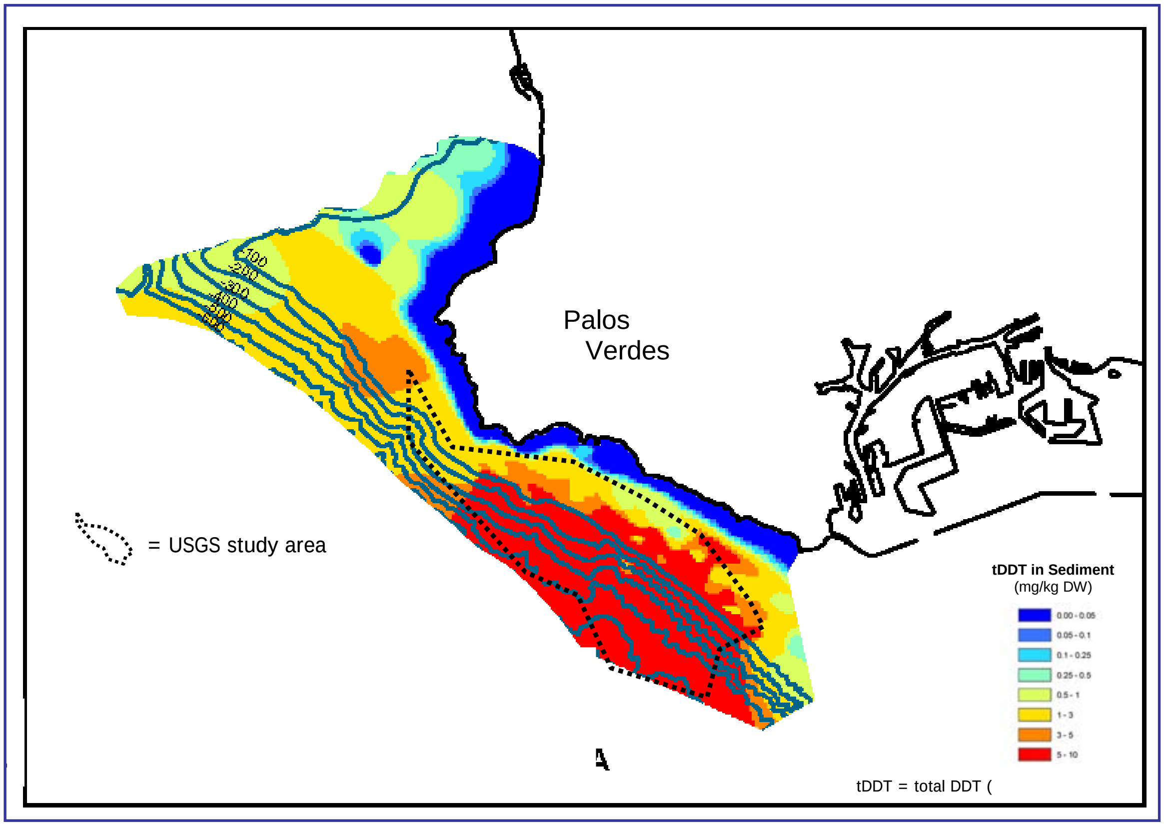


Figure 1-4. Total DDT concentration in the upper 15 cm of the sediment profile throughout the PV Shelf area, as compiled for the Ecological Risk Assessment (USEPA 2003).

1994 conducted by USGS. LACSD has collected sediment cores from fixed locations along a series of cross-shelf transects at varying distances from the outfalls since 1981. Each core is subsampled at 2-cm intervals and analyzed for DDE and other selected sediment parameters. These data represent a valuable time series that was used by USGS for the NRDA to assess temporal changes in contaminant masses and profiles that were the basis for evaluating rates of sediment accumulation on the shelf (see Lee et al. 2002). During 1992-1994, USGS also conducted an extensive series of multidisciplinary studies of the characteristics of the seafloor and sediment-contaminant distributions on the Shelf and Slope. Information obtained from these investigations was used to develop a predictive model of the long-term fate of sediment contaminants (Sherwood et al. 2002).

Sediment characterizations for a small portion of the shelf, corresponding to the locations of the pilot capping cells, were evaluated as part of the PV Pilot Cap Monitoring Program (discussed in detail in Section 4). One of the key objectives of the PV Pilot Cap Monitoring Program was to determine whether disturbances to in-place sediments can be limited (i.e., can a cap be placed on the PV Shelf without displacing contaminated EA sediments?). Sediment cores were collected using a variety of coring devices during baseline, interim-, and post-capping phases of the PV Pilot Cap Monitoring Program to evaluate this objective. Some of these coring devices apparently caused sampling artifacts, which have been well-documented in previous monitoring reports. Because of these sampling artifacts, the accuracy of the vertical profiles of sediment core characteristics, such as grain size and DDE concentrations, during and immediately following capping operations, could not be verified, thereby limiting the extent to which this monitoring objective could be satisfied.

However, sediment cores collected during a March 2002 supplemental survey using a spade core provided data that were considered appropriate for evaluating sediment displacement during cap placement (SAIC 2004c). One core, collected in the center of Cell SU (core SU22), was analyzed for DDE concentrations at 4-cm intervals to a core depth of 48 cm. The DDE profile, when compared to profiles reported by LACSD and USGS for cores collected in the general vicinity of Cell SU, was offset vertically, suggesting that the post-capping profile may have shifted upwards by as much as 22 cm. One possible explanation for this shift is that cap placement operations may have scoured a portion of the upper EA layer. Similarly, apparent shifts in DDE profiles in cores collected by LACSD within Cell SU (at Station 7C) during 1999 and 2001 (i.e., before and after placement of pilot caps) were discussed in a formal presentation to EPA by LACSD in 2003 and later in a paper by Sherwood (2003). The magnitude of these shifts ranged from 12 to 22 cm in replicate cores. Sherwood also suggested that a possible explanation for this shift is scouring of EA sediments during cap placement, and recommended that additional cores be collected and analyzed, and that additional reviews of side-scan sonar data from the Post-1 monitoring survey be undertaken to evaluate this possibility. The present study is intended, in part, to address these recommendations.

1.5 ORGANIZATION OF THE REPORT

Section 2 of this report presents the materials and methods used to collect and analyze samples. The results of these analyses are presented in Section 3. Results are applied to the study objectives and discussed in Section 4. The conclusions of the study are discussed in Section 5. Results from the data validation and data quality assessment process are included in Appendix A. Tabular listings of concentration data for all DDT compounds are included in Appendix B.

2.0 METHODS AND MATERIALS

This section describes the methods and materials for field activities (Section 2.1), sample analysis (Section 2.1.3), and data analysis (Section 2.2). Quality assurance results are summarized in Section 2.3.

2.1 FIELD ACTIVITIES

Field activities for the July 2004 survey were directed and conducted by SAIC personnel, with assistance from personnel from Oregon State University (OSU), in accordance with procedures described in the IWP (SAIC 2004b).

Vessels and Logistics

The Southern California Marine Institute (SCMI) Fish Harbor Facility was utilized for vessel-based marine operations, as well as overall field survey-related support. SCMI is located approximately 10 miles (16 km) from the capping site, and is ideally located for the Pilot Capping Program marine survey activities due to its proximity to the capping site and the local infrastructure.

SCMI facilities were used to: (1) split and log sediment cores, and (2) process sediment cores for shipment to analytical laboratories. Additional warehouse and staging areas provided access for equipment mobilization and demobilization and shipping and receiving of field equipment and samples.

The marine survey vessel used during the sampling program was *R/V VANTUNA*, operated by SCMI. The vessel is 85 ft (25 m) in length, and is equipped with an A-Frame, winch, and deck handling equipment.

Navigation and Vessel Positioning

Accurate, standardized navigation equipment and data acquisition/recording procedures were used throughout the surveys to ensure high accuracy and repeatability in collecting vessel position information. SAIC was responsible for installation, operation, and maintenance of the navigation system aboard the survey vessel. An industry-standard software product, Hypack®, was used for survey vessel positioning on all surveys. This product offers a simple user interface for entry of target station locations and survey lanes, as well as excellent real-time display and data recording capabilities. A Global Positioning System (GPS) receiver provided continuous GPS vessel-position data, and a differential GPS (DGPS) receiver was used to acquire real-time DGPS corrections from U.S. Coast Guard (USCG) beacons in San Diego and Point Conception. The GPS and DGPS receivers were interfaced to a personal computer with a 400 MHz processor for real-time display of vessel positions and data storage. The DGPS antenna was secured to the starboard aft rail, approximately 3 m offset from the hydrowire block on the A-frame, to provide an accurate navigation fix for each core sample. The positioning accuracy of the navigation system was determined to be better than ±3 m during a fixed-point calibration conducted prior to an earlier field element.

2.1.1 Sediment Coring

Sampling Locations

The sampling design consisted of collecting one or more sediment cores at 13 stations inside and near Cell SU. Sampling locations, along with the rationale for selection, are identified in Table 2-1 and shown in Figure 2-1.

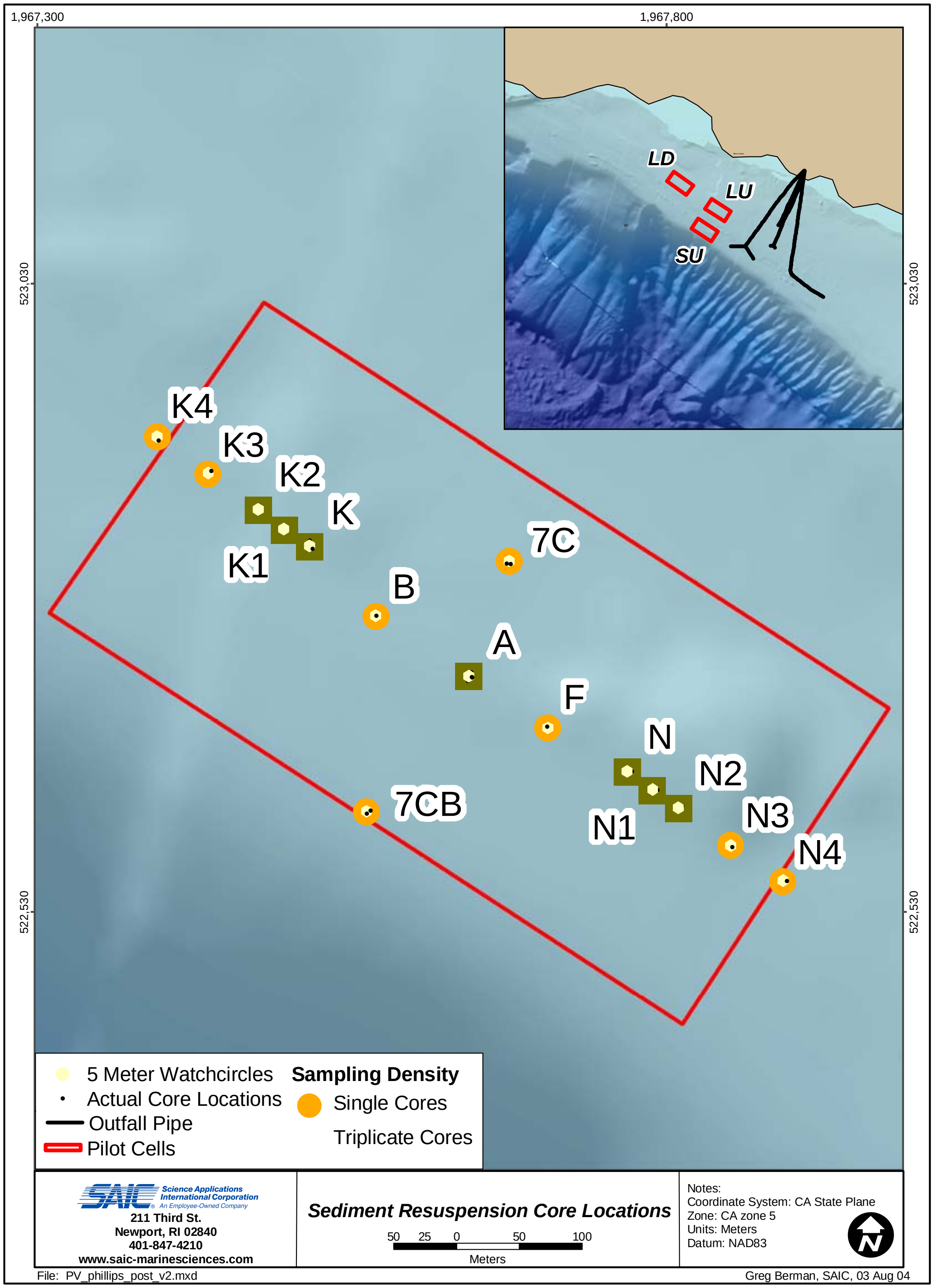


Figure 2-1. Locations of Sediment Core Samples for the Sediment Displacement Study.

The sampling design included a set of sampling sites (stations) that corresponded to actual cap placement locations along the centerline of Cell SU, and two transects that extended outward, up to 150 m upcoast (northwest, NW) or downcoast (southeast, SE) and parallel to bottom isobaths, from cap placement positions where a single load was placed along the outer edge of the Cell SU cap. Sampling was focused in Cell SU for the following reasons: (1) conventional, point-dump placement methods were used to place cap material at this site; (2) EA sediments within this cell are fine-grained with a high water content and low density and, therefore, potentially more susceptible to displacement from point placement methods than coarser-grained sediments at shallower areas of the Shelf; (3) DDE profiles exhibit clear subsurface maxima (peaks) that can be used as markers to evaluate displacement during cap placement operations; and (4) cores collected during the March 2002 supplemental survey at Station SU22 and cores collected by LACSD at 7C (within the boundaries of Cell SU), both suggested that displacement of EA sediments occurred during cap placement within this cell. Due to the low density properties of EA sediments within Cell SU, evaluations of EA sediment displacement at this site were considered a “worst-case” condition.

The sampling locations (Stations A, B, F, N, and K) were on the approximate centerline of Cell SU, and corresponded to specific cap placement positions. Position A received the first five loads of cap material placed directly on top of EA shelf sediment, whereas a single load was placed at each of the other four locations. These latter placement events overlapped previous placements so that cap materials were deposited on an existing cap layer instead of the EA sediments (see Section 4.2). While Stations B and F only received a single load, EA sediment displacement at these locations may have been affected by multiple placements at adjacent positions. Thus, cores collected at these stations were expected to provide information for evaluating the magnitude of EA sediment displacement at locations that may have been affected by multiple placement events and, in the case of Station A, the effects of direct cap placement on top of EA sediment. Cores collected along the N and K transects, representing stations at distances of 25, 50, 100, and 150 m from each of placement positions N and K, provided information to evaluate changes in the magnitude of EA sediment displacement with distance from single placement positions. These distances were selected because side-scan sonar images in Cell SU following initial cap placement events showed the greatest influence within about 50 m of the placement site, and surge measurements showed that the energy from cap placement events dissipated rapidly with distance and reached background within about 150 to 200 m of the placement site (SAIC 2002). Thus, the effects of sediment displacement (both scouring and deposition) were expected to be most evident within 150 m of a placement position.

A single core was collected at Stations B, F, N3, N4, K3, and K4, and triplicate cores were collected at Stations A, N, K, N1, K1, N2, and K2, for a total of 27 cores. Triplicate cores provided information needed for evaluating small-scale spatial variability and for supporting statistical analyses of spatial trends in the depths of the subsurface DDE peak with distance from sites with single and multiple cap placement events. Station coordinates, core lengths, and collection dates are listed in Table 2-2.

Station coordinates correspond to the location of the DGPS antenna at the time the corer contacted the seafloor. Because the DGPS antenna was mounted approximately 3 m from the hydrowire block, the actual sample location differs from the recorded coordinates by the same offset. A 5-m radius watch circle was established for each coring location. The navigational position of the antenna was within the watch circle when each core was collected, such that all samples were collected within at least 11 m of the planned target coordinates (i.e., the sum of the watch circle radius plus the offset of the antenna from the hydrowire block and the navigational accuracy). At some sites, up to several core deployments were required to obtain adequate length cores. In total, 66 drops were completed and 29 cores were retained for processing, including the 5 cores that were used for the intercalibration exercise.

Table 2-1. Sediment Coring Locations to Evaluate Sediment Displacement.

Station/Location	Rationale for Sampling
A: Placement Position A (for Events #1-5 in Cell SU; same as SU22 from March'02 survey and LACSD Station 7CX)	Determine amount of EA sediment displacement at a cap placement site potentially affected by placement events directly on top of EA sediment.
B: Placement Position B (Event # 6) in Cell SU	Determine amount of EA sediment displacement at a cap placement site potentially affected by multiple placement events.
F: Placement Position F (Event # 8) in Cell SU	Determine amount of EA sediment displacement at a cap placement site potentially affected by multiple placement events.
N: Placement Position N (Event # 16) in Cell SU	Determine amount of EA sediment displacement at a cap placement site potentially affected by a single placement event.
K: Placement Position K (Event # 14) in Cell SU	Determine amount of EA sediment displacement at a cap placement site potentially affected by a single placement event.
K1: 25 m upcoast (NW) from K	Determine amount of EA sediment displacement along an upcoast gradient from a single cap placement site.
K2: 50 m upcoast (NW) from K	Determine amount of EA sediment displacement along an upcoast gradient from a single cap placement site.
K3: 100 m upcoast (NW) from K	Determine amount of EA sediment displacement along an upcoast gradient from a single cap placement site.
K4: 150 m upcoast (NW) from K	Determine amount of EA sediment displacement along an upcoast gradient from a single cap placement site.
N1: 25 m downcoast (SE) from N	Determine amount of EA sediment displacement along a downcoast gradient from a single cap placement site.
N2: 50 m downcoast (SE) from N	Determine amount of EA sediment displacement along a downcoast gradient from a single cap placement site.
N3: 100 m downcoast (SE) from N	Determine amount of EA sediment displacement along a downcoast gradient from a single cap placement site.
N4: 150 m downcoast (SE) from N	Determine amount of EA sediment displacement along a downcoast gradient from a single cap placement site.

Table 2-2. Station Coordinates, Core Lengths, and Core Collection Dates.

Station	Station Coordinates		Core Length (cm)	Collection Date (2004)
	Lat (°N); Long (°W).	Easting; Northing		
K4-Rep 1	33.70597483; -118.3516755	1967396.25; 522905.56	50.5	July 16
K3-Rep 1	33.70575466; -118.3512216	1967438.25; 522880.99	46.0	July 16
K2-Rep 1	33.70548316; -118.3508085	1967476.44; 522850.74	49.5	July 14
K2-Rep 2	33.7054759; -118.3507955	1967477.64; 522849.93	51.0	July 15
K2-Rep 3	33.70550043; -118.3508241	1967475.00; 522852.66	47.8	July 15
K1-Rep 1	33.70535338; -118.3505823	1967497.36; 522836.27	47.7	July 15
K1-Rep 2	33.70532458; -118.3505943	1967496.24; 522833.08	47.5	July 15
K1-Rep 3	33.70535759; -118.350589	1967496.74; 522836.74	43.5	July 15
K-Rep 1	33.70521688; -118.3503996	1967514.25; 522821.07	44.0	July 15
K-Rep 2	33.70520295; -118.3503525	1967518.61; 522819.51	47.0	July 15
K-Rep 3	33.70526022; -118.3503767	1967516.39; 522825.87	46.0	July 15
B-Rep1	33.70472298; -118.3498017	1967569.49; 522766.09	44.7	July 18
A-Rep 1	33.70425801; -118.3490155	1967642.20; 522714.26	50.5	July 15
A-Rep 2	33.70428362; -118.3489837	1967645.16; 522717.09	46.0	July 15
A-Rep 3	33.70429134; -118.348995	1967644.11; 522717.95	46.0	July 15
F-Rep1	33.70393345; -118.3483374	1967704.94; 522678.04	45.0	July 18
N-Rep1	33.70361328; -118.3476077	1967772.47; 522642.29	42.5	July 16
N-Rep2	33.70359808; -118.3476274	1967770.64; 522640.61	45.0	July 16
N-Rep3	33.70362177; -118.3476627	1967767.37; 522643.25	45.2	July 16
N1-Rep1	33.70347931; -118.3473901	1967792.59; 522627.36	45.5	July 16
N1-Rep2	33.7034972; -118.3474069	1967791.04; 522629.35	48.5	July 16
N1-Rep3	33.70346512; -118.3474045	1967791.25; 522625.79	45.7	July 16
N2-Rep1	33.70333972; -118.3471872	1967811.35; 522611.81	47.0	July 16
N2-Rep2	33.70336472; -118.3471766	1967812.34; 522614.58	47.0	July 16
N2-Rep3	33.70335316; -118.3472149	1967808.79; 522613.31	44.5	July 16
N3-Rep1	33.70306972; -118.3467469	1967852.07; 522581.72	47.0	July 16
N4-Rep1	33.70282812; -118.3462784	1967895.41; 522554.77	50.5	July 16
7C	33.7050971; -118.3486539	1967676.05; 522807.22	41.0	July 14
7CB	33.7033247; -118.3498485	1967564.61; 522611.00	49.5	July 14

Sample Collection Methods

Methods for collecting and processing sediment cores for geotechnical and chemical analyses were standardized to maintain consistent and high-quality data collection. Detailed descriptions of sampling procedures are provided in the following SOPs contained in the IWP:

- *SOP for Collection of Sediment Samples using a Hydraulically-Damped Piston Corer*
- *SAIC SOP for Sediment Core Processing, Revision 01, July 24, 2000*
- *SAIC SOP 1005-M, Collection and Processing of Marine Sediment Samples, April 5, 1995*
- *SAIC SOP 400-M, Equipment Decontamination, January 20, 1998*

The overall sample collection and principles of the coring operations were similar to the procedures used for the summer 2000 survey (SAIC 2002). Vessel positioning, equipment deployment, on-board core retrieval and processing, and documentation of the field survey are detailed below.

Sediment cores were collected using a hydraulically-damped piston corer operated by OSU that has proven to be effective for collecting undisturbed sediment cores up to 75 cm in length in a variety of sediment types. The corer comprised a 10.8-cm internal diameter by 95-cm long polycarbonate barrel, an 800-lb lead weight-stand, and an aluminum support frame. The survey vessel was brought on station and the corer was maneuvered up and over the fantail of the survey vessel by winch and A-frame. The corer was winched through the water column at a controlled descent (approximately 0.3 m/sec) until bottom contact was evident by slack in the winch wire. Upon contact with the seafloor the weight-stand pushed the core barrel into the bed and simultaneously pulled a piston that forces water through a small valve. By regulating the valve opening, the descent rate of the core barrel was controlled, thereby reducing the bow-wave effect (typical of many faster-penetrating samplers) and minimizing disturbance of surficial sediment layers. Because of the slower descent rate into the seafloor (typically around 4 cm/s), the corer was capable of collecting an undisturbed sample with an intact sediment-water interface and sediment-free overlying water column. Following penetration of the corer in the sediments, the winch wire was tensioned to extract the core barrel from the seafloor and retrieve the corer to the vessel. The corer was then returned to the deck of the survey vessel.

The aft deck of the survey vessel was washed periodically with filtered seawater to keep the sampling area clean of debris. The sediment cores were collected using new butyrate core tubes that were cleaned prior to use. Therefore, additional decontamination of core tubes was not necessary.

Each recovered core was visually inspected for acceptability (adequate penetration and an undisturbed surface layer with minimal turbidity in the overlying water). If the sample was not acceptable, it was discarded and another core was collected.

The core tubes were detached from the corer, the ends of the core tube were capped, and the core length was measured. Penetration depths ranged from 30 to 75 cm, depending on the sediment type and valve opening. Cores shorter than 40 cm were discarded, and the core was recollected. The core tubes were labeled using indelible ink at the surface (top) and bottom of the cores. The label included the following specific sample information:

- Station identification
- Date and time collected
- Sample replicate number

- Top/bottom core indicators
- Collector's name or initials
- Sample depth (if appropriate)

Cores were placed upright in an open-top 55-gallon poly container filled with ice for storage. The holding container was placed in shade to the extent possible and a dark plastic trash bag was placed using a bungee cord around the container to help avoid exposure to light and possible sample degradation. At the end of each day of survey operations, cores were transferred to the person responsible for shore-based core processing.

Intercalibration Survey

The intercalibration field effort was conducted to determine whether the OSU piston coring device was capable of collecting sediment cores which were comparable in quality and length to cores collected independently by LACSD using a gravity coring method. A total of ten cores (five cores each) were collected using both the OSU and LACSD coring devices from Stations 7C, 7CX, and 7CB.

Methods used to collect the piston cores are described in the previous section. These cores were subsampled at 2-cm intervals using methods described in Section 2.1.2. This subsampling interval was used because it was consistent with the intervals sampled historically by LACSD.

Methods and equipment used by LACSD for collecting sediment cores for this intercalibration effort were identical to those used previously for their long-term sediment study. Upon recovery, the LACSD cores enclosed in acetate liners were immediately placed in sheet metal canisters and lowered into a dry ice freezing box. Liquid nitrogen was gently poured directly onto the sediment surface core top and vigorously down the outside of the canister to promote rapid freezing of the core sediment. The cores were maintained in a vertical orientation at all times until they were frozen solid. The cores were later cut by LACSD staff into 2-cm sections and stored at approximately 4°C. Samples subsequently were re-frozen and maintained in a frozen state prior to extraction. All cores were analyzed for DDT compounds, as discussed in Section 2.1.3.

2.1.2 Core Processing

At SCMI, sediment cores for geotechnical and chemical analyses were subsampled within 72 hours of collection (with the exception of cores collected by LACSD for the intercalibration exercise that were processed separately). Cores were split longitudinally, visually inspected for sampling artifacts, and photographed. Detailed descriptions of each core were recorded. Core descriptions included the following information:

- Core length
- Log of intervals subsampled for geotechnical and chemical analysis
- Description (lithology, grain size, texture, odor, number/type of organisms, color, apparent water content)

All retained cores were subsampled for DDT and metabolites, whereas only a single core per station was subsampled for grain size, bulk density, and total organic carbon (TOC). Most cores were subsampled at 4-cm intervals because this provided sufficient mass for both chemical and geotechnical analyses and provided adequate resolution for evaluating the DDE concentration profiles. Also, this subsampling interval was consistent with the approach used during previous coring events conducted for the Pilot Cap Monitoring Program. Cores collected at Station A (7CX) were subsampled at 2-cm intervals for chemical analyses because these cores were also used for the intercalibration study (discussed above) that compared profiles based on 2-cm sampling intervals. Sediment samples are summarized in Table 2-3.

DDT metabolites included the *o,p′*- and *p,p′*- isomers of DDT, DDE, and DDD, as well as DDMU [(1-chloro-2,2′-bis (p-chlorophenyl) ethylene], which is a degradation product from reductive dechlorination of *p,p′*-DDE. DDE is used as a quasi-conservative tracer, and it is a common analyte among the USGS, LACSD, and EPA/USACE pilot cap monitoring programs. Data for the other DDT compounds were considered useful for evaluating whether concentrations of the metabolites co-vary with core depth (as reported for other areas of the PV shelf; e.g., Eganhouse et al. 2000) or, if not, systematic changes in DDT compound ratios are related to varying proportions of cap material and EA sediments. Bulk density and grain size are useful geotechnical parameters for distinguishing between cap material and EA sediment. TOC is a commonly measured analyte that provides data useful for interpreting contaminant patterns and geotechnical properties of sediments.

Subsamples of sediment were collected in each interval using decontaminated stainless steel scoops. The scoops were decontaminated prior to sampling each core interval. Phthalate contamination or interferences from the core liners were avoided by removing sediment from the center of the core, away from any contact with the inside of the liner. The effectiveness of this subsampling method was demonstrated by the baseline monitoring results (SAIC 2002). Each sample for analysis of DDT compounds consisted of approximately 100 g of sediment placed in a certified-clean, 250-mL glass container with a Teflon-lined lid (Table 2-4). Sediment chemistry samples were held at 4°C (on ice or in a refrigerated storage unit) prior to shipping. Sub-samples of sediments for grain size, bulk density, and TOC analyses were collected in each 4-cm interval using decontaminated stainless steel scoops. The material was scooped into a resealable plastic bag and labeled with core and sample identifiers. All sediment sub-samples for geotechnical analyses were held at 4°C (on ice or in a refrigerated storage unit) prior to shipping.

The following types of samples were generated: field sample, duplicates, core liner rinsate sample, and core tool rinsate sample. These samples are summarized in Table 2-5 and defined below.

Field Sample: Core subsamples collected at 4-cm intervals from acceptable-quality cores (2-cm intervals from cores collected during the intercalibration survey).

Field Duplicate: A second (duplicate) aliquot of sediment collected from the same core interval as the field sample within selected cores. The field duplicates were sent to the laboratory as a "blind" duplicate, to provide a check on laboratory analytical precision.

Core Liner Rinsate Sample: Distilled water was poured over the internal surface of a core liner (chosen at random from among those used in the field), collected in two 1-liter containers, and sent to the laboratory for analysis of DDT compounds (note: only one of the 1-liter containers was required for analysis - the second represented a back-up sample). The core liner rinsate sample served to verify that there was no significant contamination of the collected sediment resulting from contact with the inside of the core liner.

Core Tool Rinsate Sample: The sediment scoop was rinsed with distilled water at the end of the decontamination procedure but before the sediment sample was taken. The rinsate was collected in two 1-liter containers and sent to the laboratory for analysis of DDT compounds (note: only one of the 1-liter containers was required for analysis - the second represented a back-up sample). The tool rinsate sample provided a check on the adequacy of the decontamination procedure to remove residual DDT from the sampling implements between samples.

Table 2-3. Summary of Chemical and Geotechnical Analyses.

Location	Stations	# of Cores	Subsampling Interval	# of Subsamples	Analytes
Cell SU	7C, A/7CX, and 7CB	10	2 cm	300	DDT compounds
Cell SU	B, F, N3, N4, K3, K4, N, K, N1, K1, N2, and K2	24	4 cm	360 for DDT compounds; 195 for grain size, TOC, bulk density.	DDT compounds, grain size, TOC, bulk density

Table 2-4. Sample Containers, Preservation, Volumes, and Holding Times for Analysis of DDT Compounds and Geotechnical Properties in Sediment.

Parameter	Container	Preservative	Min. Sample Mass	Holding Time
DDT compounds	250-mL wide-mouth glass jar, certified clean, with lids lined with chemically-inert material	4°C, freeze upon receipt at laboratory	100 g wet weight (includes primary analysis [20 g] and QC analyses and archival material)	One year for frozen samples; 40 days for extracts
Grain Size	Quart size resealable plastic bag	4°C; wet ice or refrigerated	500 grams	6 months
Bulk Density	Quart size resealable plastic bag	4°C; wet ice or refrigerated	10 grams	6 months
TOC	Quart size resealable plastic bag	4°C; wet ice or refrigerated	50 grams	6 months

Table 2-5. Types and Numbers of Sediment Samples Generated in the Field for Analysis of DDT Compounds.

Type of sample	Number of Samples
Field sample (core sample)	660
Field duplicate	66 (10% of field samples)
Core liner rinsate sample	2
Core tool rinsate sample	1

Individual samples for chemical and geotechnical analyses were generated in the sediment processing laboratory. Samples were stored temporarily (up to several hours) in a cooler containing wet ice or in a refrigerator under the custody of the sample processing team. Eventually, sample batches were prepared for shipment by placing them in coolers containing ice or ice packs. Chain-of-custody (COC) forms were completed listing all samples, sample identifications, and analysis requests that accompany each sample batch. The COC forms were signed by a member of the sample processing team. Samples were shipped to the appropriate analytical laboratories using an overnight carrier.

2.1.3 Laboratory Analyses of Core Samples

Analytical methods and the laboratory QA/QC procedures associated with the sediment analyses for the present study were the same as those used during previous phases of the Pilot Cap Monitoring Program, as described in SAIC (2002). Chemical analyses (DDT and metabolites) were performed by Woods Hole Group Environmental Laboratories (WHG) of Raynham, Massachusetts, and geotechnical analyses were performed by Applied Marine Sciences (AMS) of League City, Texas. Analytical methods and QA/QC procedures are summarized below.

Analytical Protocols – WHG

WHG analyzed sediment samples to determine concentrations of DDT compounds. The analytical protocol followed by WHG was based on the following published methods:

> Method 8081A and Method 8000B, *Test Methods for Evaluating Solid Waste*, SW-846, Third Edition, Final Update III, December 1996 (USEPA Office of Solid Waste and Emergency Response, Washington, D.C.)

The WHG SOPs for sediment analysis of DDT compounds were consistent with the methods included in the IWP (SAIC 2004b). The following is a summary of these SOPs and any modifications therein used by WHG for analyzing the sediment samples from the PV Shelf.

Sample Storage. Samples received by WHG were inspected and logged for analysis after measurement of the cooler temperature. Samples were aliquoted for determination of percent solids and for screening and then transferred to a freezer maintained at -10° to -20°C for frozen storage. Procedures are described in WHG *Sample Management Standard Operating Procedure (Revision 4)*.

Sample Screening. Samples were screened initially to determine the surrogate spike amounts and the approximate extract final volume necessary for a 10-g extract of each sample to provide a response within the Gas Chromatography – Electron Capture Detector (GC-ECD) calibration range (1 ng/mL to 200 ng/mL calibration solution concentrations). Extracts were screened by Gas Chromatography/ Mass Spectrometry (GC/MS) using procedures in WHG SOP for EPA Method 8270C, modified as follows: (1) calibrated with two calibration standards for DDE using a selected ion monitoring (SIM) acquisition method that included the base peak and at least two other ions for DDE, (2) screened extracts using the same SIM method developed for the calibration, and (3) screens run without applicable tuning or Continuing Calibration Verification (CCV) procedures.

Sample Analysis. Approximately 10 g wet weight of each sample were spiked with the amount of surrogate compounds tetrachloro-meta-xylene (TCMX) and decachlorobiphenyl (DCB) indicated by the screening analysis. Samples were extracted following procedures for sonication (EPA Method 3550B) described in Section 7.4 of WHG SOP *Method 8081A Organochlorine Pesticides by Gas Chromatography/ Electron Capture Detection (Revision 0)*. If further extract cleanup appeared necessary, an aliquot of the extract in hexane was cleaned through amino-propyl gel following procedures in WHG SOP *Amino-Propyl Cleanup of Tissues and Sediments (Revision 0)*. If further cleanup appeared necessary, gel permeation chromatography was employed on methylene chloride extracts following automated high-performance liquid chromatography procedures in WHG SOP *Gel Permeation Chromatography (Revision 0)*. Up to 20 field samples were extracted with the following batch quality control (QC) samples: 1 method blank, 1 spiked method blank, 1 matrix spike/matrix spike duplicate pair, and 1 regional reference material (RRM obtained from Southern California Coastal Water Research Project). Extracts were submitted to the GC laboratory for any dilutions and analysis by GC-ECD following procedures in WHG SOP *Determination of Polychlorinated Biphenyls (PCBs) as Congeners and Organochlorine Pesticides by Gas Chromatography/Electron Capture Detection (Revision 1.1)*.

Final sample concentrations for DDT compounds were reported on a dry weight basis. Sample results were not corrected for either surrogate compound recovery or blank contributions. The maximum allowable concentrations of individual analytes in method blanks were less than three times the corresponding method detection limit.

Confirmatory Analysis. Ten percent of the samples were confirmed for identification and quantification of DDT compounds by GC/MS-SIM following instrumental procedures in WHG SOP *Analysis of Polynuclear Aromatic Hydrocarbons by Gas Chromatography/Mass Spectrometry with Selected Ion Monitoring (Revision 1.0)*. The GC/MS-SIM SOP was modified to target *p,p'*-DDE and the surrogate compounds TCMX and DCB, the internal standards from the GC-ECD analysis. Each compound was represented in the SIM acquisition by two to three ions. SOP criteria for initial calibration followed SOP limits for linear calibration with average relative response factors and percent difference (%D) <15% for continuing calibration verification (CCVs). DDT breakdown was not monitored for the confirmatory analysis. The associated batch QC samples (method blank and spiked blank) for each sample set were analyzed, whereas the matrix batch QC (matrix spike/matrix spike duplicate (MS/MSD), RRM, Standard Reference Material (SRM)) was not confirmed.

Routine Analysis of Quality Control Samples. Table 2-6 provides a summary of the QC samples analyzed in the laboratory (including field-generated samples), including frequency of analysis and target accuracy and precision limits.

Accuracy of sediment *p,p'*-DDE analyses was assessed by analyzing the RRM, which is a regional reference material prepared for intercalibration exercises conducted as part of regional monitoring programs in the Southern California Bight. The RRM was analyzed along with each sample batch. Accuracy of sediment analyses was also assessed by analyzing matrix spikes and matrix spike duplicate samples along with each sample batch. The recoveries of spiked compounds in the MS/MSD provide a check on the accuracy achieved by the laboratory. Analytical accuracy was also addressed by acceptable calibration, surrogate recoveries, and method blank results.

The precision objective was evaluated from results of analyses of the RRM, as well as the field-generated field duplicates and the laboratory-generated MS/MSD that were analyzed with each sample batch.

The completeness objective was calculated on those samples collected and analyzed (as opposed to those collected and archived). Data from samples were considered complete if the samples were properly collected, preserved, stored, prepared, and analyzed within holding times, and all of the associated quality control criteria were met.

The representativeness objective for the sediment chemistry results was determined by documenting the collection location and conditions to describe fully each sample's origin and handling history. Representativeness of the sediment chemistry data also was verified by evaluating method and clean-up blank interference, field and equipment interference, and MS/MSD results.

Table 2-6. Summary of QC Samples and Performance Criteria for Laboratory Analysis of DDT compounds in Sediment Samples.

QC Sample	Number (Frequency)	Accuracy Criteria	Precision Criteria	Blank Contribution
Initial Calibration Verification (ICV)	33 (1 per batch of 20 field samples)	85% to 115% recovery	NA	NA
Continuing Calibration Verification (CCV)	33 (1 per batch of 20 field samples)	80% to 120% recovery	NA	NA
Field Duplicate	66 (10% of field samples)	NA	RPD ≤ 30	NA
Core liner rinsate sample	2	NA	NA	< 3x MDL
Core tool rinsate sample	1	NA	NA	< 3x MDL
Method Blank	33 (1 per batch of 20 field samples)	NA	NA	< 3x MDL
Spike Method Blank	33 (1 per batch of 20 field samples)	80% to 120% recovery	NA	NA
MS/MSD	33 (1 per batch of 20 field samples)	75% to 125% recovery	RPD ≤ 30	NA
RRM	33 (1 per batch of 20 field samples)	Within acceptance range for *p,p'*-DDE	Within laboratory control chart limits	NA

NA = not applicable; RPD = relative percent difference; MDL = method detection limit; MS/MSD = matrix spike/matrix spike duplicate; RRM = regional reference material

Comparability was evaluated from results of the RRM analyses, as well as comparisons with historical site data and assessments of the results from the intercalibration exercise.

The laboratory continuously tracked and evaluated performance using control charts for recoveries of surrogate compounds, matrix spike compounds, and *p,p′*-DDE in the RRM. The results for various QC samples were reviewed by laboratory personnel immediately following the analysis of each sample batch. The results were used to determine whether control limits had been exceeded and, if so, corrective actions were needed before analyses could proceed. The relative accuracy of the RRM analyses was determined by comparing the laboratory's value for *p,p′*-DDE against the RRM consensus mean value. On average, the laboratory's value should be within 35% of the consensus value, as well as within the laboratory's own control chart limits. For the analysis of *p,p′*-DDE in sediment samples obtained from the PV Shelf cores during the program, the following objectives are established for calibration checks: 15% relative standard deviation (RSD) for initial calibration verification (ICV) and 20% RSD for CCV.

Agreement between GC/MS and GC-ECD measurements should be 50% when concentrations are at least three times greater than the GC/MS detection limits. Lack of 50% agreement triggered a review for possible corrective action. Assuming no apparent quantification errors or biases, the GC-ECD result was qualified to indicate that GC/MS confirmation exceeded the target for agreement. Corrective actions were limited to GC/MS corrective actions specified for QC noncompliance in the SOP. The GC-ECD measurement was the reported measurement.

Confirmation analyses from multiple extraction batches were combined into each GC/MS analysis run. Confirmatory analysis results were reported to support data validation.

Analytical Protocols - AMS

AMS analyzed the sediment samples for grain size, bulk density, moisture content, and TOC. The following is a summary of these SOPs and any modifications therein used for analyzing the sediment samples from the PV Shelf for geotechnical parameters:

- Determination of Particle Size Distribution (Phi Size Classification) in Sediment Samples. SOP: AMS-PGS93. Reference Method: Plumb 1981. This method to determine disaggregated particle size distribution in marine sediments was adapted from Plumb (1981), and it characterizes marine sediments in terms of phi size for particle size distribution (0.25 phi intervals from 1.0 to 4.0 phi; 1.0-phi intervals from –1.0 to 1.0 and 4.0 to 10.0 phi). With the phi size distribution values, mean grain size, silt-clay fraction, coarse fraction, skewness, sorting, and kurtosis were calculated.

- Determining the Bulk Density of Soil Samples. SOP: AMS-9504. Reference Method: USACE EM 1110-2-1906. The determination of bulk density of soil was expressed as its weight per unit volume.

- Determination of TOC. SOP: AMS-D2216. Reference Method: EPA Method 9060. Sediment TOC concentrations were determined with a high temperature combustion procedure using a LECO carbon analyzer.

Sample Receipt. Samples received by AMS were inspected for breakage or loss of water content and checked against the COC accompanying the shipment. Samples were transferred to a refrigerator and stored at 4° C until analyzed.

Sample Analysis. Bulk density samples were transferred to a stainless steel volumetric plugger and the corresponding mass recorded. The mass of sediment divided by the volume yields bulk density. Bulk density was reported as a wet unit weight (g/cm^3) and, after drying, as a dry weight (g/cm^3). Potential errors associated with void spaces and foreign matter were noted and avoided when possible.

Sediment TOC samples were analyzed according to EPA Method 9060. Sample preparation consisted of drying, homogenization, and acidification to remove carbonates and bicarbonates. Samples were combusted in a high-temperature furnace in a stream of O_2 to form CO_2. The results were recorded by the instrument software and printed after each run.

Calibration of the carbon analyzer was monitored through the analysis of a series of four calibration standards. The standards included pure quartz (0% carbon), National Institute of Standards and Technology (NIST) SRM 1941a (4.8% carbon), a LECO Corp. calcium carbonate standard (12% carbon), and a LECO Corp. sucrose standard (42.1% carbon). According to the protocol, the results had to be within 5% relative percent difference (RPD) of accepted values for sample analysis to proceed. The samples were analyzed in batches of 20 or fewer field samples. QC samples included a replicate, standard reference material, and instrument blank with each batch.

The Plumb (1981) method for grain size analysis combined sieve and pipette analysis of sediments, and classified samples according to the Wentworth Classification. Under this classification, gravel-sized particles are those retained on a No. 10 sieve (>2.00 mm), sand-size particles are those that pass the No. 10 sieve and are retained on the No. 230 (0.0625 mm) sieve. The distribution of silt and clay-sized particles was measured by pipette withdrawals at prescribed depths and time intervals. Silt particles ranged from <0.0625 mm to 0.0039 mm. Clay particles were those <0.0039 mm. In the laboratory, sediment samples were homogenized using stainless steel spatulas creating a 25-50 gram aliquot.

Water/moisture content was determined by weighing the container used for drying with and without the sediment, drying the sample, determining the mass of the sample and container after drying, and calculating the percent water content through the differences in mass.

2.1.4 Laboratory Data Validation

All DDT data were validated and approved for incorporation into the project database. Laboratory data were validated using relevant and applicable criteria described in the USEPA *National Functional Guidelines for Organic Data Review* (EPA540/R-99/008, October 1999), *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846, May 1996), and the IWP. The validation process included reviews of the QC summary form in addition to the validation procedures described in the above referenced EPA guideline document (i.e., raw data review for system performance indicators, target compound identification, and compound quantification and project-required reporting and method detection limits).

The data validation and data quality assessment reports are provided in Appendix A. Results of the data validation and data quality assessment are summarized in Section 2.3.

2.2 DATA ANALYSIS

Statistical analyses were performed on subsets of the original data archived in a project-specific dataset. Data analysis tasks were performed using JMP® Software (version 5.0.1a, distributed by SAS®). Data were translated from Microsoft® Excel files to JMP® data sets, and all analyses were performed within the JMP® system. The following sections provide brief descriptions of the statistical analyses performed.

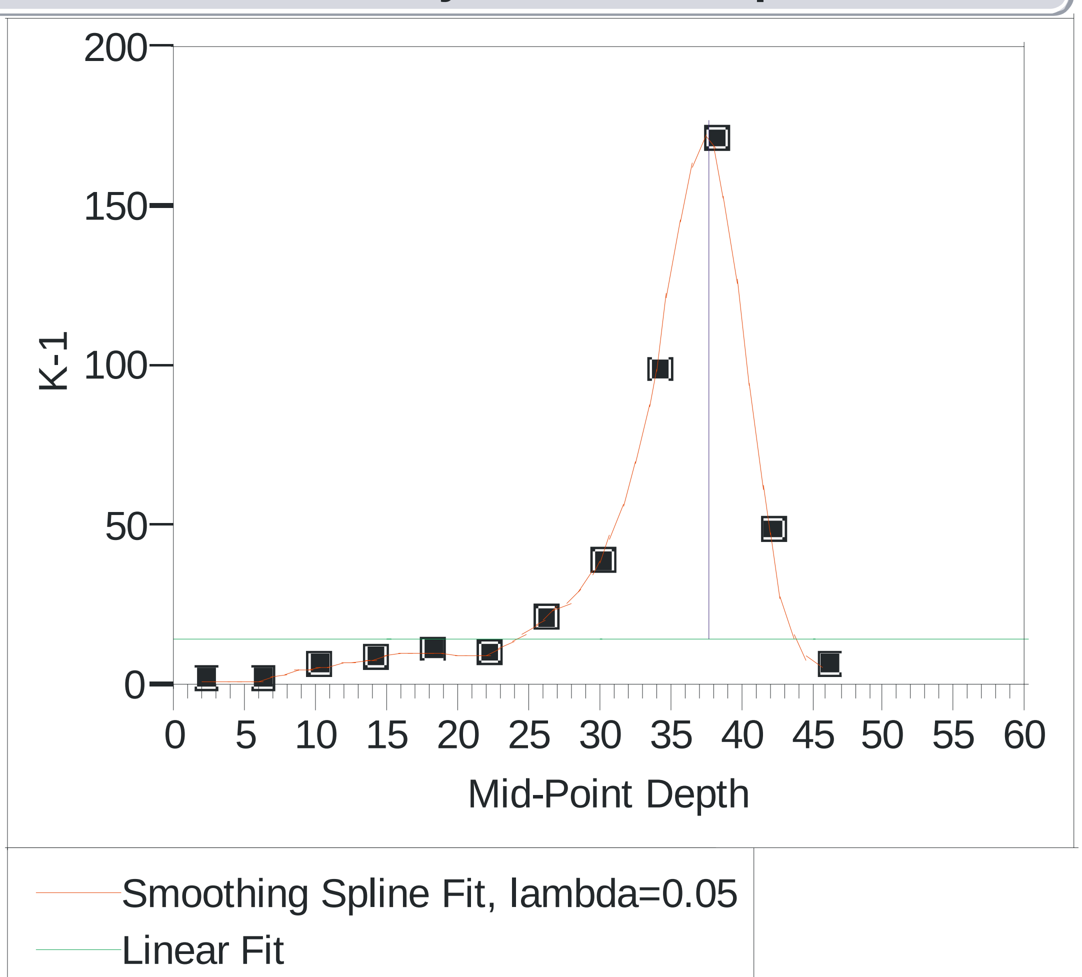
Point Estimates of DDE Concentration with Depth. DDE concentration versus core depth (based on the mid-point of the core strata) was plotted for each core from the K and N transect stations and a spline technique was used to find point estimates of the depth from the sediment surface where the concentration: (1) first reached 15 ppm (above the peak); (2) reached its peak; and (3) returned to 15 ppm (below the peak). These three point estimates are referred to as: (1) the Upper 15; (2) the Peak; and (3) the Lower 15 in all additional analyses. Figure 2-2 shows a representative spline plot for Station K, Rep 1. The green horizontal line intersects the two vertical depths above and below the peak where DDE concentrations equal 15 ppm; and the blue line estimates the corresponding depth of the peak.

The cubic spline method uses a set of third-degree polynomials spliced together such that the resulting curve is continuous and smooth at the splices (knot points). The estimation is done by minimizing an objective function that is a combination of the sum of squares error and a penalty for curvature integrated over the curve extent. A description of the method is provided in Reinsch (1967) and Eubank (1988). The smoothness (or flexibility) of the spline fit increases with increasing lambda, a tuning parameter in the spline formula. As the value of lambda decreases, the error term of the spline model has more weight and the fit becomes more flexible and curved. Higher values of lambda make the fit stiff (less curved), approaching a straight line. A lambda value of 0.05 was used as a default in this analysis; however, this value was increased up to 15 to produce the best Gaussian or bell-shaped fit that had a corresponding R-square value ≥ 0.85. This was necessary as some of the plots were slightly bi-modal around the targeted DDE point estimates. R-square measures the proportion of variation accounted for by the spline model. In Figure 2-2, fitting a spline with lambda = 0.05 explained > 99.9% of the total variation in the core data for Station K, Rep 1.

Regression Analysis. Linear regression analysis was performed for each of the three point-estimate data sets (i.e., Lower 15, Upper 15, Peak) by transect (i.e., K-transect, N-transect). A description of the method is provided in Sokal and Rohlf (1998). Log-transformed vertical depth was the dependent (y) variable and horizontal distance from the cap placement location was the independent variable (x). Depth data estimated from the spline analysis were log transformed to better approximate the underlying test assumptions of the regression analysis (Snedecor and Cochran 1978). The regression analysis was used to determine if there was a significant (i.e., α=0.05) linear relationship between log-transformed vertical depth and horizontal distance from the cap placement site (0 m station) for each transect. Regression results for each transect and DDE point-estimate are shown in Section 3.1. A statistically significant linear regression ($p<0.05$) with a positive slope (with the positive direction oriented towards the sediment-water interface) would be expected with scouring of surface sediments near the cap placement center, assuming (1) a consistent cap thickness and (2) a consistent vertical depth for each of the point estimates prior to capping.

Analysis of Variance (ANOVA). ANOVA was performed for each of the three point-estimate groups (i.e., Upper 15, Lower 15, Peak) by transect to determine if there were significant differences between the three station groups with replicates (e.g., K, K1, K2). This analysis was not performed on the 100-m and 150-m stations (e.g., K3 and K4), as no field replicates were collected at these distances. Under the ANOVA, a continuous response, or dependent variable (e.g., point-estimate of depth) is measured under experimental conditions identified by classification or independent variable (e.g., distance from the cap placement). The variation in the response is explained as being due to effects in the classification, with random error accounting for the remaining variation (Searle 1971, Sokal and Rohlf 1998). Data not normalized by log transformation were examined using a non-parametric ANOVA technique (Kruskal-Wallis). Non-normal data were assigned rankings, based on the DDE concentration (lowest values assigned lowest rank), and the ranks were processed using the ANOVA procedure. Parameters showing significant differences between sampling groups (stations equidistant from the cap site) at the $p \leq 0.05$ level were further examined using a Duncan's multiple range test (Duncan 1975). The Duncan's test is a result-guided test that compares the treatment (effects) means, while controlling the comparison-wise

Bivariate Fit of K-1 By Mid-Point Depth



Smoothing Spline Fit, lambda=0.05

R-Square	0.999989
Sum of Squares Error	0.308313

Figure 2-2. Representative Plot of Station K, Rep 1 Core Data Showing a Spline Fit with Point Estimates of Targeted DDE Concentrations.

error rate, and was used to differentiate significant differences ($p \leq 0.05$) between treatment groups (e.g., station groups).

2.3 QA SUMMARY

Field QC samples were obtained to determine the degree of cross-contamination, ensure successful decontamination procedures, or determine the effects of media heterogeneity on results, and rinsate blanks were collected to provide a measure of various cross-contamination, decontamination efficiency, and any other potential error that can be introduced from sources other than the sample. The results did not indicate significant sample contamination from field sampling/processing methodologies, and no data validation qualifiers were applied based on rinsate results.

For the overall purposes of this study, DDT results were either classified as usable or usable and estimated. Usable data are defined as those data that passed individual scrutiny of the verification and validation process and have been accepted for unrestricted application of Level IV data. Certain results were qualified as estimated; however, these data are usable and acceptable for Level IV use. No data were classified as unusable or rejected during the validation process.

Quality control (QC) data were evaluated with respect to the DQOs defined in the IWP for precision, accuracy, representativeness, comparability, and completeness (PARCC) parameters:

Precision - Based on an evaluation of the MS/MSD and field duplicate results, overall precision was acceptable. As a result, the laboratory DQO for precision was considered to have been met.

Accuracy - Based on an evaluation of the compounds detected in the field QC blanks, the overall accuracy was acceptable, except where noted. As a result, the field DQO for accuracy was considered to have been met.

Representativeness - Based on the sample precision and accuracy assessment presented above, the samples collected during the study were considered representative of the environmental condition at the site.

Comparability - Based on the sample precision and accuracy assessment presented above, as well as the agreement between GC/MS and GC-ECD measurements, the data collected during the study were considered comparable with the data collected during previous investigations.

Completeness - Based on the evaluation of the field and laboratory QC results, 100 percent of the sediment and field QC blank data collected during the present study were used as the basis for all assessments presented in this report.

3.0 RESULTS

Sections 3.1 and 3.2 present the results from geotechnical and chemical analyses of sediment cores and the coring intercalibration exercise, respectively.

3.1 CELL SU SEDIMENT CORE PROFILES

3.1.1 Geotechnical Properties

Results from previous phases of the Pilot Cap Monitoring Program (SAIC 2002, 2004c) demonstrated that the Queensgate cap material could be distinguished from EA sediments by relatively higher proportions of medium sand (2 phi; particle diameters from 0.25 to 1 mm) and fine sand (3 phi; <0.25–0.125 mm), and lower proportions of very fine sand (4 phi; <0.125 to 0.0625 mm). Other studies (e.g., Lee et al. 2002; Santschi et al. 2001) and monitoring on the PV Shelf have also reported that EA sediments in the vicinity of Cell SU are characterized by low bulk density, high water content (porosity), and high DDE concentrations. The following discussion focuses on those geotechnical parameters considered most diagnostic for distinguishing cap material and EA sediments.

Grain Size

Percentages of medium and fine sands are listed in Tables 3.1-1 and 3.1-2, and a cross-section of medium plus fine sands along the station transect is shown in Figure 3.1-1. For all cores combined, the percentages of medium and fine sands tended to covary (r^2=0.74). Sediments containing more than 30% medium plus fine sands occurred mostly in the near-surface layers (0-12 cm) of cores within the region of survey transect bounded by Stations K3 and N3. Sediments containing 20% or more medium sands and 20% or more fine sands occurred at depths from 16 to 32 cm at Station A and in the 4 to 8 cm layer at Stations B and F. These were the only samples with grain size characteristics that were similar to those of the Queensgate cap material. All other samples contained percentages of medium and fine sands indicative of a mixture of varying proportions of cap material and EA sediments.

Along the transect of K stations (i.e., K through K4), medium sands in the surface 0 to 12 cm layers decreased with distance from Station K (the cap placement location), with the exception of relatively low percentages in the 4 to 8 cm and 8 to 12 cm layers at Station K compared to those at Stations K1 and K2 (25 m and 50 m, respectively from the placement site). At core depths below 12 cm, percentages of medium and fine sands were mostly less than 5%, and no consistent patterns with distance from Station K were apparent. Similarly, along the N station transect (Stations N through N4), percentages of medium sands in the 4 to 12 cm layers generally decreased with distance from Station N, whereas percentages of medium sands in the 0 to 4 cm layers at Stations N, N1, N2, and N3 were fairly uniform. The percentages of fine sands in the 0 to 4 cm layers at Stations N1 and N2 were slightly higher than those in the 0 to 4-cm layer at Station N. At depths below 12 cm, sediments typically contained less than 5% medium sands and fine sands, and there were no obvious patterns in grain size with distance fromStation N.

At Stations B and F, sediments with >6% medium sands and >10% fine sands extended to subcore depths of 16 cm and 8 cm, respectively. Percentages of medium and fine sands decreased to less than 5% each at core depths below 20 cm. At Station A, the site in the center of Cell SU that received the initial five loads of cap material, sediments with >6% medium sands occurred at subcore depths from 8 to 36 cm, whereas the 0 to 8 cm layers contained relatively lower percentages (<6%) of medium sands compared to cores from adjacent stations. Fine sands followed a similar pattern with core depth, although the percentages were consistently higher than those of medium sands for all core layers. At core depths below 40 cm, percentages of medium and fine sands were similar to those of EA sediments.

Table 3.1-1. Percentages of Medium Sands (0.25 to 1 mm diameter) in Cell SU Sediment Cores From the July 2004 Survey.

July 2004 Survey													
Core Depth (cm)	**K4, Rep1**	**K3, Rep1**	**K2, Rep1**	**K1, Rep1**	**K, Rep1**	**B, Rep1**	**A, Rep1**	**F, Rep1**	**N, Rep1**	**N1, Rep1**	**N2, Rep1**	**N3, Rep1**	**N4, Rep1**
0–4	1.45	4.15	9.33	10.10	10.16	11.44	1.77	11.92	11.87	12.52	13.30	3.55	2.03
4–8	1.24	3.58	11.82	12.21	4.82	27.59	3.52	23.57	8.90	9.88	4.82	4.72	2.74
8–12	0.72	3.14	5.11	9.35	3.57	19.04	6.36	5.44	5.05	4.59	3.06	1.57	2.31
12–16	2.22	0.91	2.91	3.17	3.38	7.19	12.13	4.52	4.25	2.32	3.06	0.68	2.23
16–20	1.08	4.41	4.50	4.08	3.95	5.99	20.10	0.34	2.41	2.99	3.57	0.84	1.57
20–24	6.92	0.86	3.44	1.59	3.22	2.13	27.26	1.93	3.93	1.44	0.29	0.15	0.32
24–28	3.82	0.53	0.76	0.23	2.19	3.32	25.82	1.91	0.14	3.46	3.22	1.46	0.43
28–32	2.43	0.39	3.44	0.80	2.34	1.91	27.96	0.40	0.76	5.66	2.03	0.80	0.26
32–36	0.86	0.05	0.88	0.28	1.06	4.57	15.92	1.38	0.82	1.60	0.69	0.51	2.35
36–40	1.41	0.81	0.75	2.75	1.19	0.99	3.97	0.19	0.65	0.73	1.18	0.69	1.22
40–44	1.16	0.09	0.56	0.21	0.72	1.10	0.58	0.59	0.25	0.34	0.50	0.22	0.50
44–48	1.45	0.53	4.73	0.82			0.36			0.74	0.53	0.42	0.28
48–52			4.89				2.01						0.21

Table 3.1-2. Percentages of Fine Sands (<0.25 to 0.125 mm diameter) in Cell SU Sediment Cores from the July 2004 Survey.

0–4	11.20	20.98	28.96	28.09	25.27	38.40	7.91	41.06	20.05	28.33	36.97	20.97	10.17
4–8	9.13	13.69	26.83	21.72	12.58	45.67	13.41	38.76	9.98	13.46	12.41	12.80	6.43
8–12	4.58	5.37	8.99	7.73	6.16	21.90	30.86	9.74	6.62	7.73	7.30	5.33	4.26
12–16	5.12	2.89	5.37	5.52	5.57	12.92	47.39	6.66	4.61	3.41	6.02	2.42	4.89
16–20	2.07	4.37	4.18	5.56	6.14	9.23	56.13	4.83	2.00	2.46	4.12	0.85	1.02
20–24	4.39	1.36	3.45	2.50	2.38	5.00	52.34	2.34	1.52	1.60	0.53	0.73	0.32
24–28	1.85	2.44	1.60	1.05	2.78	2.34	24.97	2.14	0.25	3.16	3.56	5.17	0.48
28–32	1.71	1.95	3.29	0.51	1.83	4.07	28.83	0.46	0.88	7.32	2.84	1.63	1.01
32–36	0.87	1.74	1.49	0.46	1.86	6.47	30.96	1.44	1.69	4.08	1.33	2.06	3.26
36–40	3.93	3.71	2.04	2.49	3.27	2.54	9.83	0.92	3.53	0.28	3.01	2.66	3.36
40–44	2.57	1.81	2.90	3.70	3.32	4.40	2.20	2.45	2.08	0.69	2.80	1.54	2.04
44–48	3.28	3.89	7.77	5.53			1.89			2.52	2.37	2.22	1.82
48–52			7.09				5.24						2.74

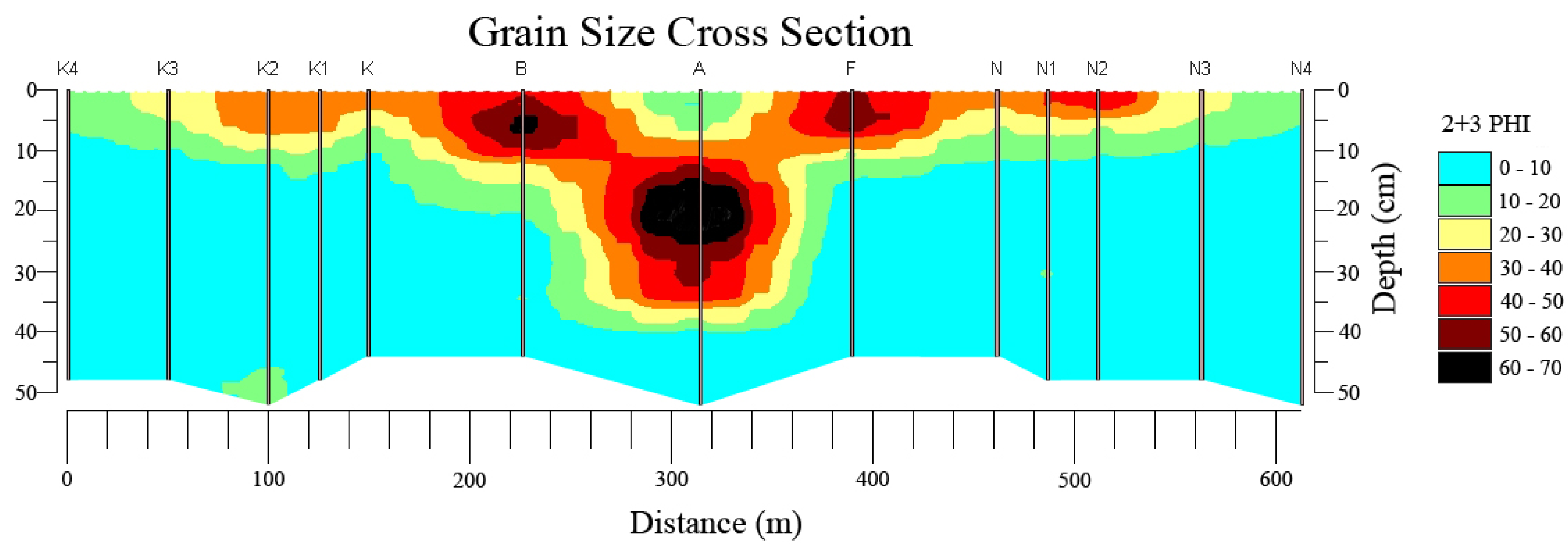


Figure 3.1-1. Percentages of Medium Plus Fine Sands (% 2 + 3 phi) in Cell SU Sediment Cores During July 2004. Values are from the replicate 1 cores only from each station. Note vertical exaggeration of y-axis scale.

Percentages of very fine sands (4 phi; <0.125 to 0.0625 mm) in sediment cores are listed in Table 3.1-3. The vertical distribution patterns for very fine sands were consistent for all cores, with relatively higher values (e.g., 15 to 30%) in the surface (0 to 12 cm) and bottom (below about 40 cm) portions of the core, and minimal contributions (less than 10%) in the 24 to 32 cm layers. Percentages of very fine sands were not correlated with percentages of medium sands.

Dry Bulk Density, Water Content, and Total Organic Carbon

Dry bulk density values for the sediment core layers ranged from 0.46 to 1.59 g/cm^3 (Table 3.1-4). With the exception of the Replicate 1 core from Station A, dry bulk density values greater than 1 g/cm^3 occurred primarily in the near-surface layers (0 to 8 cm) and at core depths below about 40 cm, while minimal values (0.46 to 0.55 g/cm^3) generally corresponded to core depths with minimum percentages of medium sands (Figure 3.1-2). For the K and N station transects, dry bulk density values did not exhibit any obvious or consistent trends with distance from the cap placement locations (i.e., Stations K and N). Dry bulk density values were moderately correlated with percentages of very fine sediments (r^2=0.59), but weakly correlated with percentages of medium and fine sands (r^2=0.27 and r^2=0.33, respectively). The weak correlations between bulk density and medium sands were attributable in part to comparatively higher dry bulk density values (>1 g/cm^3) in the bottom layers of some cores (>36 to 40 cm) that contained low percentages of medium sands. At Station A, dry bulk density values greater than 1 g/cm^3 occurred in subcore depths from 8 to 52 cm with no subsurface minimum.

The moisture content of core sediments ranged from 19 to 67% (Table 3.1-5). With the exception of the Replicate 1 core from Station A, comparatively higher moisture content values (e.g., >50%) occurred at subcore depths between about 16 and 40 cm, whereas the moisture contents of the near-surface and near-bottom core layers were relatively lower. The Replicate 1 core from Station A contained <40% moisture content for all but the 0 to 8 cm layers. Sediment porosity was calculated from the measured moisture content values according the approach described by Santschi et al. (2001): porosity (Ø) = fw/[fw + (1 - fw)ρw/ρs], where fw is the fraction of water content in bulk sediments (% moisture/100), ρw is the density of water (1.0 g/cm3), and ρs is density of solids (2.5 g/cm^3). Values for all but the Replicate 1 core from Station A were mostly in the range of 0.7 to 0.8 (Table 3.1-6) and consistent with values measured in the near-surface sediment layers during the Task 3b Geotechnical Study (SAIC 2005) and with values reported by Santschi et al. (2001). Slightly lower porosity values were associated with the surface layers of cores containing relatively high medium-sand contents and in some of the deepest core strata that may have corresponded to pre-EA sediment layers.

Total organic carbon (TOC) concentrations in sediments ranged from 0.1 to 12.7% (Table 3.1-7). At all but Station A, the highest TOC concentrations occurred at subcore depths from about 20 to 40 cm, whereas concentrations in the near-surface and near-bottom core layers were relatively lower (Figure 3.1-3). These patterns were similar to those for moisture content, and the inverse of patterns for dry bulk density and medium sands. For all cores, TOC concentrations were moderately correlated with very fine sands (r^2=0.70), but weakly correlated with medium and fine sands (r^2=0.17 and r^2=0.45, respectively). TOC concentrations also were strongly correlated with sediment porosity. As noted by Santschi et al. (2001), this relationship occurs because higher organic content causes swelling of sediment particles, which results in higher water content and higher porosity. The Replicate 1 core from Station A did not contain a subsurface TOC peak similar to the other cores. Instead, the TOC concentrations at core depths between 12 and 36 cm were less than 1%, compared to concentrations up to 2.4% in core layers above and below these depths. For the K and N station transects, TOC concentrations did not exhibit any clear trends with distance from the cap placement locations (i.e., Stations K and N).

Table 3.1-3. Percentages of Very Fine Sands (<0.125 to 0.0625 mm diameter) in Cell SU Sediment Cores from the July 2004 Survey**.**

0–4	26.11	26.04	21.36	20.74	18.95	18.16	11.75	16.56	15.78	17.82	20.05	27.97	25.90
4–8	21.28	21.57	19.56	16.56	15.59	12.50	13.09	12.68	14.41	15.92	18.27	18.45	19.82
8–12	18.19	19.95	18.06	13.74	14.94	9.22	26.41	14.38	14.09	12.64	16.89	15.69	16.08
12–16	17.27	12.76	15.94	16.37	15.50	15.00	23.28	14.28	10.27	8.66	12.59	9.56	11.56
16–20	10.60	8.24	12.09	13.45	12.30	16.73	16.50	12.84	6.97	4.81	6.97	2.68	3.12
20–24	6.98	2.94	8.14	11.39	5.21	14.10	10.51	7.59	4.82	3.90	1.10	4.42	1.19
24–28	7.52	3.72	6.63	3.66	5.06	5.99	6.33	3.65	1.86	4.39	7.31	7.48	1.67
28–32	3.22	4.50	7.14	1.48	4.56	8.71	7.02	1.06	1.23	6.38	6.79	4.53	2.05
32–36	4.11	14.94	6.74	2.28	8.39	7.59	19.98	3.39	9.94	4.28	3.48	5.27	16.37
36–40	19.93	26.66	27.61	7.12	22.73	4.22	22.05	3.55	24.67	22.48	10.63	24.72	24.90
40–44	25.94	28.59	26.65	22.19	28.39	15.32	23.82	20.22	25.86	26.77	24.36	26.32	23.52
44–48	24.41	31.61	17.86	32.15			25.21			27.46	24.26	25.20	21.90
48–52			15.06				20.93						25.43

Table 3.1-4. Dry Bulk Density (g/cm3) of Cell SU Sediment Cores From the July 2004 Survey.

0–4	0.97	1.01	1.03	1.04	0.96	1.14	0.67	1.12	1.01	1.13	1.19	1.00	0.94
4–8	1.00	0.95	1.13	1.07	0.90	1.47	0.80	1.39	0.95	1.00	0.90	0.94	0.84
8–12	0.81	0.85	0.92	0.92	0.94	1.34	1.17	0.90	0.78	0.83	0.79	0.83	0.81
12–16	0.77	0.76	0.85	0.83	0.76	0.96	1.45	0.80	0.74	0.70	0.73	0.74	0.65
16–20	0.71	0.71	0.77	0.81	0.80	0.90	1.37	0.71	0.59	0.58	0.65	0.58	0.54
20–24	0.55	0.53	0.59	0.69	0.64	0.83	1.43	0.65	0.49	0.51	0.53	0.53	0.46
24–28	0.55	0.48	0.53	0.60	0.52	0.68	1.55	0.56	0.46	0.46	0.56	0.55	0.46
28–32	0.46	0.55	0.58	0.53	0.56	0.62	1.59	0.48	0.49	0.45	0.52	0.55	0.53
32–36	0.49	0.74	0.54	0.53	0.75	0.60	1.40	0.50	0.56	0.52	0.56	0.57	0.68
36–40	0.71	1.19	1.16	0.64	1.04	0.55	1.22	0.50	1.07	0.80	0.62	1.11	0.99
40–44	1.12	1.34	1.32	0.96	1.28	0.73	1.30	0.94	1.33	1.15	1.09	1.24	1.19
44–48	1.11	1.22	0.94	1.22			1.33			1.14	1.22	1.30	1.19
48–52			0.82				1.13						1.28

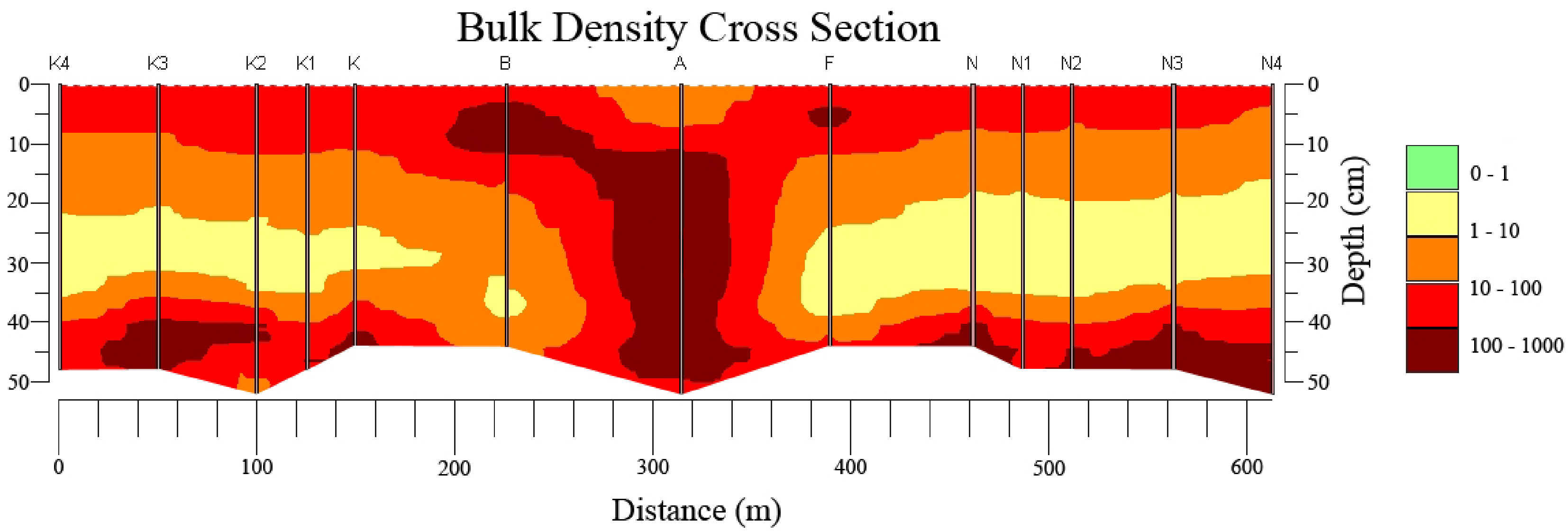


Figure 3.1-2. Bulk Density (g/cm3) of Cell SU Sediments During July 2004. Values are from the replicate 1 cores only from each station. Note vertical exaggeration of y-axis scale.

Table 3.1-5. Moisture Content (%) of Cell SU Sediment Cores From the July 2004 Survey.

0–4	41.8	38.1	39.6	37.1	35.2	36.4	54.8	33.1	35.6	31.9	33.6	37.4	41.3
4–8	40.6	39.6	42.8	35.2	33.4	24.1	52.2	25.1	28.8	28.1	40.7	40.3	42.5
8–12	43.1	43.1	46.7	42.7	46.1	27.5	34.5	40.4	43.7	27.4	47.0	47.3	44.9
12–16	52.7	47.0	47.0	46.1	46.4	61.8	29.2	46.4	47.4	48.1	48.9	50.3	48.8
16–20	56.8	51.4	51.2	46.8	50.3	39.7	24.7	46.8	51.5	49.3	55.0	57.4	55.4
20–24	59.5	58.7	59.4		53.0	46.5	21.9	49.4	55.4	59.5	58.7	59.6	62.0
24–28	59.2	63.2	62.7		57.5	51.0	23.2	53.0	58.5	62.0	59.5	56.3	60.7
28–32	64.1	58.2	63.7		62.4	57.0	19.2	62.1	64.5	66.0	60.8	57.5	55.9
32–36	50.9	48.5	60.5	61.9	61.3	57.5	21.8	63.5	56.1	66.8	33.1	56.4	60.0
36–40	33.0	36.5	54.6	56.4	61.7	61.3	26.6	58.7		61.3	55.6	38.6	39.6
40–44	36.4	28.1	46.1	40.5	51.8	51.7	37.2	41.0	29.4	49.2	33.6	28.3	33.4
44–48		31.0	34.9	30.8	66.6		26.6			31.4	28.8		36.1
48–52			35.8				27.6						31.5

Table 3.1-6. Porosity of Cell SU Sediment Cores From the July 2004 Survey.

0–4	0.64	0.61	0.62	0.60	0.58	0.59	0.75	0.55	0.58	0.54	0.56	0.60	0.64
4–8	0.63	0.62	0.65	0.58	0.56	0.44	0.73	0.46	0.50	0.49	0.63	0.63	0.65
8–12	0.65	0.65	0.69	0.65	0.68	0.49	0.57	0.63	0.66	0.49	0.69	0.69	0.67
12–16	0.74	0.69	0.69	0.68	0.68	0.80	0.51	0.68	0.69	0.70	0.71	0.72	0.70
16–20	0.77	0.73	0.72	0.69	0.72	0.62	0.45	0.69	0.73	0.71	0.75	0.77	0.76
20–24	0.79	0.78	0.79		0.74	0.68	0.41	0.71	0.76	0.79	0.78	0.79	0.80
24–28	0.78	0.81	0.81		0.77	0.72	0.43	0.74	0.78	0.80	0.79	0.76	0.79
28–32	0.82	0.78	0.81		0.81	0.77	0.37	0.80	0.82	0.83	0.79	0.77	0.76
32–36	0.72	0.70	0.79	0.80	0.80	0.77	0.41	0.81	0.76	0.83	0.55	0.76	0.79
36–40	0.55	0.59	0.75	0.76	0.80	0.80	0.48	0.78		0.80	0.76	0.61	0.62
40–44	0.59	0.49	0.68	0.63	0.73	0.73	0.60	0.63	0.51	0.71	0.56	0.50	0.56
44–48	0.83	0.53	0.57	0.53			0.48		0.58	0.53	0.50		0.59
48–52			0.58				0.49						0.53

Table 3.1-7. Total Organic Carbon Content (%) of Cell SU Sediment Cores From the July 2004 Survey.

0–4	1.16	1.01	1.14	1.02	1.04	0.79	2.43	0.88	1.11	0.88	0.66	1.21	1.42
4–8	1.73	1.74	1.52	1.47	1.91	0.25	2.40	0.52	1.82	1.86	1.97	2.42	2.12
8–12	2.22	2.79	2.52	2.17	2.69	0.56	1.48	2.12	3.01	2.37	3.01	2.83	3.10
12–16	3.06	4.15	2.35	2.58	3.50	1.68	0.43	2.80	4.00	4.44	4.65	5.11	5.46
16–20	5.16	5.64	4.00	4.10	3.96	2.71	0.21	4.41	5.59	7.53	5.55	7.56	8.75
20–24	7.37	7.57	7.29	5.48	5.12	4.07	0.10	5.69	7.44	8.68	8.35	8.11	10.51
24–28	8.59	9.58	7.92	7.33	8.31	4.96	0.22	7.52	12.26	9.98	7.33	9.03	12.01
28–32	11.08	8.13	9.05	8.94	7.35	6.67	0.13	10.17	10.83	6.99	7.96	8.69	9.68
32–36	7.15	3.97	6.43	7.99	6.79	7.83	0.50	9.04	8.57	7.04	9.46	6.20	4.86
36–40	3.04	1.38	1.34	5.56	2.85	9.11	1.65	9.59	1.38	2.94	4.82	2.10	2.16
40–44	1.49	0.97	1.11	3.33	1.15	4.09	1.16	1.96	0.95	0.87	1.72	0.90	1.49
44–48	2.14	0.84	2.17	1.07			0.60			1.28	1.17	0.91	1.19
48–52			3.80				1.27						1.23

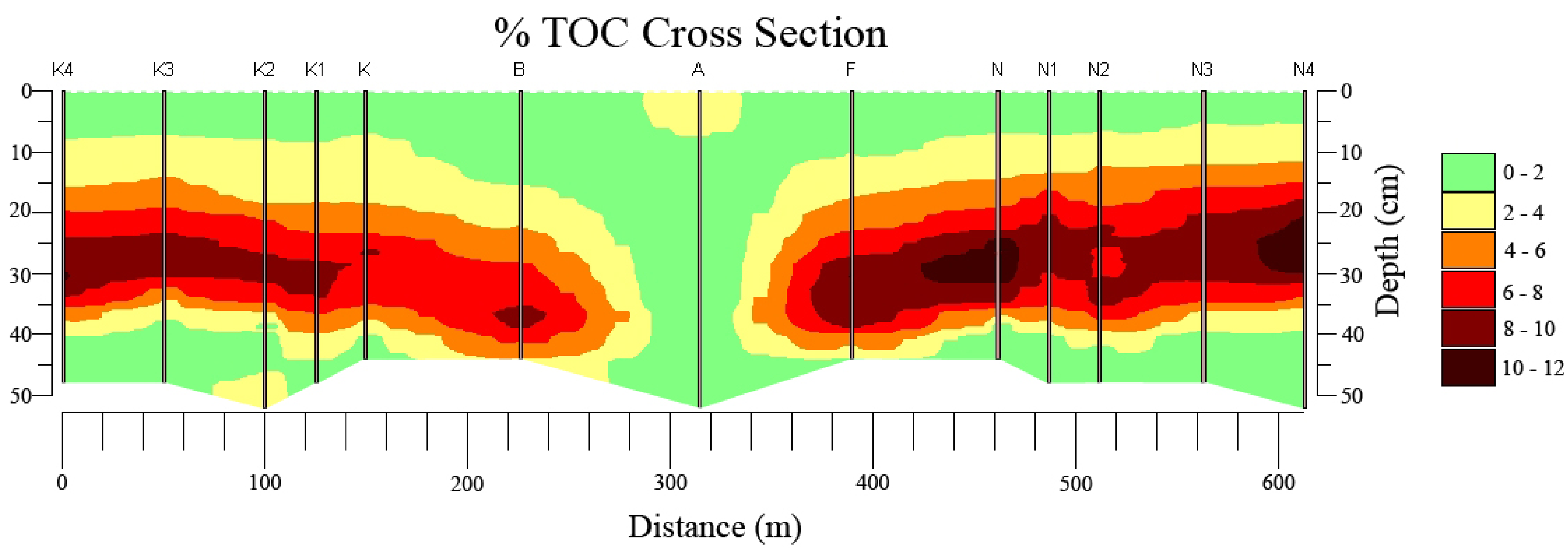


Figure 3.1-3. Total Organic Carbon Concentrations (% dw) in Cell SU Sediment Cores During July 2004. Values are from the replicate 1 cores only from each station. Note vertical exaggeration of y-axis scale.

3.1.2 Sediment DDT

Samples of the Queensgate sediments that were used to construct the pilot cap in Cell SU contained an average DDE concentration of about 0.02 ppm (Sea Surveyor 1994), which was two or more orders of magnitude lower than concentrations in the surface EA sediment layers within Cell SU prior to cap placement. As a result, low DDE concentrations in post-capping sediments are considered another geochemical marker for the presence of cap material (e.g., SAIC 2004c).

DDE Concentrations

The magnitude of *p,p´*-DDE concentrations in the Cell SU cores ranged over four orders of magnitude, from 0.02 to 230 ppm (Tables 3.1-8 and 3.1-9). A cross-section pattern for DDE concentrations, shown in Figure 3.1-4, indicates relatively low concentrations (<10 ppm) in the surface 0-12 cm layers that increased with core depths to peak concentrations between 24 and 40 cm, and then decreased with depth below the peak to levels from <1 to several ppm. Although the DDE concentration profiles generally matched patterns for grain size, dry bulk density, TOC, and moisture/porosity (Figures 3.1-1 through 3.1-4), DDE concentrations combined from all cores were not strongly correlated with grain size, bulk density or TOC. Concentrations were most strongly correlated with fine silts and clays (e.g., 6 to 10 phi; $0.42<r<0.55$), whereas DDE concentrations were weakly, but negatively correlated with medium, fine, or very fine sand-size particles ($-0.44<r<-0.27$).

From the profile data it appeared that all cores, except the Replicate 1 core from Station A and the Station 7C core collected for the intercalibration exercise (see Section 3.2), spanned the subsurface DDE peaks. DDE concentrations in the deepest core layers analyzed ranged from <1 to about 6 ppm, except for cores from Stations B and F, in which DDE concentrations in the deepest core layers analyzed were 46 ppm and 18 ppm, respectively. Although these latter concentrations were lower than the peak DDE concentrations, they were still well above levels expected in pre-effluent sediment layers (e.g., <1 ppm).

DDE concentrations in the Replicate 1 core from Station A were noticeably different from those in the other two replicate cores from this station as well as cores from other stations. In particular, DDE concentrations in the Replicate 1 core were less than 5 ppm, and no depth-related patterns were apparent. Instead, concentrations measured in adjacent strata varied by up to two orders of magnitude. Nevertheless, the uniformly low DDE concentrations were consistent with the relatively high medium and fine sand content, high dry bulk density, and low TOC concentrations measured in this core. The DDE profiles from the other two replicate cores from Station A were substantially different from those in the Replicate 1 core (Table 3.1-9). Specifically, the Replicate 2 core exhibited relatively low (<1 ppm) concentrations in the 6- to 14-cm core layers, an abrupt increase between the 14-16 and 16-18 cm layers, a peak DDE concentration of 66 ppm at 18-20 cm, and then relatively lower concentrations decreasing to <1 ppm at 42 cm. Similarly, the Replicate 3 core also contained a surface layer from 4 to 20 cm with DDE concentrations <1 ppm, increasing to a subsurface DDE peak concentration of 140 ppm at a core depth of 30-32 cm, and then decreasing to <1 ppm at a depth of 44 cm. The grain size and geochemical characteristics of the Replicate 1 core suggested that sediments throughout the 50 cm-length of the core were predominantly cap material, whereas the DDE concentrations in the Replicate 2 and 3 cores reflected the presence of remnant cap material in the upper 12 cm layer that covered underlying EA sediments (no grain size data are available for the Replicate 2 and 3 cores).

The variability among replicate core profiles for Stations N, N1, N2, K, K1, and K2 was considerably smaller than for Station A, as illustrated by comparisons of the magnitude and the depth to the peak DDE concentration in replicate cores (Table 3.1-10). For this comparison, the depth to the peak DDE concentration was assigned to the mid-point of the core interval containing the highest DDE concentration

Table 3.1-8. DDE Concentrations (ppm) in Sediment Cores From the Station K and Station N Transects During the July 2004 Survey.

0–4	1.8	3.8	2.1	4.5	1.6	1.5	2.4	1.8	2.0	1.6	1.8	2.2	2.3	1.8	1.2	1.6	1.4	1.7	2.1	2.3	2.6	2.5
4–8	3.6	4.8	2.8	4.8	3.9	2.6	3.5	3.8	3.6	2.1	3.5	3.4	3.8	1.3	2.1	1.1	2.6	2.6	4.0	2.2	6.4	5.1
8–12	7.2	9.2	5.9	9.8	6.4	5.8	6.2	5.5	6.0	6.0	4.5	6.5	5.2	4.9	4.6	3.1	4.9	4.0	7.0	3.7	9.0	9.3
12–16	9.4	14	8.3	10	7.6	8.2	6.4	6.6	8.8	8.6	7.4	9.7	7.7	7.8	7.2	9.0	7.6	6.1	8.6	5.6	11	8.2
16–20	13	13	8.8	14	6.7	11	8.4	9.1	8.5	11	8.2	14	7.9	9.2	6.9	8.2	7.5	7.0	8.2	7.3	20	18
20–24	24	34	9.5	25	11	10	8.4	12	12	9.8	9.5	30	22	12	14	20	12	9.5	16	9.6	52	83
24–28	43	120	19	60	26	18	10	32	33	21	28	160	44	26	34	41	21	26	22	14	140	140
28–32	84	150	46	120	52	31	34	160	100	38	80	150	160	130	130	230	120	100	46	90	120	100
32–36	230	37	170	150	94	180	120	47	130	98	110	100	140	72	100	280	150	38	200	120	82	150
36–40	39	14	12	83	28	83	120	7.6	42	170	90	8.3	26	19	47	130	37	81	80	28	8.6	10
40–44	5.3	0.5	0.4	38	1.8	9.5	32	0.6	2.2	48	17	0.2	3.4	0.3	3.4	25	2.6	20	4.2	4.5	0.14	1.8
44–48	6.4	6.1	4.5	3.2	2.1	1.3	1.9			5.6	2.2				3.7	1.4	1.5	5.6	0.70		1.8	0.5
48–52			8.9	4.9																		0.3

Table 3.1-9. DDE Concentrations (ppm) in Sediment Cores From Stations B, F and A During the July 2004 Survey.

0–4	1.5	1.5		0–2	3.2	2.0	1.6
4–8	0.6	0.8		2–4	4.5	2.1	1.6
8–12	1.3	4.6		4–6	5.4	1.4	0.72
12–16	5.0	7.0		6–8	3.9	0.24	0.25
16–20	6.5	7.4		8-10	3.0	0.047	0.2
20–24	12.0	9.0		12–14	2.1	0.17	1.5
24–28	11.0	12.0		14–16	1.3	0.15	7.7
28–32	20.0	47.0		16–18	0.6	0.85	9.4
32–36	48.0	160		18–20	0.2	34	9.7
36–40	99.0	130		20–22	0.02	66	11
40–44	46.0	18.0		22–24	0.011	37	19
44–48				24–26	0.12	9.0	26
48–52				26–28	3.2	5.6	34
				28–30	1.4	5.6	38
				30–32	0.031	1.4	49
				32–34	0.018	0.84	140
				34–36	0.0048	2.5	81
				36–38	0.64	2.1	49
				38–40	6.0	2.2	66
				40–42	3.2	2.7	21
				42–44	0.75	1.0	19
				44–46	0.12	0.47	1.6
				46–48	0.17		
				48-50	0.12		

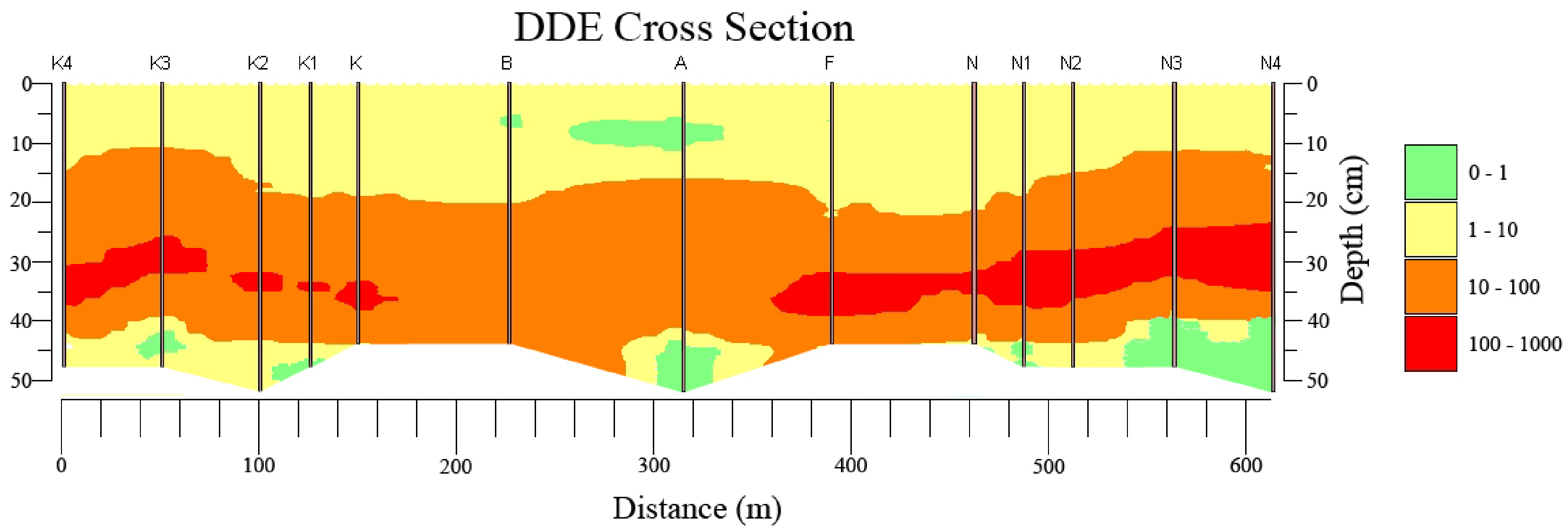


Figure 3.1-4. DDE Concentrations (ppm dw) in Cell SU Sediment Cores During July 2004. Profiles for Stations K, K1, K2, N, N1, and N2 are based on averages from three replicate cores per station and the profile for Station A is based on an average from two replicate cores per station (replicate 1 excluded). Note log scale for concentration patterns and vertical exaggeration of y-axis scale.

in the core profile (e.g., 30 cm for the 28-32 cm core strata) or the depth of the interface if two adjacent layers had the same DDE concentration. Differences in depths to the DDE peak among replicate cores from Stations K through K2 and N through N2 typically were 4 cm, which represents the vertical resolution for the subsampling scheme.

DDE concentrations in the surface 0 to 8 cm layers of most of the cores from the K and N station transects were less than 4 ppm and lower than pre-capping sediment concentrations. For example, baseline (i.e., pre-capping) sediment cores collected in Cell SU contained average DDE concentrations from 6 to 8 ppm in upper 0-4 cm and 4-8 cm layers (SAIC 2002), while a core collected in 2002 at a Cell SU reference station (Station SUU19) contained DDE concentrations of 3.1 ppm and 6.1 ppm in the 0-4 cm and 4-8 cm, layers, respectively (SAIC 2004c). LACSD measured pre-capping DDE concentrations from 7 to 17 ppm in the upper 10 cm of cores collected at Station 7C during 1989 to 1999. Thus, present DDE concentrations in the surface layers of these cores were up to several times lower than pre-capping concentrations, although there was some overlap in the respective concentration ranges for the pre-capping and recent surface sediments. The Replicate 1 core from Station A was the only core with DDE concentrations comparable to those in the Queensgate cap material. Thus, the magnitude of DDE concentrations in the surface portions of the remnant cap layer in Cell SU are lower than the pre-capping baseline concentrations, but also higher than concentrations in the Queensgate cap material. These results suggest that the present DDE concentrations in the cap layer have been enriched to varying degrees by contributions from EA sediments and/or other recently deposited particles that have been reworked into the cap layer.

Scouring Estimates Based on DDE Concentration Profiles

DDE profiles for cores from the K and N station transects were used to evaluate the magnitude of EA sediment scouring from cap placement operations. Figure 3.1-5 shows the DDE concentration and dry bulk density profiles along the Station K and N transects. The DDE peaks typically matched the depth of minimum bulk density. The figure also illustrates how the depth of the DDE peaks varies along the station transects. As described in Section 2.2, the depths of the concentration peaks, as well as the upper and lower shoulders of the peaks, for individual cores were used to develop estimates of sediment scouring. This approach was consistent with that used by Sherwood et al. (1996) and Lee et al. (2002) to evaluate sedimentation rates based on changes over time in the depths of the DDE peaks. A curve-fitting routine was used to smooth the DDE concentration profiles prior to identifying core depths associated with the upper and lower shoulders (Upper 15 and Lower 15, respectively) and the peak concentration. The depths of the three profile markers for each core collected along the N and K station transects were then plotted as a function of distance from Stations N and K, respectively, and a regression line was fit to each set of data points. Significant scouring or displacement of EA sediments during cap placement would be expected to shift the DDE concentration peak upwards, towards the sediment-water interface. This shift would be expected to decrease with distance due to decreasing surge force, resulting in a positive slope for the regression fit (with the positive direction oriented towards deeper core depths). Conversely, the presence of a cap layer that is thicker close to the placement location would yield a negative slope. A zero slope (i.e., horizontal line) could imply that displaced EA sediment was replaced by a layer of cap material of equal thickness. The regression analysis was performed to identify major scouring (e.g., > 20 cm) since the variance in cap thickness and pre-capping depths of the DDE peaks is unknown and could be considerable (e.g., up to several centimeters).

Core depths associated with the upper and lower shoulders and concentration peaks for each transect location are listed in Table 3.1-11. Changes in depths of the profile markers as a function of distance from Stations K and N are shown in Figures 3.1-6 and 3.1-7, respectively, and the slopes, intercepts, and regression statistics are listed in Table 3.1-12.

Table 3.1-10. Variability in the Peak DDE Concentrations (ppm) and Depth to Peak DDE Concentration (cm) among Replicate Cores. Depth to peak DDE concentration taken as the center of the core interval or depth of the interface between layers if both layers have the same concentration.

Station	Peak DDE Concentration (ppm)			Depth to Peak DDE Concentration (cm)		
	Rep1	Rep2	Rep3	Rep1	Rep2	Rep3
N	130	160	160	30	26	30
N1	280	130	150	34	30	34
N2	200	100	120	34	30	34
K	170	130	110	38	34	34
K1	180	120	160	34	36	30
K2	150	170	94	34	34	34
A	6	66	140	None	19	31

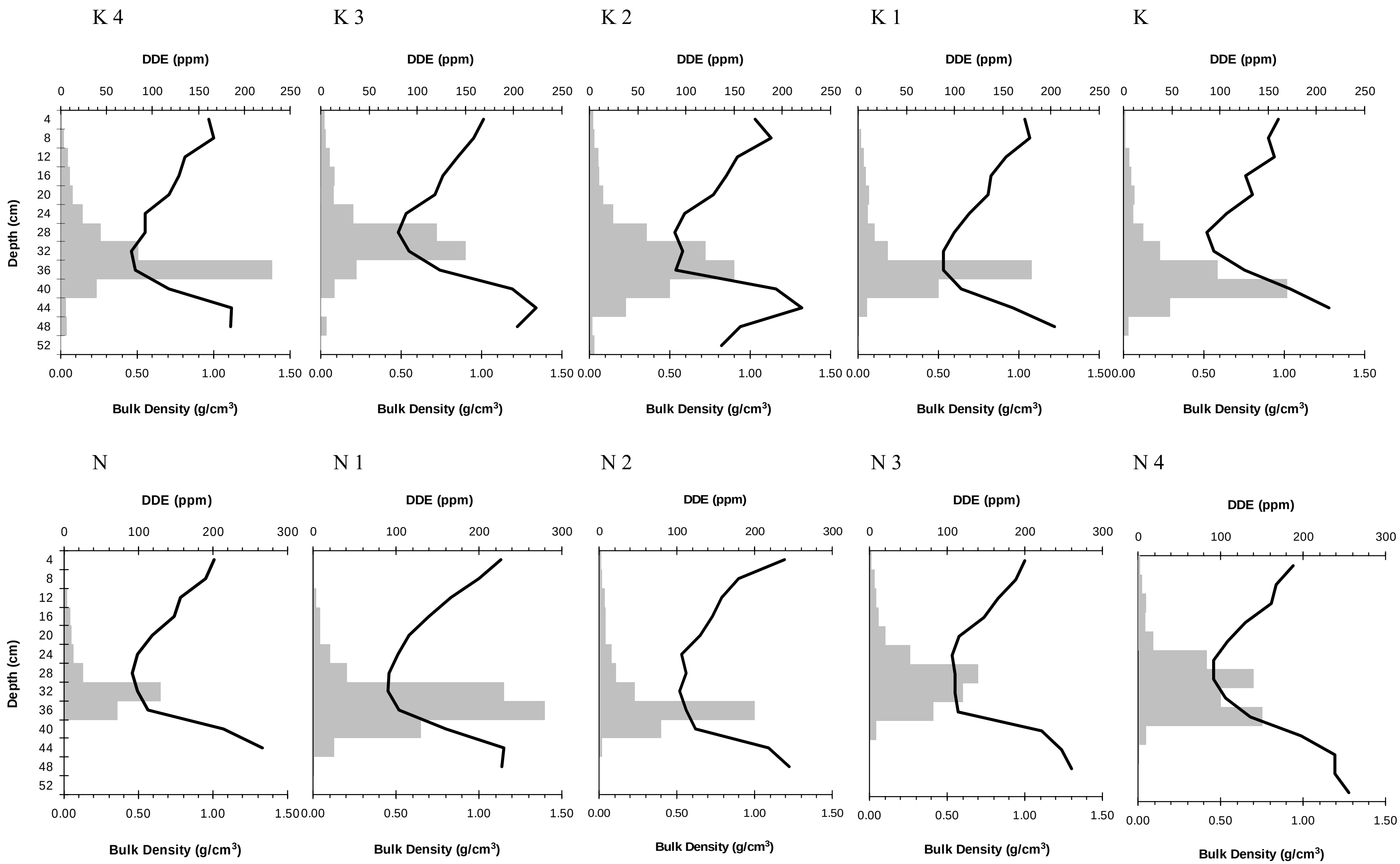


Figure 3.1-5. DDE (shaded histograms) and Bulk Density (lines) Profiles for the K and N Station Transects. Profiles are based on data from the replicate 1 core from each station.

The depths of the three profile markers in the K transect cores generally decreased with distance from Station K (Figure 3.1-6). The Upper 15 group at transect K was the only group with a significant negative slope (r^2=0.59; p=0.006); there were no other significant relationships at the $p<0.05$ level. These results indicated that no major scouring occurred along the transect or that the extent of scouring was less than the variability in pre-capping subsurface DDE concentrations (at the 15 ppm and peak levels). Results from the one-way ANOVA did not indicate any significant differences for core peak depths among Stations K, K1, and K2. These patterns appeared to reflect the presence of a relatively uniform cap layer at Stations K through K2, compared to a relatively thin or no cap in the vicinity of Stations K3 and K4. Significant differences in depth (for each point estimate) would be expected with substantial localized scouring. This test was performed in addition to the regression analysis to remove effects associated with distance from the cap site (i.e., no relationship between cap thickness and distance from the cap site was assumed). Another *a priori* assumption for this test was that any scouring would be localized and, therefore, highly variable between the three distance groups.

The magnitude of EA sediment scouring was estimated based on the following:

- 8 cm cap thickness at Station K, measured by the Post-21 sediment-profile image (SPI) survey
- 3 cm cap thickness at Station K4 measured by the Post-21 SPI survey
- 1.8 cm disturbance depth of EA sediments at Station K4, determined from the difference in the depths of the redox potential discontinuity (RPD) layers in pre- and post-capping SPI data
- 8 cm offset in depths of peak DDE concentrations in sediment cores from Stations K and K4
- Assumed pre-cap depths of the DDE peak of 32.8 cm, which represents the present peak depth at Station K4 minus the 1.8 cm disturbance depth, and uniform DDE peak depths along the K station transect
- Assumed uniform post-cap sediment deposition rate at all transect stations.

Based on these conditions, the present results indicated maximum estimated scour depths of about 2 to 5 cm (Table 3.1-13). For example, the present depth of the DDE peak at Station K (36 cm) was 3.2 cm deeper than the assumed pre-capping depth. Given the presence of an 8-cm thick cap (based on results from the Post-21 SPI survey), a scour depth of 4.8 cm would be required to achieve the present depth of the DDE peak at this location.

The results for the N transect cores were slightly different from those in the K transect cores, primarily because depths of the three profile markers increased slightly with distance between Stations N and N2, and then decreased at Stations N3 and N4 (Figure 3.1-7). Consequently, regression fits for the depths of core markers with distance from Station N were not significant. These results indicated that no major scouring occurred along this transect. Similarly, results from ANOVA did not indicate any significant differences among Stations N, N1, and N2. The present results, combined with assumptions similar to those used to estimate scouring at the K stations, suggested maximum scour depths at the N transect stations from about 1 to 5 cm (Table 3.1-13).

Assessments of the replicate core profile data from Station A indicated appreciably greater scouring of EA sediments at this location compared with results for the K and N station transects. In particular, the peak DDE concentration in the Replicate 2 core from Station A occurred at a depth of 18-20 cm, which was about 17 cm shallower than at the K and N stations and 14 cm shallower than the assumed pre-capping depth. Also, the DDE concentrations increased from <1 ppm in the 14-16 cm layer to 34 ppm in the 16-18 cm layer, possibly indicating a transition between a cap layer and underlying EA sediment. This profile could be resolved if approximately 30 cm of EA sediment had been displaced at this location

Table 3.1-11. Core Depths (cm) Corresponding to the Upper and Lower Shoulders and Peak DDE Concentrations in Sediment Cores from the K and N Station Transects. The upper and lower shoulders are core depths corresponding to 15 ppm DDE concentrations above and below the peak concentration.

Station	Distance from K/N (m)	Depth – Upper 15 (cm)	Depth – DDE Peak (cm)	Depth – Lower 15 (cm)
K	0	24	36	44
K1	25	25	34	42
K2	50	22	34	41
K3	100	18	29	38
K4	150	17	34	40
N	0	20	31	39
N1	25	24	33	42
N2	50	24	33	43
N3	100	17	29	38
N4	150	16	29	40

*Average of 3 replicate cores.

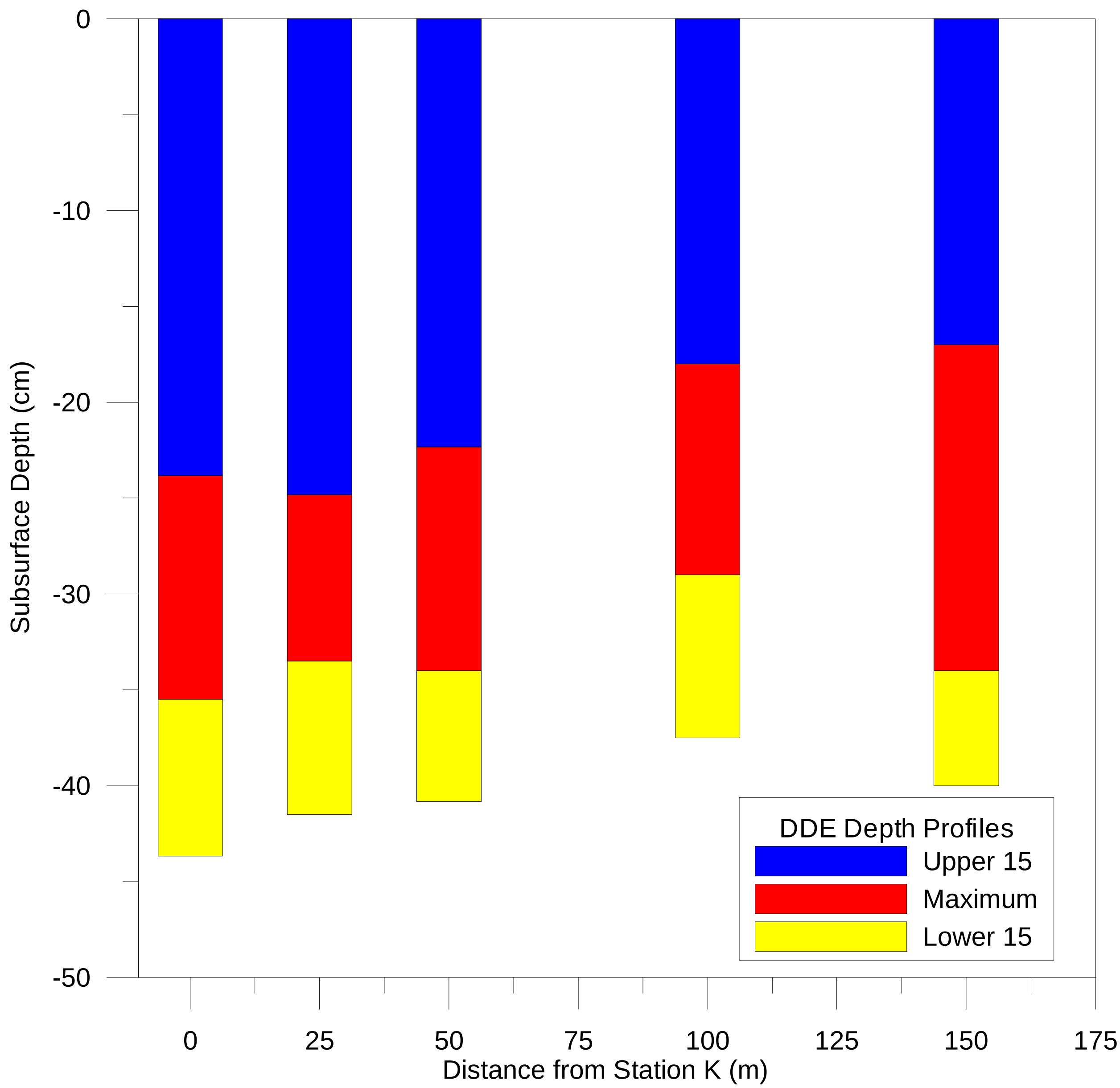


Figure 3.1-6. Transect K mean subsurface depth and horizontal distance for DDE point estimates.

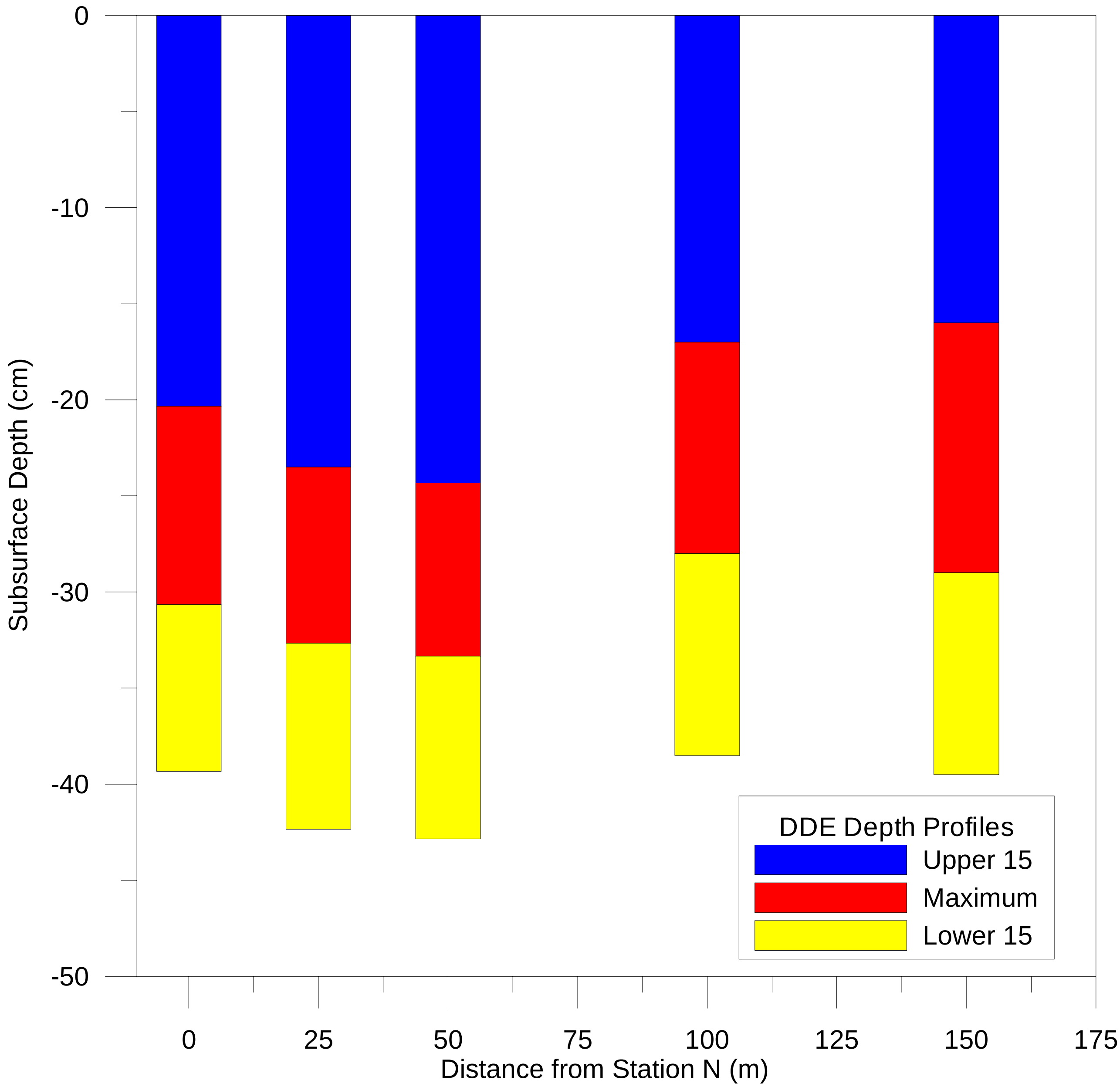


Figure 3.1-7. Transect N mean subsurface depth and horizontal distance for DDE point estimates.

Table 3.1-12. Results from Regression Analyses of Core Depths for Upper and Lower Shoulders and Peak DDE Concentration as a Function of Distance from Stations K and N.

	Regression Fit				
	R^2	Intercept (cm)	Slope (cm/m)	Slope: difference from 0	Peak Shift (cm)
Station K					
Upper 15	0.55	25	-0.054	sig	-8.1
Peak	0.15	35	-0.021	ns	
Lower 15	0.25	43	-0.032	ns	
Station N					
Upper 15	0.28	23	-0.035	ns	
Peak	0.16	32	-0.018	ns	
Lower 15	0.02	41	-0.006	ns	

Table 3.1-13. Estimated Scour Depths (cm) at the K and N Stations. Estimates are based on interpolated cap thickness values (Figure 4.2-5), EA disturbance depths at Stations K4 and N4 estimated from Post-21 SPI survey results (Figure 4.2-6), and depths of DDE concentration peak markers (Table 3.1-11).

		Estimated Scour Depth (cm)			
Station	**Cap Thickness (cm)**	**Upper 15**	**Peak**	**Lower 15**	**Average**
K	8	0	5	3	3
K1	6	0	5	3	3
K2	5	0	4	3	2
K3	4	2	8	5	5
N	9	3	5	8	5
N1	7.5	0	1.5	3.5	2
N2	6.5	0	0.5	1.5	1
N3	4	1	2	4	2

and then covered by an 16-cm thick layer of cap material. By comparison, the DDE peak in the Replicate 3 core from Station A occurred at a depth of 33 cm, and there was no abrupt increase between adjacent core layers in DDE concentrations comparable to that exhibited by the Replicate 2 core profile. The Replicate 3 core profile suggests that the scouring depth was comparable to the thickness of the cap layer, and the net upwards displacement of the DDE peak was limited to a few centimeters. The Replicate 1 core from Station A contained uniformly low DDE concentrations throughout the 50 cm length of the core with no subsurface peak. While the core characteristics indicated a layer of cap material, in the absence of a subsurface peak it is not possible to determine whether the core may have been collected from a mound that formed on top of EA sediments or a from scoured depression that was backfilled with cap material. For the latter condition, cap placement could have displaced most or all of the EA deposit at this location. Regardless, the differences in the DDE profiles obtained for the three replicate cores from Station A appear to be attributable to localized scouring due to cap placement directly on top of EA sediments, combined with relatively large, small-scale, spatial variability in the distribution and thickness of the cap layer.

These estimates of sediment scouring potentially are subject to large errors related to variability in any of the pre- or post-capping conditions used to calculate the magnitude of the sediment disturbance. Despite these uncertainties, the estimates suggest that scouring near the Stations K and N placement sites were relatively small (up to several centimeters) and less than the thickness of the cap layer, whereas scouring in the vicinity of the initial cap placement events (Station A) was more extensive and, in some cases, greater than the thickness of the cap layer. The relatively greater scouring at Station A probably was due to placement of cap material directly on top of the existing EA sediments, whereas placements at Stations K and N were intentionally on top of cap material from previous placement events at adjacent locations that minimized scouring of the underlying EA layer (discussed in Section 4.3).

Other DDT Isomers

Concentrations of seven DDT isomers were quantified in all sediment samples; results are listed in Appendix B. The *p,p′*-DDE and DDMU isomers were the dominant compounds, and the summed concentrations of these two components typically comprised about 75 to 85% of the total DDT concentration. With some exceptions, *o,p′*-DDE contributed 4 to 14%, *p,p′*-DDD and *p,p′*-DDT typically contributed <10% each, and *o,p′*-DDT represented <1% of the total DDT concentrations. Overall, the percentages of the individual DDT compounds were remarkably uniform throughout the Cell SU cores. These percentages, and the uniformity of component ratios, were consistent with those reported in cores analyzed by Eganhouse et al. (2000). Therefore, the DDT metabolite ratios did not vary in relation to different mixtures of cap material with EA sediments.

3.2 Sediment Coring Intercalibration

An objective of this study was to compare sampling methods used by the Pilot Cap Monitoring Program with those used by LACSD for their long-term sediment study. To address this objective, sediment cores were collected separately by SAIC and LACSD at Stations 7C, 7CB, and A/7CX using different sampling protocols; cores were subsampled at 2-cm intervals, and each subsample was analyzed for DDE. Results from this intercalibration exercise are listed in Table 3.2-1 and DDE profiles for the cores are shown in Figure 3.2-1.

Station 7C

The gravity core collected by LACSD at Station 7C was considerably longer (72 cm) than the core collected with the OSU piston core (41 cm). However, the magnitude of the DDE concentrations, and patterns in DDE concentration with core depth within the overlapping portions of the cores were generally comparable. Because the piston core only penetrated to 41 cm, and the highest measured DDE concentration (120 ppm) occurred in the 40-41 cm layer, the magnitude and location of the DDE peak in this core was uncertain and could not be compared directly with those in the LACSD core.

Station 7CB

The lengths of the piston and gravity cores collected at Station 7CB were identical (50 cm). The DDE concentration profiles in the two cores were generally comparable, although the magnitude and depth of the DDE peak (110 ppm and 30-32 cm, respectively) associated with the piston core were greater than those (62 ppm and 26-28 cm, respectively) associated with the gravity core.

Station A/7C

Lengths (i.e., penetration depths) of the three replicate cores collected at Station A using the OSU piston corer ranged from 46 to 50 cm compared to core lengths from 32 to 58 cm for the three LACSD gravity cores. The DDE profiles in the six intercalibration cores from this location varied considerably, both in the magnitude and depth of the peak DDE concentration (Table 3.2-2). As discussed in the Section 3.1, the DDE profile for the Replicate 1 piston core was atypical, with no obvious DDE peak and maximum DDE concentrations ≤6 ppm. Minimum DDE concentrations (<0.1 ppm) occurred at core depths from 18 to 22 cm and 30 to 36 cm, interspersed with sediment layers with DDE concentrations up to several ppm. By contrast, the Replicate 2 and 3 piston cores contained relatively low DDE concentrations (<5 ppm) in the surface 0 to 18 cm and 0 to 12 cm layers, increasing to a peak, and then decreasing to sub-ppm levels at core depths below 44 cm. However, the depth of DDE peaks (20-22 cm and 32-34 cm) and magnitude of the peak concentrations (66 ppm and 140 ppm) were not consistent.

The magnitude of the variability associated with the three replicate gravity cores from this location was comparable to that exhibited by the Replicate 2 and 3 piston cores (Figure 3.2-2). Specifically, the depth of the DDE peaks in the gravity cores ranged from 13 to 29 cm, and the magnitude of the peak DDE concentrations ranged from 76 to 130 ppm. Nevertheless, the DDE profile for the Replicate 1 gravity core was generally comparable to the DDE profile in the Replicate 3 piston core, and the profiles in the Replicate 2 and 3 gravity cores were comparable to that of the Replicate 2 piston core profile. While the DDE profile for the Replicate 1 piston core was not comparable to any of the profiles associated with the other intercalibration cores, it was similar to a core profile obtained by LACSD at this site in 2003. Thus, the variability among cores collected at Station A/7CX using both coring devices was comparable, which suggested that variability was not an artifact of the sampling method.

Overall, the results of the intercalibration exercise indicated that the piston and gravity cores were capable of similar penetration depths. Further, both coring methods resulted in DDE profiles that were consistent with expectations based on historical core profiles collected at these sites. The depths to the DDE peaks obtained from the piston core were 3 to 6 cm deeper than for the corresponding gravity cores (based on an average of the Replicate 2 and 3 piston cores from Station A). However, the variability among replicate cores in the depth and magnitude of the DDE peaks appeared to be as great as the variability between the two sampling methods.

Table 3.2-1. DDE Concentrations (ppm dw) in Sediment Cores Collected in July 2004 at Stations A/7CX, 7C, and 7CB Using the OSU Piston Corer and LACSD Gravity Corer.

Core Interval (cm)	Station A/7CX						Station 7C		Station 7CB	
	Piston Corer			Gravity Corer			Piston Corer	Gravity Corer	Piston Corer	Gravity Corer
	Rep1	Rep2	Rep3	Rep1	Rep2	Rep3				
0-2	3.2	2.0	1.6	1.2	0.97	1.1	1.8	3.1	0.76	0.81
2-4	4.5	2.1	1.6	0.84	0.3	1.0	1.2	2.9	0.76	0.61
4-6	5.4	1.4	0.72	0.52	0.058	0.52	0.82	1.8	0.39	0.65
6-8	3.9	0.24	0.25	0.58	0.53	0.47	0.26	0.8	0.19	1.7
8-10	3.0	0.047	0.2	2.8	8.1	0.26	0.11	1.2	0.84	2.7
10-12	2.1	0.17	1.5	7.1	37	0.56	0.33	2.8	2.4	3.8
12-14	1.3	0.15	7.7	6.0	76	4.2	4.1	5.0	3.6	5.3
14-16	0.6	0.85	9.4	12	49	52	5.0	8.2	4.8	6.9
16-18	0.2	34	9.7	14	42	100	6.5	8.9	6.3	7.7
18-20	0.02	66	11	23	24	71	11	11	8.6	12
20-22	0.011	37	19	37	10	26	15	12	12	22
22-24	0.12	9.0	26	84	5.6	27	13	11	15	27
24-26	3.2	5.6	34	120	2.3	16	9.8	9.7	25	51
26-28	1.4	5.6	38	130	0.82	3.7	10	11	32	62
28-30	0.031	1.4	49	130	0.47	1.0	10	24	62	31
30-32	0.018	0.84	140	110	0.25	0.19	15	29	110	27
32-34	0.005	2.5	81	48		0.13	16	50	68	3.6
34-36	0.64	2.1	49	15		0.44	20	120	35	1.4
36-38	6.0	2.2	66	5.8			32	210	22	0.69
38-40	3.2	2.7	21	0.86			83	210	9.2	0.57
40-42	0.75	1.0	19	0.97			120	140	0.95	0.35
42-44	0.12	0.47	1.6	0.46				120	1.1	0.19
44-46	0.17	0.26	0.38	0.25				170	0.74	0.086
46-48	0.12			0.22				86	0.72	0.094
48-50	3.5			0.063				31	0.47	

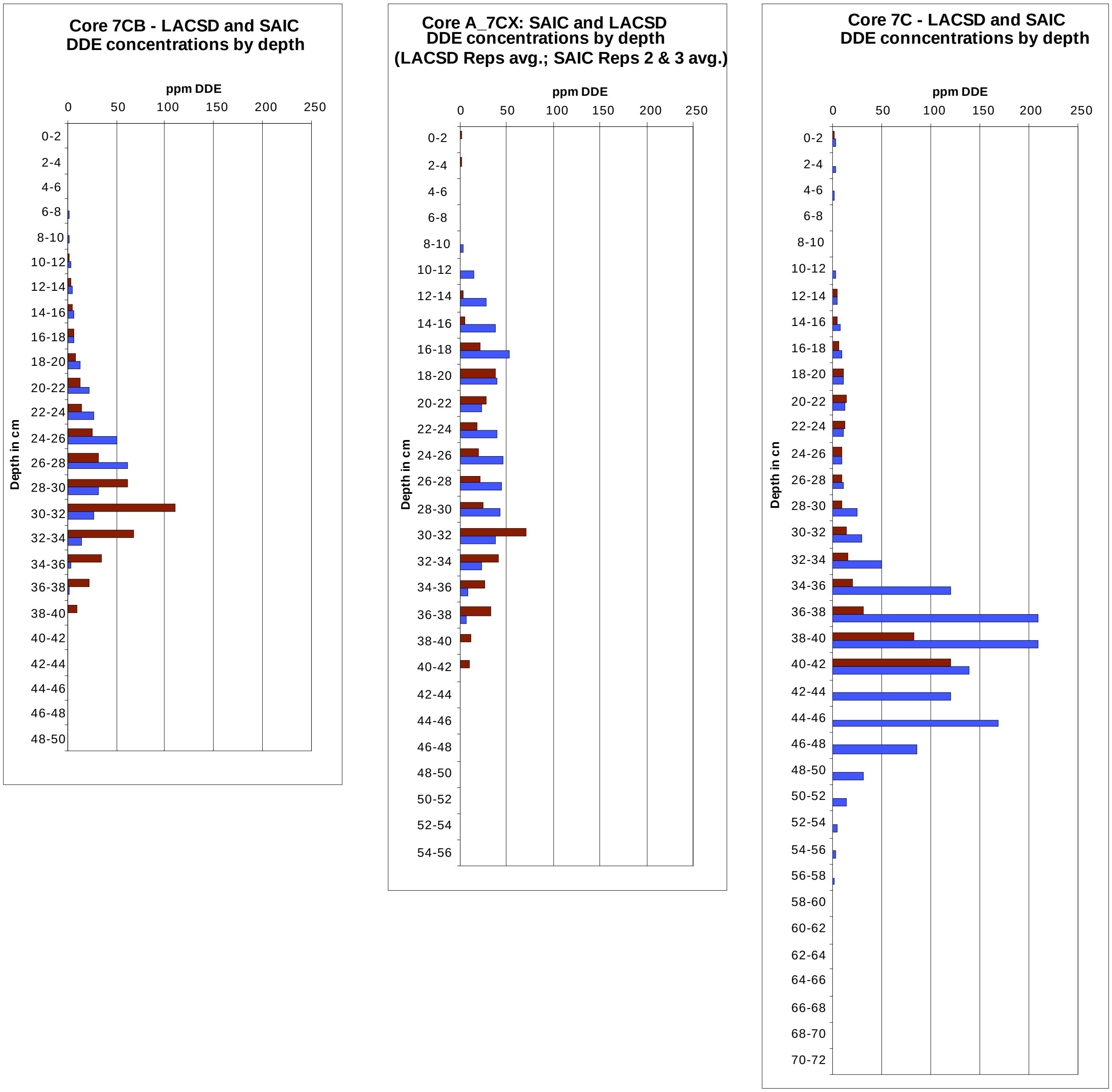
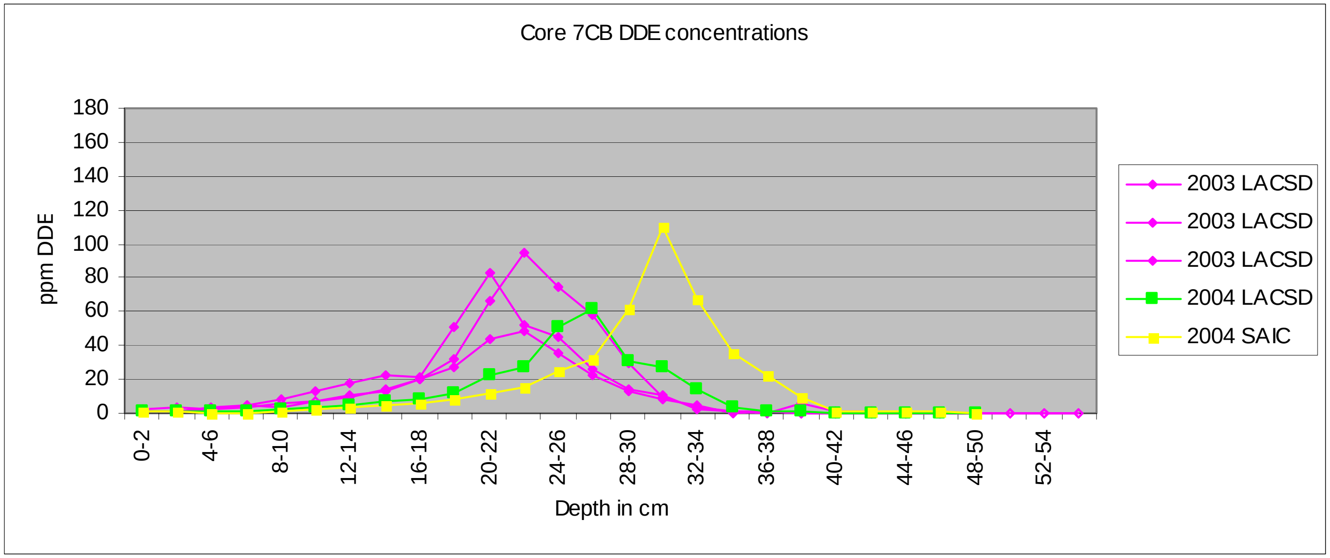


Figure 3.2-1. Results from the Sediment Coring Intercalibration Exercise. Red bars are DDE concentrations (ppm) in the piston cores and blue bars are DDE concentrations in corresponding gravity cores.

Table 3.2-2. Comparisons of Peak DDE Concentrations (ppm) and Depths to the DDE Concentration Peak (cm) in Sediment Cores Collected for the 2004 Intercalibration Exercise.

Station	**Peak DDE Concentration (ppm)**		**Depth to DDE Peak (cm)**	
	Piston Core	Gravity Core	Piston Core	Gravity Core
Station A/7CX, Rep1	6	130	None	28
Station A/7CX, Rep2	66	76	19	13
Station A/7CX, Rep3	140	100	31	17
Station A, Average.	100*	100	25*	19
Station 7C, Rep1	120	210	41	38
Station 7CB, Rep1	110	62	31	27

* does not include Station A, Rep1



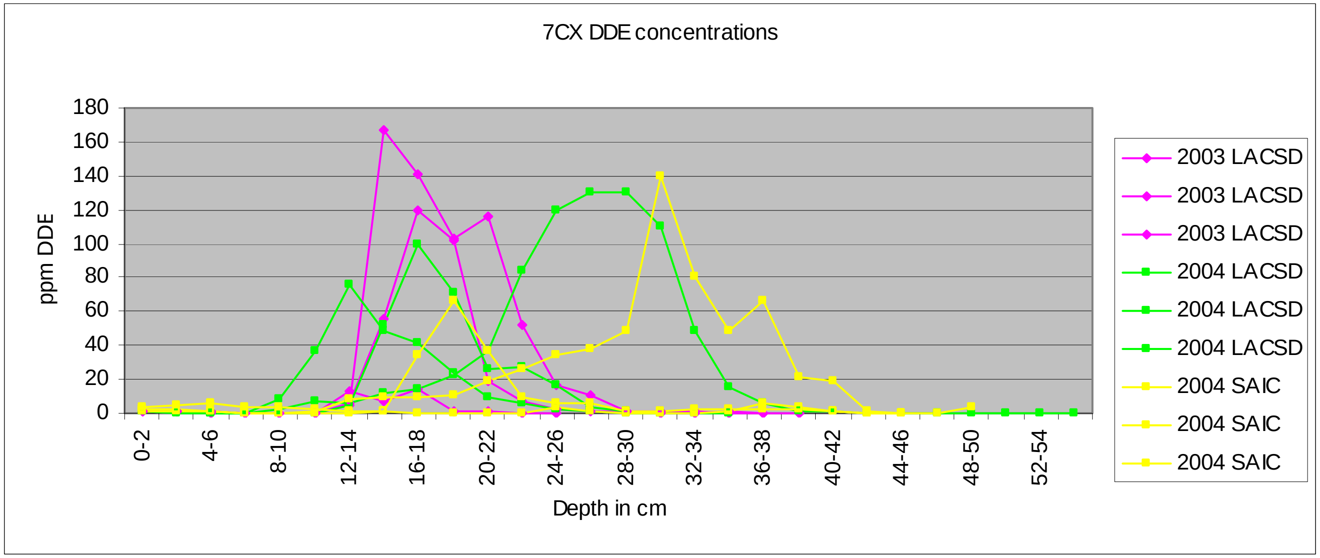


Figure 3.2-2. DDE Concentration (ppm) in Sediment Cores from Stations 7CB and A/7CX Collected in 2003 and 2004 by LACSD and in 2004 by SAIC.

4.0 DISCUSSION

This Sediment Displacement Study had two primary objectives (Table 1-2). The first objective, addressed in Section 4.1, related to the collection of appropriate quality sediment cores and demonstrating comparability with core data collected by LACSD. The second objective, discussed in Section 4.2, addressed the magnitude of sediment displacement from cap placement in Cell SU.

4.1 OBJECTIVE 1: COLLECTION OF QUALITY CORES

The July 2004 Sediment Displacement Study achieved all of the sampling objectives identified in the IWP. Although the majority of piston cores were shorter than the target lengths, all but one of the cores collected at Station 7C for the intercalibration exercise appeared to have captured the subsurface DDE concentration peaks, and most extended to depths approaching the base of the EA sediment layer. Thus, the samples provided the data needed to evaluate Objective 2, and the shorter core lengths did not compromise the study DQOs.

The study also provided data for evaluating comparability with the LACSD long-term sediment study. This was an important objective because the LACSD sediment core data provide the most comprehensive and complete historical record of temporal trends in sediment quality on the PV Shelf. The intercalibration exercise demonstrated that results from the present study and future monitoring objectives, using the same or similar sampling protocols, can be expected to provide data of sufficient quality to support analyses of temporal and spatial trends in contaminant distributions that will be important for monitoring long-term changes in sediment quality.

4.2 OBJECTIVE 2: EVALUATE THE EXTENT OF SEDIMENT DISPLACEMENT

The second objective of this study was to collect information that could be used to better understand the effects of the cap placement operations in Cell SU. The background, results, and findings from the PV Shelf summer 2000 Pilot Cap Monitoring Program have been discussed in detail by Fredette et al. (2002) and SAIC (2002). Information from these reports related to cap placement in Cell SU is summarized briefly in this section because it is useful for interpreting results from the current study.

Synopsis of Cap Placement Events and Results from Previous Pilot Cap Monitoring in Cell SU

Twenty-one separate cap placement events were performed at Cell SU, beginning at the center and working outward. Seventeen sites received cap material, and each site received only one load except the site corresponding to Station A, which received five loads. The first placement event at Station A occurred on 8/8/00, and the initial placement volume was 1409 yd^3. The next four placements in the vicinity of Station A occurred on 8/18 and 8/19, and the volumes were 1211, 1211, 1554, and 1770 yd^3, respectively. The locations of the five placements at Station A (Figure 4.2-1) illustrate the extent of overlap between successive placement events. Cap placement volumes at Stations B, F, K, and N were 1499, 1571, 1445, and 1355 yd^3, respectively. Events D and BE placed 1445 and 1301 yd^3, respectively, in the vicinity of Stations 7C and 7CB, that were sampled for the intercalibration exercise (Figure 4.2-2). The total volume of cap material placed in Cell SU was 29,838 yd^3, and the average volume per placement event was 1421 yd^3. Of the total cap material volume, an estimated 21,564 yd^3 was placed in the central portion of Cell SU, while 4,065 yd^3 and 4,209 yd^3 were placed in the southeastern and northwestern portions of the cell, respectively. The cap placement sequence was developed so that all but the initial placement at Station A overlapped with previously placed cap material to minimize potential disturbances to EA sediments (Fredette et al. 2002).

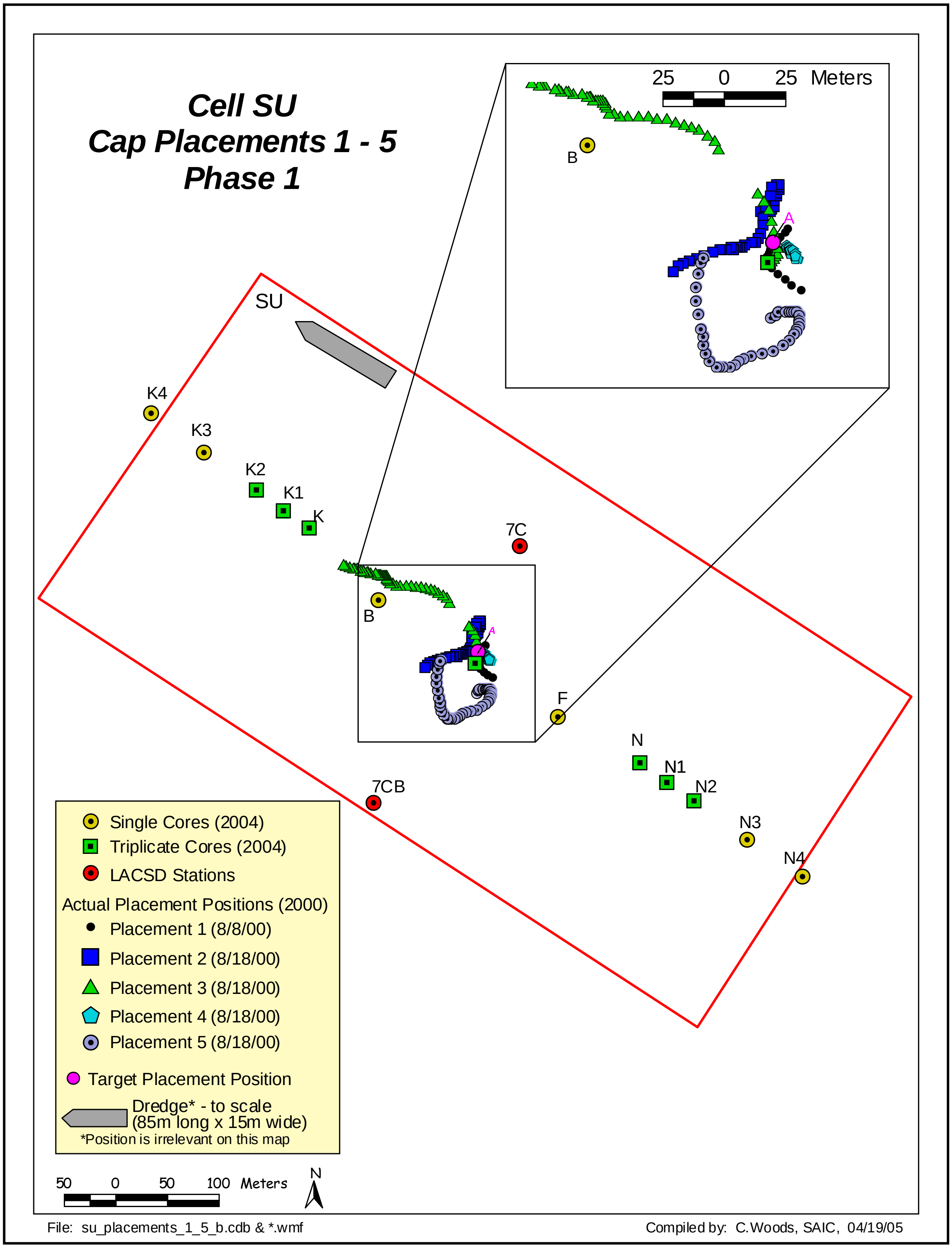


Figure 4.2-1 Locations of the Target Placement Positions and the Actual Hopper Dredge Tracks for Events Placement 1-5 at Site A in Cell SU. Locations of the 2004 sediment coring stations are shown.

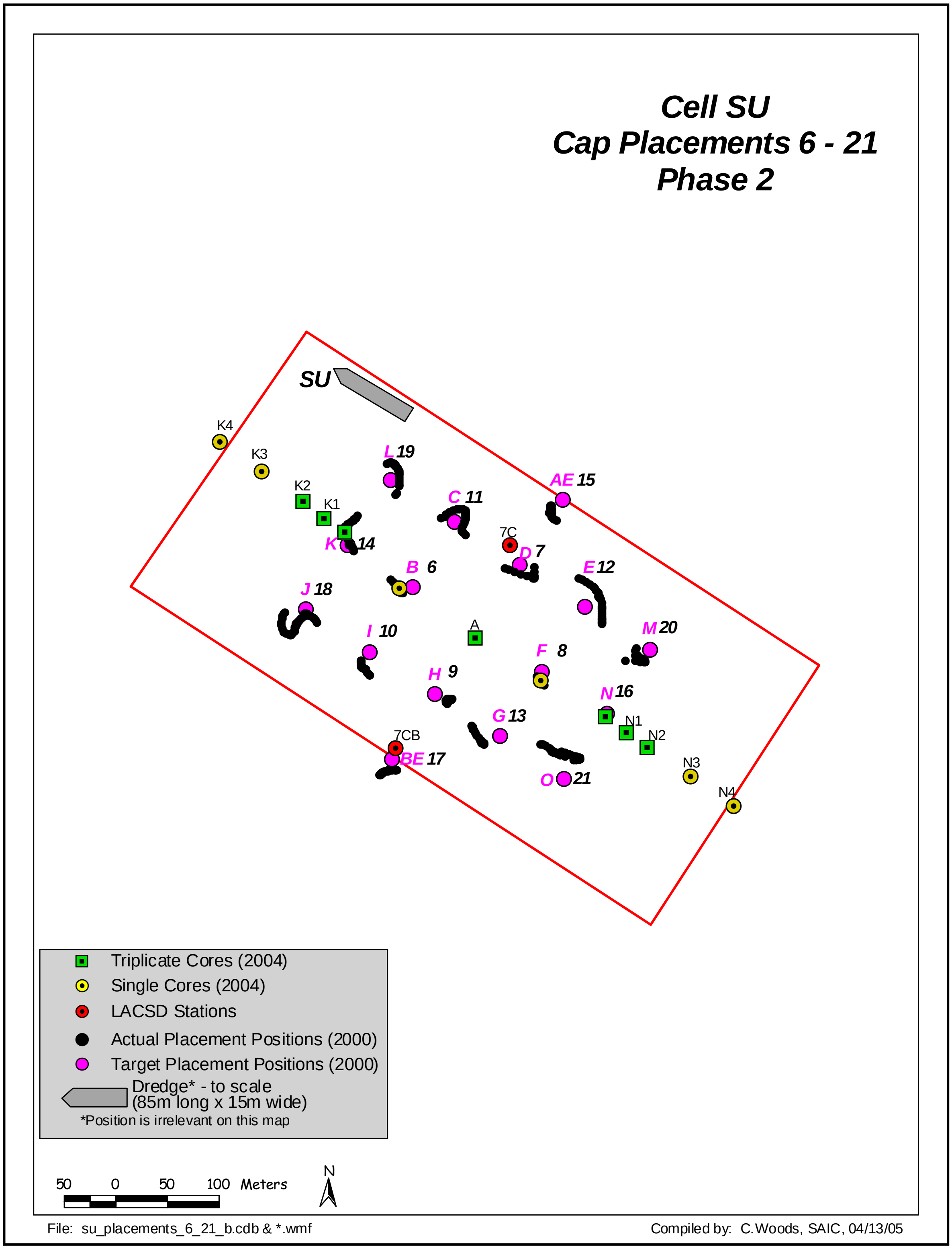


Figure 4.2-2. Target and Actual Cap Material Placement Location in Cell SU for Events 6-21. Locations of the 2004 sediment coring station are shown.

Pilot Cap Monitoring

Cap placement monitoring in Cell SU occurred prior to cap placement (baseline) and after the 1st, 5th, and 21st placement events (Post-1, Post-5, and Post-21, respectively), using a suite of sampling tools that included current meters, water column profiling systems, side scan sonar, sediment-profiling imagery, and sediment coring. Additional sediment cores were collected in 2001 and 2002, using a vibracorer and spade (box) corer, respectively. Results from these surveys were presented in SAIC (2002) and SAIC (2004c). One of the objectives of the post-capping surveys was to determine whether excessive resuspension of EA sediments, and mixing of cap material with contaminated sediments, can be avoided during cap placement. Several of the results and key findings from these earlier studies are useful for interpreting the present data and evaluating sediment displacement resulting from cap placement in Cell SU. Relevant results from these studies are reviewed below.

Current surge and accompanying changes in turbidity conditions were monitored during Placement Event #1 in Cell SU. The data showed evidence for horizontal surge of a mixture of cap material and EA sediments, especially in a downslope direction. At a site 115 m downslope from Station A, maximum surge velocities reached 72 cm/sec, and current velocities remained elevated relative to pre-dumping background-current velocities for a period of about 13 min. At a site 170 m downslope from Station A, maximum surge velocities reached 63 cm/sec. Maximum surge velocities at a site upslope from Station A were comparatively lower than those measured in the downslope direction, possibly due to the slope of the bottom (3.2 deg) at Cell SU. The surge velocities in the immediate vicinity of the placement location were not measured, but they likely were greater than 100 cm/sec based on extrapolations of data from measurements at distances of 115 m and 170 m from the placement site. Elevated turbidity conditions accompanied the increases in surge velocities. Maximum DDE concentrations in near-bottom waters (1.2 µg/L compared to pre-dumping concentrations of 0.012 to 0.02 µg/L) occurred within 2 minutes of the release, and these maximum concentrations preceded the maximum measured turbidity levels. These results indicated that the initial cap placement event caused high surge velocities in the vicinity of the placement site that resulted in localized resuspension of some EA sediments.

Side-scan sonar images within Cell SU following Placement Event #1 (Post-1) showed high reflectance (strong acoustic signature) over a circular area with a diameter of approximately 125 m, with a weaker return extending another 15 to 25 m (Figure 4.2-3). The stronger reflectance was interpreted as the main disturbance area that was created from the impact of the cap material hitting the seafloor. The weaker reflectance was interpreted as the deposition pattern for displaced EA sediment mixed with cap material. A high reflectance edge on the upslope side of the depression suggested limited surge in this direction. In contrast, on the downslope side, the change in reflectance was more gradual, indicating greater dispersion in the downslope direction, which was consistent with the directional differences in surge velocities. The resolution of the side scan sonar images was not sufficient to distinguish small-scale bathymetric features (e.g., mounds or scoured depressions) or to estimate the depth of disturbance caused by cap placement.

The footprint of the high reflectance area in the side-scan mosaic matched the spatial distribution of the 4-cm thick cap layer developed from the Post-1 SPI survey results (Figure 4.2-3). The Post-1 SPI results showed that the cap layer was roughly circular, with a diameter ranging from 275 to 325 m, and more than 20 times greater than the size of the disturbance areas indicated from the side-scan image. This difference reflected the greater sensitivity of SPI for detecting the presence of cap material. Differences between pre- and post-placement depths of the apparent redox potential discontinuity (RPD) layer observed in the SPI images were used to estimate the extent of scouring of the surface EA layer. The estimated depth of EA disturbance exceeded 2.5 cm at the center of the cell, and was up to 3 cm at sites near F, K, and B. The maximum depths of disturbance could not be determined from SPI images because

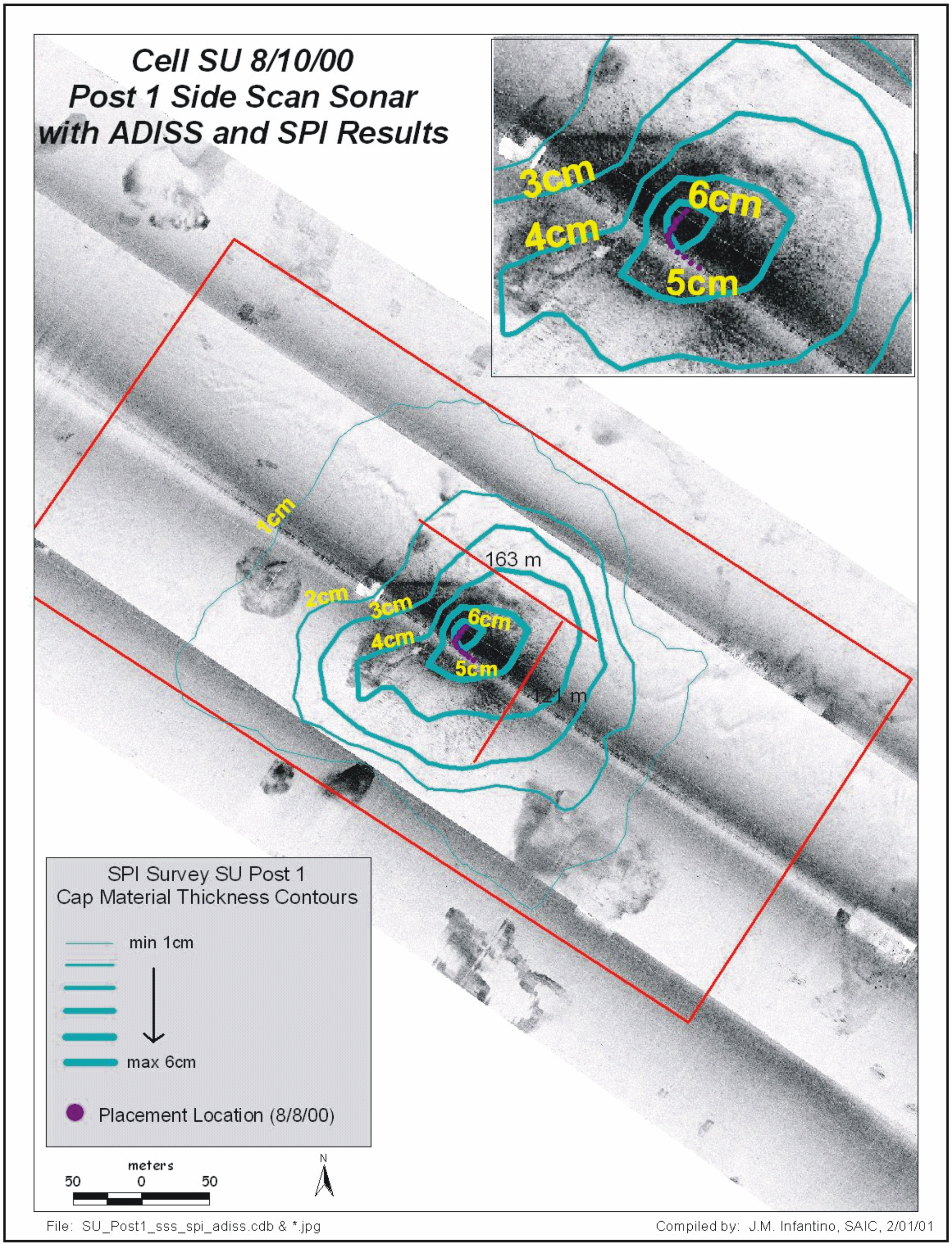


Figure 4.2-3. Side-scan Mosaic with Cap Layer Thickness (cm) Contours from SPI Results for Cell SU Post 1 Survey.

some of the Post-1 images did not contain a detectable RPD layer. Conversely, no change in the RPD depth was evident at sites outside of the cap layer footprint.

Following the fifth placement event at Site A, the Post-5 side-scan sonar survey indicated an area of high reflectance that was relatively smaller than that observed during the Post-1 survey (Figure 4.2-4). The lateral surge pattern extended 175 m from the primary placement area in the downslope direction, but only 100 m from the placement area in the upslope direction, and matched the distribution of the 9-cm thick cap mapped from the Post-5 SPI survey data. It was not possible to identify the signatures from individual placement events in the side-scan mosaic because the footprints of the individual placements overlapped spatially. These results suggested that, while the surge from the first placement event consisted of both cap material and EA sediments, subsequent placement events appeared to displace only cap material from the previous placement events. After the twenty-first placement event in Cell SU (Post-21), the disturbance areas in the center of the cell were no longer distinguishable from side scan imagery due to the presence of the cap layer. However, reflectance patterns around the periphery of the cap resembled patterns observed near the center of the site following the initial placement events. Cap material was detected from the SPI data throughout the cell, including areas corresponding to the Stations K3/K4 and N3/N4 sampled for the present study. The thickness of the cap layer in the central portion of the cell was greater than 10 cm and then decreased to approximately 3 cm in the vicinities of Stations K4 and N4 at the northwestern and southeastern boundaries of the capping cell (Figure 4.2-5). However, these topographic changes were too small to resolve with the side-scan sonar data. The SPI results also indicated that scouring depths along the centerline of the cell ranged from 1.8 to >3 cm, whereas the depth of disturbance near Station 7C (Station I27) was estimated at 2 to 2.5 cm.

Sediment DDE concentrations and grain size distributions in cores collected in Cell SU during the Post-21 survey reflected the presence of cap material, but the results also suggested that up to 5 cm of the surface EA layer could have been displaced during cap placement. However, this could not be confirmed with the SPI data, and potential sampling artifacts associated with the gravity corer used to collect sediment cores limited the certainty of these findings. Sampling artifacts from gravity and vibracores used previously for sediment studies on the PV Shelf have been described by others (Santschi et al. 2001; Lee et al. 2002).

2002 Box Core Survey

In March 2002, a series of sediment cores were collected in Cell SU using a NEL spade (box) corer that was identical to the box corer used by USGS for the 1992-93 NRDA study (Lee 1994). A core collected in the center of Cell SU (Core SUU22) contained DDE concentrations that varied over several orders of magnitude, from a minimum (0.08 ppm) at 4-8 cm to peak levels (140 ppm) at depths of 28-32 cm. Below 32 cm, DDE concentrations in this core decreased with increased subcore depth. The DDE profile for this core was comparable with the profile in the Replicate 3 core from Station A (Table 3.1-9) from the present study. The SUU22 profile also was comparable to those reported for cores collected in 1992 at USGS Station 556 (inshore and upcoast from Cell SU) by Lee (1994). However, an important difference was that the DDE concentration peaks in the USGS cores occurred at subcore depths of 38 to 44 cm, or approximately 10 cm below the peak depth observed in the SUU22 core. The study (SAIC 2004c) concluded that these differences in the depths of subsurface DDE peaks could be attributable to spatial variations in core profiles. Alternatively, differences could be due to scouring of the surface EA sediment layer during cap placement in Cell SU. If the latter process occurred, the thickness of the eroded layer must have been at least 22 cm to account for the 10 cm difference in the depths of the subsurface maxima plus the depth of the existing cap layer and the overlying surface layer (approximately 12 cm). The potential contribution from these and other processes could not be determined from this single core profile.

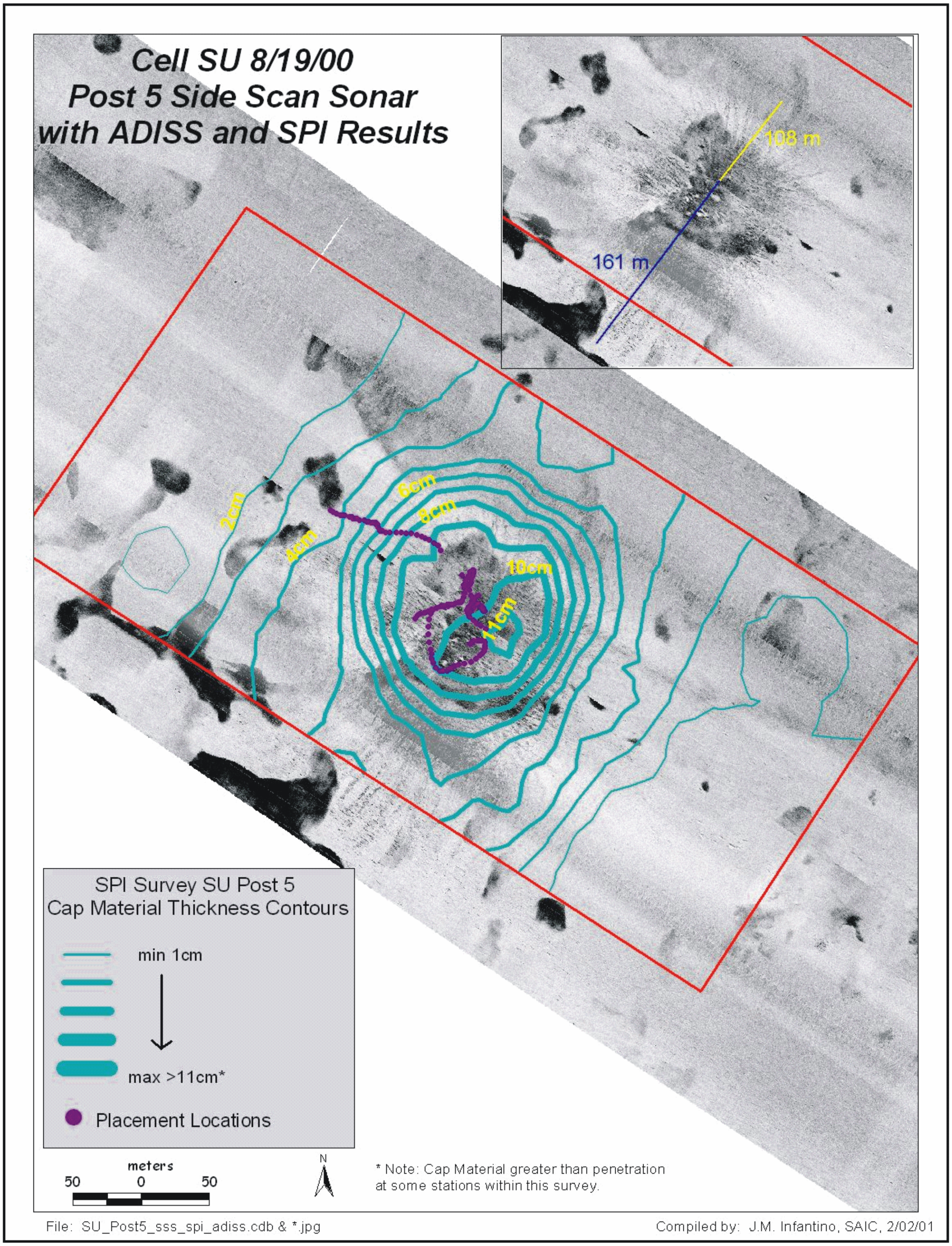


Figure 4.2-4. Side-scan Mosaic with Cap Layer Thickness (cm) Contours from SPI Results for Cell SU Post 5 Survey.

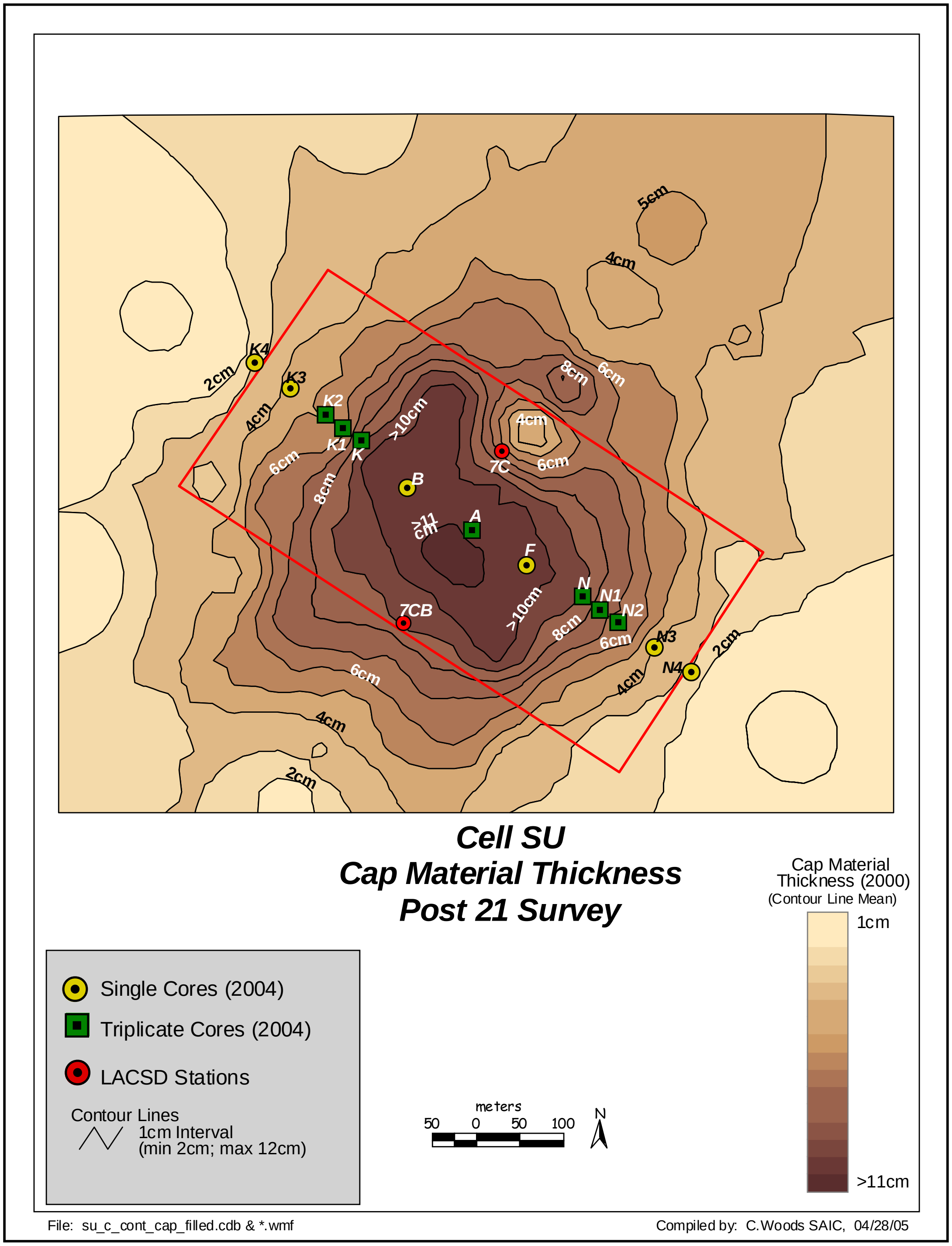


Figure 4.2-5. Cap Material Thickness in Cell SU for the Post 21 Survey. Contour lines are based on the average measured thickness of the cap material layer at each station (mean of n=3 replicate sediment-profile images). Note that the average cap material layer thickness exceeded the penetration depth of the sediment-profile camera at 10 stations inside the cell boundary (cap material > penetration). Locations of the 2004 sediment coring stations are overplotted on the cap thickness contours.

Combined, the results from previous cap monitoring in Cell SU indicated that the initial placement event caused some disturbance of EA sediments, but the magnitude and spatial extent of this disturbance could not be quantified. Subsequent placement events resulted in accumulations of a relatively uniform cap layer up to several centimeters thick along the centerline of the cell. The March 2002 results indicated the presence of 16-cm thick cap at core depths from 0-16 cm near the center of the cell, and cap thickness of 12 cm or more at other sites near the centerline of the cell. However, the net change in depths to the subsurface peak contaminant concentrations due to the combination of EA sediment scouring and accumulation of cap material could not be determined from these data.

Comparisons with Other Data Sources

Assessments of data from pre- and post-capping cores collected at Station 7C by LACSD for their long-term sediment study are useful for evaluating displacement in Cell SU at sites other than those along the K and N station transects sampled during this study. In 2003, LACSD made a formal presentation to EPA describing evidence for sediment displacement based on comparisons of DDE profiles in sediment cores collected at Station 7C prior to capping (1987 through 1999) with profiles in cores collected after capping (in 2001). Three replicate cores from Station 7C collected by LACSD in 2001 contained subsurface DDE peaks at depths from 17 to 29 cm, which were approximately 12 to 23 cm shallower than corresponding depths in the pre-capping cores. This apparent shift was inconsistent with the temporal trend since 1987 of the progressive movement of the peak deeper into the sediment column at this location. In a subsequent paper, Sherwood (2003) discussed several possible explanations for this shift in the DDE profiles for the post-capping cores, including spatial variability. He noted that variability among cores had been observed previously by LACSD, but concluded it would be unlikely that similar shifts would occur in all three replicate cores from the LACSD 2001 survey, as well as in core SUU22 from the March 2002 survey, due to spatial variability alone. Assessments of temporal trends in the depths of the DDE peaks at other LACSD coring sites outside of the capping cells (e.g., 6C and 8C) did not detect comparable excursions in post-capping cores that would support a physical disturbance mechanism, such as localized erosion, as the explanation for this shift in the DDE peak at Station 7C (Sherwood 2003). In the absence of natural erosion processes, navigational inaccuracies, or sampling artifacts, the possibility that cap placement in Cell SU scoured the surface layer of EA sediment in the vicinity of Station 7C appears to be the most plausible explanation for the upwards shift in the DDE peak in the 2001 cores.

In 2003, LACSD collected three more replicate cores at Station 7C. Two of the cores contained peak DDE concentrations at depths of 41 and 47 cm, whereas the third core had a DDE peak at 33 cm, with an average peak depth for all three replicate cores at 40 cm (Figure 4.2-6). Similarly, the core collected by LACSD at Station 7C in 2004 for the intercalibration exercise contained a DDE peak at a depth of 41 cm (see Section 3.2), which was consistent with DDE peak depths in the pre-capping cores, and more than 10 cm deeper than the peak depths in the 2001 cores. It is unlikely that this apparent downwards displacement in the DDE peak between 2001 and 2003 was due to sedimentation, although bedload transport of cap material from adjacent areas and accumulation in bathymetric depressions could have contributed to this apparent shift in the peak depth. It should be noted that a Post-21 SPI survey at a tightly-spaced cluster of sites near Station 7C indicated small-scale (25 m radius) spatial differences in the cap layer thickness of up to 7 cm (SAIC 2002). Thus, this spatial variability in the Station 7C core profiles could be due to localized scouring combined with a non-uniform cap layer. Prior to capping in 2000, the minimum DDE concentration in the upper 20 cm of the LACSD cores from Station 7C was 7 ppm. All post-capping cores from Station 7C had DDE concentrations <7 ppm to depths of least to 10 cm and up to 18 cm, which may approximate the thickness of the remnant cap layer in these cores. The net displacement of the DDE peak in the post-capping cores ranged from an upwards shift of approximately 23 cm to a small downwards shift. Thus, based on the differences in the depths of the DDE peaks in the

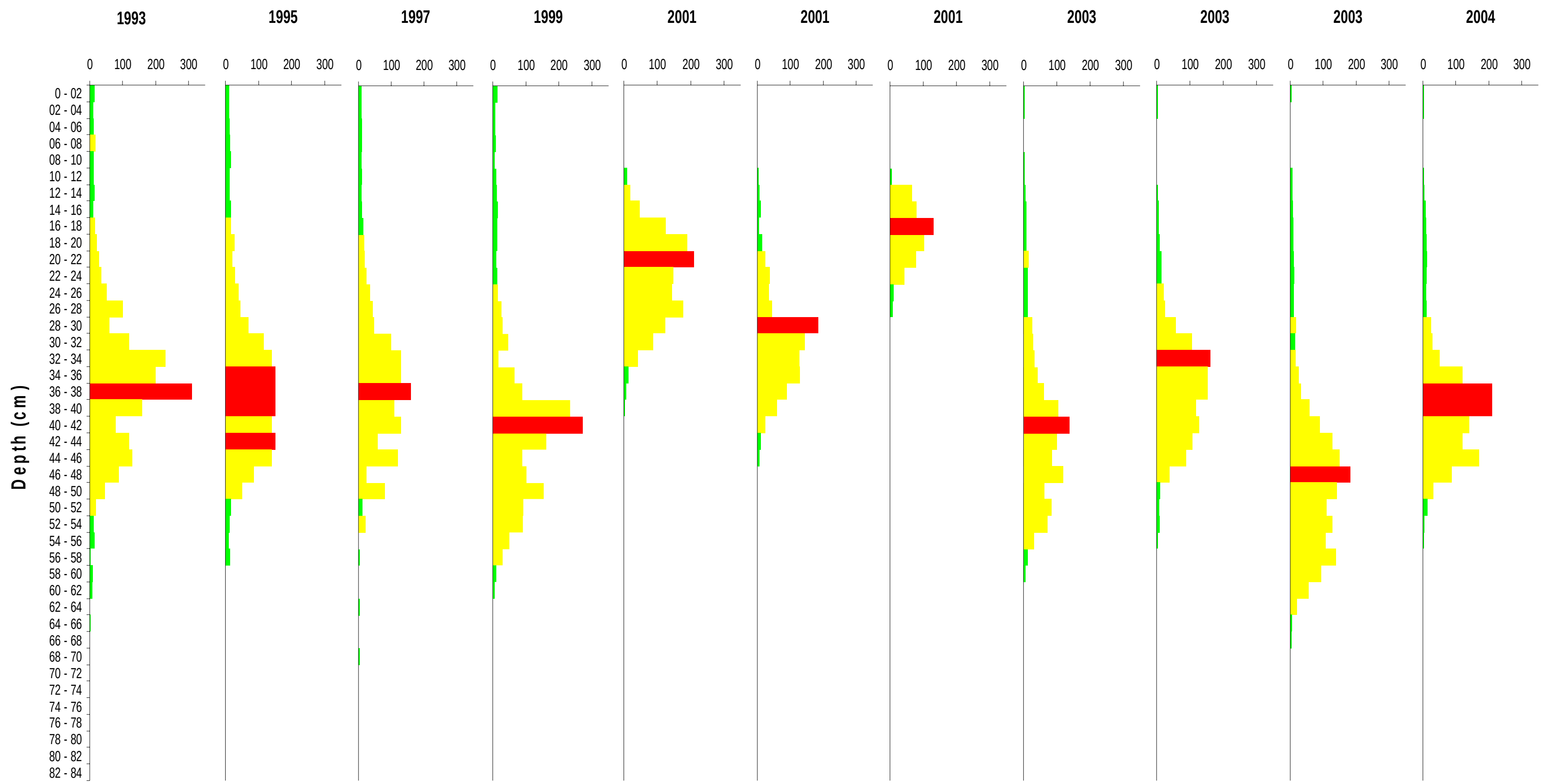


Figure 4.2-6. DDE Concentration Profiles for LACSD Sediment Cores from Station 7C During 1993 through 2004. Red bars indicate Peak DDE concentration, and yellow bars indicate DDE concentrations above 15 ppm.

post-capping cores, the variation in the thickness of the layer of scoured EA sediment appears to be slightly greater than the variation in the cap layer thickness at this location.

Assessments of the post-capping cores from Station A/7CX indicate some similarities to Station 7C. Figure 3.2-2 shows the results from the LACSD 2003 sediment cores collected at Station 7CX combined with data from the 2004 intercalibration cores. The magnitude of replicate variability for the LACSD 2003 cores was similar to that observed during the 2004 intercalibration exercise. While no pre-capping core data are available for comparison, scouring of EA sediments at this site is indicated by the shallow depths of the DDE peaks in a number of the post-capping cores. For example, two of the three replicate cores collected in 2003 contained maximum DDE concentrations at depths of 15 cm and 17 cm. Similarly, the three replicate cores collected in 2004 by LACSD had subsurface DDE peaks at 13 cm, 17 cm, and 27 cm, and one of the three cores collected by SAIC had a subsurface DDE peak at 19 cm. These core profiles reflect a net upwards shift in the DDE peaks of up to approximately 17 cm. Assuming the presence of a 16-cm thick cap layer (based on DDE concentrations less than or equal to 2 ppm in the 0-16 cm layers of the Replicate 2 core from Station A [Table 3.2-1]), the profiles could reflect localized scouring of about 30 cm. One of the three cores collected by LACSD in 2003, and one of the three cores collected by SAIC in 2004, contained uniformly low DDE concentrations (<20 ppm) with no obvious subsurface peak. Based on the grain size characteristics of the Replicate 1 core from Station A (Section 3.1.1), these cores consisted primarily of cap material that could indicate the presence of small mounds or depressions scoured by cap placement and subsequently filled in by cap material. Therefore, the core DDE profile data for the center of Cell SU also could be explained by scouring with non-uniform cap layer thickness. The relatively large scouring depths combined with the high variability in the core profiles likely reflects a highly dynamic but localized response to the initial cap placements at this site.

In contrast, pre- (1999) and post-capping (2003 and 2004) profiles of DDE concentrations in cores collected by LACSD at Station 7CB, shown in Figure 4.2-7, do not indicate substantial upwards displacements in the DDE peak comparable to those at Stations 7C and A/7CX. Instead, the DDE peaks in the post-capping profiles are similar to (in the three 2003 LACSD cores) or 4 to 8 cm deeper (in the 2004 LACSD and SAIC cores, respectively) than the corresponding DDE peak in the pre-capping core. Data from the Post-21 SPI survey (Figure 4.2-5) indicated a 8 cm thick cap layer in the vicinity of Station 7CB. Therefore, assuming the presence of an 8 cm cap, negligible post-capping sediment accumulation, and no sampling artifacts (i.e., no systematic loss of surficial sediment layers during coring), scouring depths from 0 to 10 cm are postulated to resolve the shifts in the DDE peaks in the post-capping profiles.

As mentioned, these estimates of sediment scouring assume some general uniformity in the pre-capping depths of the DDE peaks. Previous studies of sediment contaminant distributions on the PV Shelf have addressed the issue of spatial variability. Eganhouse et al. (2000) described the variability among replicate cores from LACSD Station 3C, and attributed this variability to a combination of natural (spatial) variability, navigational uncertainties, and possible sampling differences. Murray (1994) analyzed the variability among replicate cores from LACSD Stations 3C and 6C. He characterized the core profiles as consisting of an upper zone (above 22 cm) with low contaminant concentrations and low variability (standard deviations), and a lower zone (below 22 cm) with higher contaminant concentrations and high variability. The larger variability associated with the lower portion of the profile was attributed to sampling variability combined with steep vertical gradients in the contaminant concentrations. He concluded that variability associated with laboratory measurements was substantially smaller than the variability among replicate cores associated with spatial heterogeneity. Regardless, the total variability for replicate cores was less than differences between the two sites. This conclusion may not be applicable to differences between closely-spaced sites, such as those on the K and N transects sampled for the study. Regardless, the variability among pre-capping, replicate cores appears to be smaller than the variability among the replicate cores from Station A/7CX, which suggests that the capping process also contributed to localized variability in the post-capping core profiles.

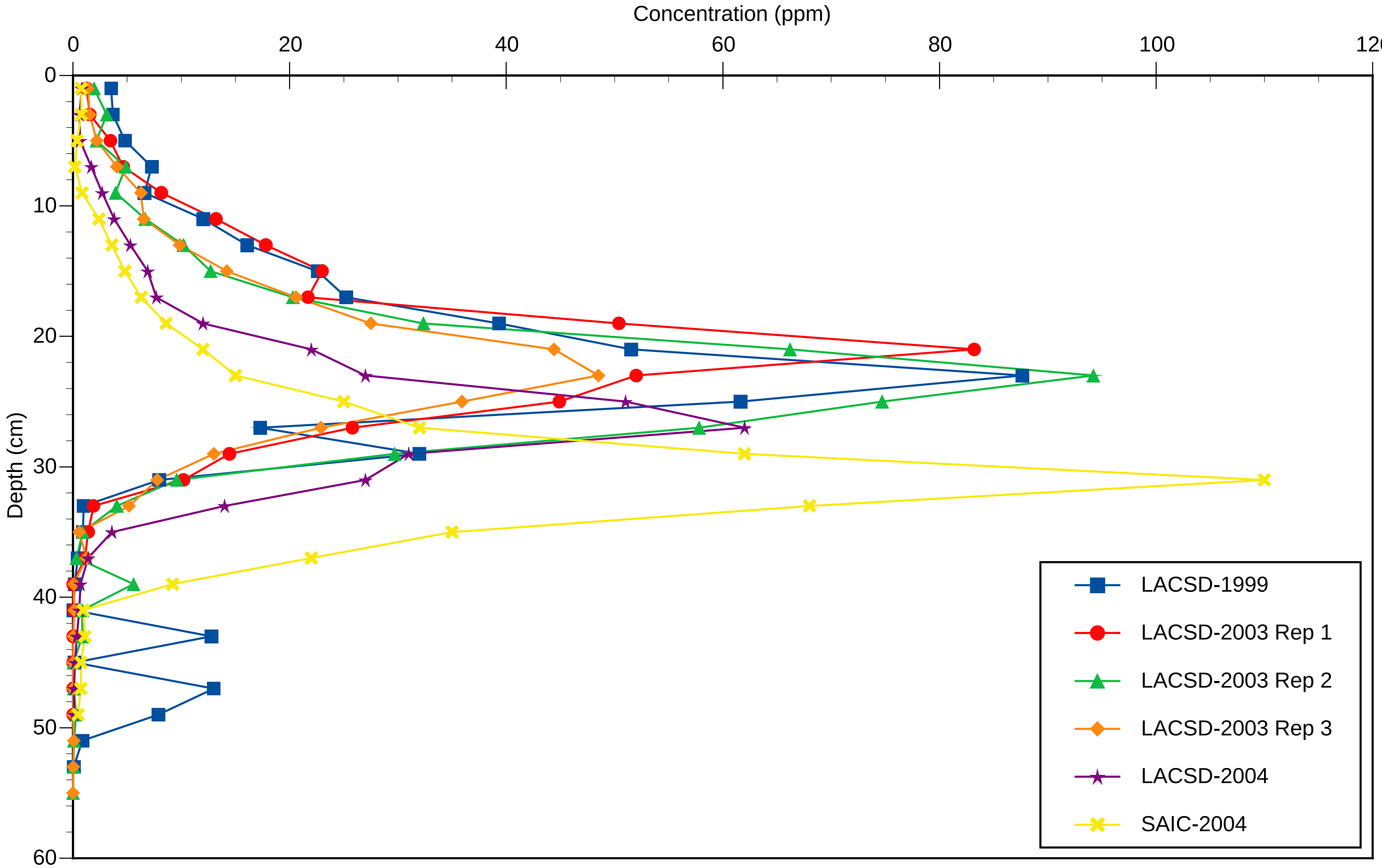


Figure 4.2-7. DDE Concentration Profiles for Station 7CB in Pre-Capping (1999) and Post-Capping (2003-2004) Cores.

The difference between the peak depths in the SUU22 core, as well as at the K and N stations, with those reported by USGS for Station 556 also reflects cross-shelf patterns in the distributions of the contaminant mass. Specifically, the depths of the DDE peaks at sites along the 60-m isobath LACSD C station transect (i.e., 6C and 7C) are greater than at the 65-m isobath stations sampled for this study. This cross-shelf pattern for DDE distributions has been described by Lee et al. (2002) and also is evident from comparisons of DDE profiles for cores collected at Stations 7C and 7CX during the present study. Lee (1994) also discussed the effects of navigational uncertainties when comparing DDE profiles in USGS and LACSD cores, and concluded that small cross-shelf offsets in sampling locations could account for apparent differences in core profiles. Post-capping shifts in the DDE profiles, such as those observed at Stations 7C and A/7CX, due to navigational uncertainties seems unlikely. All cores collected during the 2004 intercalibration exercise were within a 5 m-radius watch circle and there were no indications during the survey or during core processing of any sampling irregularities that could account for the observed differences between replicate cores. Instead, small-scale variability in the relative thicknesses of the displaced EA sediment and cap layer is a more tenable explanation for the changes in the post-capping DDE profiles.

4.3 Conclusions Concerning the Extent of EA Sediment Displacement from Cap Placement Operations in Cell SU

Data obtained from this study were appropriate for addressing Question F6 of the Feasibility Study:

> *What is the thickness of surface EA sediment displaced and what is the spatial extent of EA displacement associated with a placement event?*

The study results indicated that the thickness of the EA sediment layer displaced during capping can vary from a few centimeters at sites where cap placements overlapped up to tens of centimeters at sites where cap material was placed directly on top of EA sediments. This conclusion was based on the relatively uniform depths for the peak DDE concentrations (typically from 30 to 36 cm) with increasing distance from placement sites (i.e., Stations K and N) and the apparent absence of upward shifts in the DDE peaks within the sediment column following cap placement using the overlapping placement approach. Instead, cap placement at these locations achieved a net downwards displacement of the DDE peak of up to approximately 7 to 10 cm, although the magnitude of the displacement was less than the cap layer thickness. Maximum scour depths up to 5 cm were estimated for these areas within Cell SU. Capping also achieved reductions in the magnitude of sediment contaminant concentrations, although there was some overlap in the DDE concentration ranges for the pre-capping and recent sediment samples. The current DDE concentrations, combined with the other grain size and physical/chemical properties, suggest that the present surface sediment layer represents a mixture of cap material with varying proportions of EA sediments that likely have been advected on to, and mixed into, the cap layer during the four year period following cap placement. While the distinction between the cap layer and EA sediment has become less apparent, the overall reductions in contaminant concentrations in surface sediments have persisted for several years after cap placement. These characteristics are consistent with the concept of a "thin cap" described by Palermo et al. (1999), in which a cap layer with a thickness of approximately 15 cm is used to dilute contaminated sediments and slow contaminant remobilization rates. Thus, the net burial depth of the subsurface contaminant layers, without significant scouring of EA sediments, along with dilution to achieve lower contaminant concentrations of the surface layers, appear to be consistent with USACE's original design objectives for the pilot cap in Cell SU.

The conclusions for Stations A and 7C are different from those for areas along the N and K transects. Conditions near Station A are highly variable, and the magnitude of scouring at some locations appears to be greater than the thickness of the cap layer, while at immediately adjacent locations the remaining cap layer is up several tens of centimeters thick. It is not possible to determine from existing information whether this is due to the presence of small-scale bathymetric features such as mounds or scoured depressions that were back-filled with cap material. These results for Station A are not surprising given that the cap material was dumped directly on top of EA sediments. The DDE profiles for Stations B and F, which were the closest sites to Station A, were similar to those at the K and N stations. Therefore, scouring at Station A does not appear to extend to the adjacent sites along the cell centerline. The actual spatial extent of scouring near Station A can not be determined from the present data due to the high variability among cores. The reason(s) for the apparent scouring at Station 7C is not obvious because cap placement in this area used an overlapping placement approach that was similar to that used at the K and N locations.

As mentioned previously, the conclusions from this study have certain limitations.

Results relied on the assumption that, prior to cap placement, the depth of the DDE peak was relatively uniform over spatial scales up to 150 m in the alongshelf directions of the two main station transects. Lee et al. (2002) and Murray et al. (2002) concluded from geospatial analysis that DDE distribution patterns on the PV Shelf exhibited strong spatial continuity in the alongshelf direction. Therefore, the assumption that the peak depth in the pre-capping EA sediments was relatively uniform along the station transect is reasonable.

Conclusions were also limited by spatial variability. The general magnitude of this variability for profiles from replicate cores, other than those for Stations A/7CX and 7C, was consistent with variability reported for previous studies of DDE distributions on the PV Shelf (e.g., Lee et al. 2002; Murray et al. 2002; Eganhouse et al. 2000). If the magnitude of small-scale spatial variability is greater than the observed shifts in the depth of DDE peak, then it is not possible to use these data to detect anything other than large scouring events. Comparisons of DDE profiles in replicate cores from Stations K, K1, K2, N, N1, and N2 showed reasonable agreement, and the smoothing curves applied to the profile data for analyzing peak depth as a function of distance from placement locations showed consistent distribution patterns with similar depths for the DDE profile markers. The variability among replicate cores from Stations A/7CX and 7C was considerably greater than at the K and N stations, and was probably due in large part to effects from cap placement, although no replicate, pre-capping core data are available for these sites to confirm this.

5.0 CONCLUSIONS

This study addressed two primary data quality objectives:

DQO1a: Determine whether the OSU corer can collect sediment cores of adequate length and quality to achieve other study measurement objectives.

The study successfully collected, processed, and analyzed all sediment cores and parameters specified in the IWP. At some sites, multiple deployments of the OSU piston corer were required to obtain adequate-length cores. In total, 66 drops were completed and 29 cores were retained for processing, including the 5 cores used for the intercalibration exercise. Despite multiple attempts at most sites, sediment cores longer than 50 cm — which is the minimum core length identified in the IWP — could not be obtained consistently using the piston corer. Although the piston corer did not obtain the target core lengths, the core samples collected along the N and K station transects were long enough to capture the DDE peak and, in most cases, the lower shoulders of the peak, to allow assessments of DQO2. Therefore, this objective was achieved.

DQO1b: Determine whether core DDE profiles obtained using the OSU corer are comparable to those obtained using the LACSD corer.

This objective was achieved by conducting a coring intercalibration exercise with LACSD personnel. This exercise provided sufficient data for evaluating the comparability of the two sample collection and processing methods. The data obtained from this exercise indicated that the two methods are generally comparable and there were no indications that one or both methods resulted in sampling artifacts that biased the results. Therefore, data collected for this phase of the pilot cap monitoring program are considered comparable to those collected by the LACSD long-term sediment study.

DQO2: Determine the thickness and spatial extent of surface EA sediment displaced laterally by point cap placement event(s).

This objective was achieved using multiple lines of evidence. The numbers of samples and specific parameters were appropriate for addressing the objective. The core profiles were useful for testing trends in the DDE peak depths with distance from single cap placement locations (i.e., the K and N station transects), and the results were adequate to demonstrate the absence of large shifts in peak depths that would have accompanied scouring of the EA layer at these locations. The data also were useful for explaining previous observations, based on measurements from previous phases of the cap monitoring program and from the LACSD long-term sediment study that suggested upward shifts in the DDE peaks following cap placement operations in Cell SU. The results from SPI and side-scan sonar images collected during the 2000 pilot cap monitoring program demonstrated that some disturbances to EA sediments accompanied cap placement operations. However, the present sediment core data for the K and N station transects indicated that any scoured sediments were replaced by a layer of cap materials with a thickness that was equal to or greater than the displaced EA sediments. The net result is that the layer of sediments containing the highest contaminant concentrations has not been shifted upwards towards the sediment-water interface. These conditions are consistent with the intent of overlapping cap placements to minimize potential impacts to the EA sediment layer. Data collected during this study, combined with pre- and post-capping core data for Station 7C and post-capping data for Station A/7CX collected by LACSD, indicate greater scouring with non-uniform cap layer thickness at these locations. This results in spatial heterogeneity, with small areas with DDE peaks closer to the interface adjacent to areas with thick cap material deposits. Relatively greater scouring at Station A/7CX is not surprising since cap placements at this location were directly on top of the EA sediments, whereas the explanation for scouring at Station 7C, where overlapping placement was used, is not apparent.

REFERENCES

Drake, D.E., Sherwood, C.R., and P.L Wiberg. 1994. Predictive modeling of the natural recovery of the contaminated effluent-affected sediment, Palos Verdes Margin, Southern California. Expert Report, Proposal for National Oceanic and Atmospheric Administration.

Duncan, D.B. 1975. t-Test and intervals for comparisons suggested by the data. Biometrics 31: 339-359.

Eganhouse, R.P. and J. Pontolillo. 2000. Depositional history of organic contaminants on the Palos Verdes Shelf, California. Marine Chemistry 70:317-338.

Eganhouse, R.P., J. Pontolillo, and T.J. Leiker. 2000. Diagenetic fate of organic contaminants on the Palos Verdes Shelf, California. Marine Chemistry 70:289-315.

Eganhouse, R.P., and M.I. Venkatesan. 1993. Chemical oceanography and geochemistry. Chapter 3 In Daily, MD, Reish, DJ, Anderson, JW (Eds.) Ecology of the Southern California Bight: A Synthesis and Interpretation. University of California Press. Berkeley, CA. USA.

Eubank, R.L. 1988. Spline Smoothing and Nonparametric Regression. Marcel Dekker, Inc. New York.

Fredette, T., J. Clausner, S. McDowell, M. Palermo, J. Ryan, L. Smith, S. Bratos, M. Brouwer, T. Prickett, E. Nevarez, and F. Schauffler. 2002. Field Pilot Study of In-Situ Capping of Palos Verdes Shelf Contaminated Sediments. ERDC TR-02-5.

Lee, H.J. 1994. The distribution and character of contaminated effluent-affected sediment, Palos Verdes margin, southern California. U.S. Geological Survey Expert Report, Southern California Bight Natural Resources Damage Assessment. 261 p.

Lee, H.J., C.R. Sherwood, D.E. Drake, B.D. Edwards, F. Wong, and M. Hamer. 2002. Spatial and temporal distribution of contaminated effluent-affected sediment on the Palos Verdes margin, southern California. Continental Shelf Research 22:859-880.

Murray, C.J. 1994. Geostatistical Mapping of the Distribution of Effluent-Affected Sediment Deposit and Associated Contaminant Inventories, Palos Verdes Margin, Southern California. Appendix M to The Distribution and Character of Contaminated Effluent-Affected sediment, Palos Verdes Margin, Southern California. U.S. Geological Survey Expert Report, Southern California Bight Natural Resources Damage Assessment.

Murray, C.J., H.J. Lee, and M.A. Hampton. 2002. Geostatistical mapping of effluent-affected sediment distribution on the Palos Verdes shelf. Continental Shelf Research 22:881-897.

Palermo, M.,P. Schroeder, Y. Rivera, C. Ruiz, D. Clarke, J.Gailani, J. Clausner, M. Hynes, T. Fredette, B. Tardy, L. Peyman-Dove, and A. Risko. 1999. Options for In Situ Capping of Palos Verdes Shelf Contaminated Sediments. Technical Report EL-99-2, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. http://www.wes.army.mil/el/elpubs/pdf/trel-99-2.pdf

Plumb, R.H., 1981. Procedure for Handling and Chemical Analysis of Sediment and Water Samples. Technical Report EPA/CE 81-1, prepared for by Great Lakes Laboratory, State University College at Buffalo, NY, for the U.S. EPA/Corps of Engineers Technical Committee on Criteria for Dredged and Fill Material. Published by the U.S. Army Engineers Waterways Experiment Station, CE, Vicksburg, MS

Reinsch, C.H. 1967. Smoothing by Spline Function. Numerische Mathematik 10:177-183.

SAIC. 2002. Monitoring Results from the Field Pilot Study of In Situ Capping of Palos Verdes Shelf Contaminated Sediments. Final report prepared for U.S. Army Corps of Engineers and U.S. Environmental Protection Agency. SAIC Report No. 514. Newport RI.

SAIC. 2004a. Preliminary Study Plan for Oceanographic Measurements and Multidisciplinary Surveys on the Palos Verdes Shelf in 2004.

SAIC. 2004b. Investigation Work Plan for the 2004 Physical Oceanographic Measurements Program on the Palos Verdes Shelf, Draft dated February 2004.

SAIC. 2004c. Monitoring Results from the March 2002 Post-Capping Survey on the Palos Verdes Shelf. Final Report prepared for U.S. Army Corps of Engineers and U.S. Environmental Protection Agency.

SAIC. 2005. Data Report for the Summer 2004 Geotechnical Measurement Program Conducted on the Palos Verdes Shelf. Final Report prepared for U.S. Army Corps of Engineers and U.S. Environmental Protection Agency.

Santschi, P.H., L. Guo, S. Asbill, M. Allison, A.B. Kepple, and L.-S Wen. 2001. Accumulation rates and sources of sediments and organic carbon on the Palos Verdes shelf based on radioisotopic tracers (^{137}Cs, ^{239,240}Pu, ^{210}Pb, ^{234}Th, ^{238}U and ^{14}C). Marine Chemistry 73:125-132.

Searle, S.R. 1971. Linear Models. Ed. John Wiley & Sons, Inc. NY.

Sea Surveyor. 1994. Queens Gate Dredging Geotechnical and Chemical Investigation. Final Report Prepared for Port of Long Beach. Contract No. HD-5240. December, 1994.

Sherwood, C.R. 2003. Did the placement of cap material in the pilot study at Palos Verdes cause impact depressions? Unpublished paper.

Sherwood, C.R., D.E. Drake, P.L. Wiberg, and R.A. Wheatcroft. 2002. Prediction of the fate of DDT in sediment on the Palos Verdes margin. Continental Shelf Research 22:1025-1088.

Snedecor, G.W., and W. G. Cochran. 1978. Statistical Methods. 6th ed. Ames:Iowa State Univ. Press.

Sokal, R.R. and F. J. Rohlf. 1998. Biometry: The principles and practice of statistics in biological research. W. H. Freeman and Co., San Francisco., 3rd Edition. 749 p.

Stull, J.K. 1995. Two decades of marine biological monitoring, Palos Verdes, California, 1972 to 1992. Bulletin of the Southern. California Academy of Sciences. 94:21-45.

USEPA. 1994. Guidance for the Data Quality Objectives Process. EPA QA/G-4. U.S. Environmental Protection Agency. Quality Assurance Management Staff, Washington, D.C. 68 p.

USEPA. 1996. Method 8081A and Method 8000B, *Test Methods for Evaluating Solid Waste*, SW-846, Third Edition, Final Update III. USEPA Office of Solid Waste and Emergency Response, Washington, D.C.

USEPA. 1999. National Functional Guidelines for Organic Data Review (EPA540/R-99/008), Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846, May 1996).

USEPA. 2001. EPA Requirements for Quality Assurance Project Plans. Office of Environmental Information, Washington, D.C. EPA/240/B-01/003. March 2001. 24 p.

USEPA. 2003. Environmental Risk Assessment for the Palos Verdes Shelf. Prepared for USEPA by CH2M Hill (Contract No. 68-W-98-225); USEPA, San Francisco, CA.

APPENDICES

A DATA VALIDATION REPORTS

A.1 DATA QUALITY ASSESSMENT

A comprehensive quality assurance/quality control (QA/QC) program was followed during the capping and post-cap phases of the U.S. Army Corps of Engineer's (USACE) Palos Verdes (PV) supplemental sampling to ensure that analytical results and the decisions based on these results are representative of the environmental conditions at PV. The monitoring program is multifaceted, involving a variety of sampling techniques to characterize biological, chemical, and physical conditions on the sea floor and the water before, during, and after the controlled placement of the cap material in specific locations. Woods Hole Group Environmental Laboratories, (WHG) of Raynham, Massachusetts performed the analytical work in accordance with the U.S. Environmental Protection Agency (EPA) *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW846.* The following were used during the evaluation of the QC data: QC requirements contained within the guidelines and specifications presented in *the Project Work Plan for the PV Pilot Capping Project*: *Quality Assurance Project Plan (QAPP)* (SAIC 2000); EPA Contract Laboratory Program (CLP) *Statement of Work (SOW) for Organic Analysis*; and EPA CLP *National Functional Guidelines for Organic Data Review* (EPA 1994). All tables referenced throughout the text are presented at the end of this section.

A.1.1 Data Validation Methodology

Sediment samples and field QC blanks (i.e., equipment rinsate blanks) collected during the PV supplemental sampling were analyzed for pesticides (i.e., 2,4-DDD, 2,4-DDE, 2,4-DDT, 4,4-DDD, 4,4-DDE, 4,4-DDT, and 4,4-DDMU) using EPA SW846 method 8081A. Gas chromatography/mass spectrometry (GS/MS) confirmation was performed for 10 percent of the sediment samples.

Ten percent of the sediment and GC/MS confirmation data packages obtained during the supplemental sampling were validated in accordance with the EPA CLP *National Functional Guidelines for Organic Data Review* (February 1994) as modified for SW846 methods including recalculations. Samples were reviewed for holding times, blank contamination, calibrations, surrogates, matrix spike/matrix spike duplicates (MS/MSDs), laboratory control samples (LCSs), internal standards, detection limits, error determination, and confirmed identification data. Calculations of reported results were verified from the raw data. The data packages were reviewed for content to ensure that the necessary forms and raw data required to validate the sample results were present. Laboratory QC forms were reviewed to ensure that the QC results fell within the appropriate QC limits. In addition, summary results for hand-transcribed forms and computer-generated forms were recalculated from raw data to verify that the algorithms were used and the data transcriptions were correct. Analytical results were checked and recalculated from raw data. Data validation qualifiers were applied as necessary. This information is summarized and presented in Section A.1.3.

During the data validation for the remaining ninety percent of the data, a modified CLP National Functional Guidelines validation occurred. As such, CLP Forms 1 to 10 were reviewed to ensure that the QC results fell within the appropriate QC limits for holding times, blank contamination, calibrations, surrogates, MS/MSDs, LCSs, internal standards, detection limits, and any other required QC data. No recalculations were done. Any resulting data validation qualifiers were applied and are summarized in Section A.1.3.

For the overall purposes of this study, pesticide results were either considered usable or usable and estimated. Usable data are defined as those data that passed individual scrutiny of the verification and validation process and have been accepted for unrestricted application of Level IV data. Certain pesticide results were qualified as estimated; however, these data are usable and acceptable for Level IV use.

A.1.2 Data Validation Report

Environmental and field QC samples collected during the PV supplemental sampling events were submitted to WHG for pesticides analysis using EPA SW846 method 8081A. GS/MS confirmation was performed for 10 percent of the sediment samples. Technical criteria identified in the *National Functional Guidelines for Organic Data Review* (EPA 1994) were used to validate the data as described in Section A.1.1. A data validation report was generated for each sample lot generated by the laboratory. The following definitions provide brief explanations of the data validation qualifiers assigned to results in the data review process:

U—The analyte was analyzed for, but was not detected above, the reported sample quantitation limit. These results are qualitatively acceptable and will be used in the risk assessment.

J—The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. These results are qualitatively acceptable, but estimates, and will be used in the risk assessment.

UJ—The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. These results are qualitatively acceptable, but estimates, and will be used in the risk assessment.

R—The sample results were rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified. These results will not be used in the risk assessment.

All data validation qualifiers applied by SAIC to all data (i.e., detected and nondetected values), as necessary, are contained in Table A-1. No data were rejected by SAIC during the validation process.

A.1.3 Laboratory Quality Control Assessment

This section summarizes the sample delivery group (SDG)-specific data validation reports for the PV supplemental sampling for Shelf Capping project sampling events.

Technical Holding Times

Based on an evaluation of all sediment samples and field QC blanks, all technical holding time criteria were met.

Instrument Performance Checks

The performance evaluation mixture (PEM) was analyzed at the proper frequency and position sequence as specified in EPA SW846 method 8081.

Initial Calibration Results

Initial calibration of each instrument used to analyze the samples collected during the PV supplemental sampling events was conducted in accordance with EPA SW846 method 8081A and EPA SW846 GC/MS confirmation Method 8270. Based on an evaluation of the initial calibration analyses conducted, all initial calibration requirements were met with the exceptions summarized below and in Table A-1. Tables A-2 through A-4 summarize calibration outliers for sediment, field QC blank, and GC/MS confirmation samples.

Pesticide Analysis—For sediments, 4,4-DDT exceeded the 15% RSD limit on columns A and B in SDGs 0407075 and 0410087 with a %RSD range of 18.9-19.5% and 16.2-18.9%. Instances where results were quantitated from this column were qualified as estimated (J). As a result, all 4,4-DDT results in these two SDGs were qualified as estimated (J).

4,4-DDMU exceeded the 15% RSD limit on column A in SDGs 0409156, 0409157, 0409158, 0409159, 0409160, 0409161, 0409162, 0410091, and 0502058 with a RSD range of 15.1-19.2%. Instances where results were quantitated from this column were qualified as estimated (J).

The surrogate compound decachlorobiphenyl (DCB) exceeded the 15 % RSD limit three times on column A and four times on column B. No validation qualifiers were applied due to surrogates above 15% RSD. All were less than 20% and not significantly above the UCL of 15%. All other initial calibration results were within acceptance criteria.

For field QC blank samples, 4,4-DDT exceeded the 15% RSD limit on column A with a RSD of 46.6% for the August 28, 2004 calibration and 23.3% for the September 1, 2004 calibration. 4,4-DDT exceeded the 15% RSD limit on column B with a RSD of 36.8% for the August 28, 2004 calibration. Instances where results were quantitated from this column were qualified as estimated (J). As a result, three field QC blank samples were qualified as estimated (J) for 4,4-DDT. All other initial calibration criteria were met for field QC blank samples.

GC/MS Confirmation Analysis—2,4-DDD exceeded the 15% RSD limit in the calibration curve associated with SDG 0501089. As a result, the forty sediment samples associated with this SDG were qualified as estimated (J) for 2,4-DDD. All other initial calibration results were within acceptance criteria.

Continuing Calibration Verification Results

Continuing calibration verification (CCV) of each instrument used to analyze the samples collected during the PV supplemental sampling event was conducted in accordance with EPA SW846 Method 8081A and EPA SW846 GC/MS confirmation Method 8270. Based on an evaluation of the continuing calibrations conducted for all analyses, all continuing calibration criteria requirements were met with the exceptions summarized below and in Table A-1. Tables A-2 through A-4 summarize calibration outliers for sediment, field QC blank, and GC/MS confirmation samples.

Pesticide Analysis—For sediments, 2,4-DDT exceeded the 20% D limit 7 times on column A and 6 times on column B in SDGs 0410089 and 0410090 with a % D range of 29-52.3% and 20.1-44.3%. Instances where results were associated with these CCVs and quantitated from the affected column were estimated (J).

4,4-DDT exceeded the 20% D limit 13 times on column A and 15 times on column B in SDGs 0407074, 0407075, 0409144, 0409150, and 0410090 with a % D range of 20.6-64% and 22.7-59.5%. Instances where results were associated with these CCVs and quantitated from the affected column were estimated (J).

4,4-DDD exceeded the 20% D limit one time on column A in SDG 0409150 with a % D 23.5. Instances where results were associated with these CCVs and quantitated from the affected column were estimated (J).

4,4-DDMU exceeded the 20% D limit one time on column A in SDG 0407075 with a % D of 23.5. Instances where results were associated with these CCVs and quantitated from the affected column were estimated (J).

The surrogate compound DCB exceeded the 20 %D limit nine times on column A and eleven times on column B. The surrogate compound tetrachloro-meta-xylene (TCX) exceeded the 20% RSD limit one time on column A. No validation qualifiers were applied due to surrogates above 20%. SDGs with CCV DCB outliers also had initial calibration DCB and, therefore, no further action was taken.

For field QC blank samples, 4,4-DDT exceeded the 20% D limit on column B with a % D of 20.2% for C3083102. No qualifiers were applied as 44-DDT was qualified due to ICV results. TCX exceeded the 20% D limit with a % D of 26.9% on column A and with a % D of 28% on column B for C3083104. Because all associated field QC blank surrogate recoveries were acceptable, no data validation qualifiers were applied. All other continuing calibration results were within acceptance criteria.

Method Blank Results

Method blanks were analyzed with each analytical batch of samples in accordance with EPA SW846 method 8081A and EPA SW846 GC/MS confirmation method 8270. The method blank results for both sediment, field QC blank, and GC/MS confirmation samples resulted in no qualification of the data. Equipment rinsate blank samples analyses are discussed in Section A.1.4.

Surrogate Results

Surrogate compounds for sediment, field QC blank, and GC/MS confirmation samples were analyzed in accordance with EPA SW846 Method 8081A and EPA SW846 GC/MS confirmation Method 8270. Tables A-5 through A-7 summarize surrogate recovery results for sediment, field QC blank, and GC/MS confirmation samples. Deviations are listed below and in Table A.1.

Pesticide Analysis—Six DCB and one TCX sediment percent recovery values were above the upper control limit (UCL). As a result, the positive results in seven sediment samples (i.e., PV-0704-K3 28-32cm, PV-0704-K2-R2 32-36cm, PV-0704-K2-R2 40-44cm, PV_0704_K4 28-32cm, PV-0704-K4 32-36cm, PV-0704-N3 28-32cm, and PV-0704-K2-R 32-36cm) were qualified as estimated "J."

Five SDGs (i.e., 0409146, 0409150, 0409159, 0409160, and 0410086) had samples with both surrogates diluted out in their second analysis. Nondetect results were qualified as estimated "UJ" and positive results were qualified as estimated "J" for these second dilution results. The affected samples were: PV-0704-A-R3 30-32cm, PV-0704-N-R3 36-40dup, PV-0704-K-R3 28-32cm, PV-0704-K-R3 32-36cm, PV-0704-K-R3 36-40cm, PV-0704-N-R1 24-28cm, PV-0704-N-R1 28-32cm, PV-0704-N-R1 32-36cm, PV-0704-N-R2 28-32cm, PV-0704-N-R2 32-36cm, and 7CXR2-22-24. All other surrogate criteria were met.

GC/MS Confirmation Analysis—Four sediment TCX percent recovery values (of 73 total TCX values) were above the UCL. As a result, positive results in GC/MS confirmation samples 7CB-18-20, 7CXR2-

14-16, 7CXR2-16-18, and 7CXR2-10-12 were qualified as estimated "J." All other surrogate criteria were met.

Matrix Spike/Matrix Spike Duplicate Results

MS/MSD analyses were conducted to assess the accuracy and precision of the analytical system and to evaluate the matrix effect of the sample upon the analytical methodology based upon the percent recovery of each compound. The control limits for percent recoveries and relative percent differences (RPDs) in sediment samples were described in EPA SW846 method 8081A and in the IWP (SAIC 2004b). No formal validation action is recommended according to the guidelines based only on MS/MSD analyses. Table A-8 summarizes the MS/MSD results for sediment samples. Recoveries and reproducibilities of the spiked compounds were within acceptable ranges with the exceptions listed below and in Table A-1.

Pesticide Analysis—For sediments, one 2,4-DDD, nineteen 2,4-DDE; nine 2,4-DDT; ten 4,4-DDD; forty-two 4,4-DDE; twenty-eight 4,4-DDT; and twenty-four 4,4-DDMU percent recovery values (of 60 total values for each pesticide) were outside the control limits of 75-125. Sediment samples associated with these outliers were qualified as estimated (J) due to MS/MSD recoveries in instances where other QC criteria (e.g., surrogates, LCSs, calibration) were outside of applicable criteria as well. In a few samples, qualifiers were applied due to zero percent recovery or extremely high recovery of a specific pesticide. No other qualifiers were applied due to MS/MSD recoveries because all other QC criteria were met. Poor recoveries appeared to be due to sample heterogeneity and high levels of pesticides in the native sample.

Four 4,4-DDE and nine 4,4-DDT RPD values (of 30 total values for each pesticide) exceeded the RPD limit of 30%. No qualifiers were applied due to RPD values exceeding criteria. All other MS/MSD criteria were met.

Laboratory Control Sample Results

The LCS monitors the overall accuracy and performance of all steps in the analysis, including sample preparation, and was prepared and analyzed in accordance with EPA SW846 Method 8081A and EPA SW846 GC/MS confirmation Method 8270. Tables A-9 through A-11 summarize all LCS results for sediment, field QC blank, and GC/MS confirmation samples. Recoveries of the LCS compounds were within acceptable ranges with the exceptions listed below and in Table A-1.

Pesticide Analysis—For sediments, a total of twenty LCS results were below the LCL of 80%. These low LCS results were associated with 13 of the 31 sediment SDGs validated. SDGs 0407074, 0409146, 0409147, 0409148, 0409149, 0409155, 0409162, 0410091, and 0502058 all had 4,4-DDMU LCS percent recovery values below the LCL. SDG 0410086 had a 2,4-DDE LCS percent recovery value below the LCL. SDG 0410085 had 2,4-DDE and 4,4-DDMU LCS percent recovery values below the LCL. In SDG 0407075, 2,4-DDD, 4,4-DDD, 4,4-DDT, and 4,4-DDMU LCS percent recovery values were below the LCL. In SDG 0409150, 2,4-DDD, 2,4-DDE, 2,4-DDT, and 4,4-DDMU LCS percent recovery values were below the LCL. All sample results in the thirteen SDGs associated with these low LCS results were qualified as estimated (J).

4,4-DDT was above the UCL of 120% in the LCSs analyzed with SDGs 0409154 and 0410087. As a result, positive 4,4-DDT results associated with these SDGs were qualified as estimated (J). All other LCS criteria were met.

GC/MS Confirmation Analysis—For SDG 0501089, two 2,4-DDD, two 2,4-DDE, one 2,4-DDT, and one 4,4-DDE LCS percent recovery values (of 5 total values for each pesticide) were below the LCL of 80%. As a result, in SDG 0501089, twelve 2,4-DDD, twelve 2,4-DDE, two 2,4-DDT, and ten 4,4-DDE GC/MS confirmation values were estimated "J." For SDG 0503073, three 2,4-DDD, three 2,4-DDE, two 4,4-DDD, and one 4,4-DDMU LCS percent recovery values (of 5 total values for each pesticide) were below the LCL of 80%. As a result, in SDG 0503073, six 2,4-DDD, six 2,4-DDE, two 4,4-DDD, and two 4,4-DDMU GC/MS confirmation results were estimated "J." All other LCS criteria were met.

Target Compound Identification

The DDE results that were reported as detects satisfied all qualitative and quantitative identification criteria specified in EPA SW846 Method 8081A and EPA SW846 GC/MS confirmation Method 8270 with the exceptions summarized below.

Many reported pesticides in sediments had a RPD greater than 40% between values reported from column A and column B. Any reported values that had a greater than 40% RPD between the two columns were estimated (J).

In SDG 0407117, 4,4-DDT in PV-0704-RINSET-01 was qualified as estimated "J" due to percent concentration deviations between both columns being greater than 40 %.

Thirty Regional Reference Materials (RRMs) were analyzed for DDE with results falling within 35 percent of the mean consensus value of 10,100 µg/Kg (= ng/g) dry weight and a range of 6,560 to 15, 300 µg/Kg with one exception. The RRM analyzed with SDG 0407076 had a value of 6500 µg/Kg for 4,4-DDE. Since this was not significantly outside criteria and the LCS recovery was acceptable for 4,4-DDE, no action or qualifiers were applied. RRM results are summarized in Table A-12.

Reporting Limits

All reporting limit criteria specified in EPA SW846 Method 8081A and EPA SW846 GC/MS confirmation Method 8270 were met.

System Performance

Based on instrument performance indicators, all analytical systems remained within parameters throughout the duration of all of the sediment, field QC blank, and GC/MS confirmation sample analysis with the exceptions summarized above.

A.1.4 Field Quality Control Assessment

During all activities conducted as part of the PV supplemental sampling program, QC samples were collected to gauge the impacts from various components of field activities. Field QC samples were obtained to determine the degree of cross-contamination, ensure successful decontamination procedures, or determine the effects of media heterogeneity on results. A total of three rinsates were collected and analyzed using the same laboratory techniques as those used for the environmental samples. Rinsate blanks provide a measure of various cross-contamination, decontamination efficiency, and any other potential error that can be introduced from sources other than the sample. No data validation qualifiers were applied based on rinsate results.

A.2 DATA QUALITY OBJECTIVES

This section summarizes the results of the data quality assessment conducted for the analytical data associated with the samples collected during the monitoring of the capping and post-cap phases of the U.S. Army Corps of Engineer's (USACE) Palos Verdes (PV) Supplemental Sampling. This survey was conducted to ensure that analytical results and the decisions based on these results are representative of the environmental conditions at the site. The evaluation of the quality control (QC) data was evaluated using the guidelines summarized in Section A.1. The following sections summarize the data quality objectives (DQOs) as defined in the IWP for the precision, accuracy, representativeness, comparability, and completeness (PARCC) parameters obtained during the PV Shelf Pilot Capping Project. A detailed project data quality assessment is presented in Section A.1. All data validation qualifiers applied to the data are presented in Table A-1.

A.2.1 Precision

Precision is defined in Section 2 of the IWP and was evaluated based on the analysis of two different types of QC samples: matrix spike/matrix spike duplicates (MS/MSDs) and field duplicate sample analyses.

The first type of QC sample used to assess the analytical precision of the data quality was the relative percent differences (RPDs) of the MS/MSD samples. All MS/MSD RPDs were within the control limits with the exceptions listed in Section A.1. These MS/MSD outliers are considered to have little impact on the data quality and are considered more likely to be the result of matrix variability. No data validation qualifiers were applied based on MS/MSD RPD outliers.

The second type of QC sample, field duplicate samples, was included to evaluate field precision. Duplicate sample pairs were collected to ascertain the contribution of variability (i.e., precision) due to environmental media and sampling precision technique. Data have not been qualified based on the results of field duplicates, since the Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) *National Functional Guidelines for Organic Data Review* (EPA 1994) do not include control limits for RPD values. No specific control limits for field duplicates were established in part because the natural heterogeneity of the environmental media was much greater than the variability imparted by field and laboratory activities.

Based on an evaluation of the MS/MSDs and field duplicate results, overall precision is acceptable. As a result, the laboratory DQO for precision is considered to have been met.

A.2.2 Accuracy

Analytical accuracy is defined in Section 2 of the QAPP and was measured through the use of surrogates, MS/MSDs, laboratory control samples (LCSs), and Regional Reference Material (RRM) sediment samples.

The first type of QC used to assess the accuracy of the data quality was the percent recoveries of the surrogates for DDE analyses. All technical data review criteria were met for surrogates with the following exceptions.

Six DCB and one TCX sediment percent recovery values were above the upper control limit (UCL). As a result, the positive results in seven sediment samples (i.e., PV-0704-K3 28-32 cm, PV-0704-K2-R2 32-36 cm, PV-0704-K2-R2 40-44 cm, PV_0704_K4 28-32 cm, PV-0704-K4 32-36 cm, PV-0704-N3 28-32 cm, and PV-0704-K2-R 32-36 cm) were qualified as estimated "J." These qualified data points are considered acceptable but estimated, and will be used to support further recommendations.

Five SDGs (i.e., 0409146, 0409150, 0409159, 0409160, and 0410086) had samples with both surrogates diluted out in their second analysis. Nondetect results were qualified as estimated "UJ" and positive results were qualified as estimated "J" for these second dilution results. The affected samples were: PV-0704-A-R3 30-32 cm, PV-0704-N-R3 36-40dup, PV-0704-K-R3 28-32 cm, PV-0704-K-R3 32-36 cm, PV-0704-K-R3 36-40 cm, PV-0704-N-R1 24-28 cm, PV-0704-N-R1 28-32 cm, PV-0704-N-R1 32-36 cm, PV-0704-N-R2 28-32 cm, PV-0704-N-R2 32-36 cm, and 7CXR2-22-24. All other surrogate criteria were met. These qualified data points are considered acceptable but estimated, and will be used to support further recommendations.

All MS/MSDs were within the control limits with the following exceptions For sediments, one 2,4-DDD, nineteen 2,4-DDE; nine 2,4-DDT; ten 4,4-DDD; forty-two 4,4-DDE; twenty-eight 4,4-DDT; and twenty-four 4,4-DDMU percent recovery values (of 60 total values for each pesticide) were outside the control limits of 75-125. Sediment samples associated with these outliers were qualified as estimated (J) due to MS/MSD recoveries in instances where other QC criteria (e.g., surrogates, LCSs, calibration) were outside of applicable criteria as well. In a few samples, qualifiers were applied due to zero percent recovery or extremely high recovery of a specific pesticide. These qualified data points are considered acceptable, but estimate and will be used to support further recommendations. No other qualifiers were applied due to MS/MSD recoveries because all other QC criteria were met. Poor recoveries appeared to be due to sample heterogeneity and high levels of pesticides in the native sample.

The LCS was the third QC type used to assess analytical accuracy. Based on an evaluation of the data, all criteria were met with the following exceptions. For sediments, a total of twenty LCS results were below the LCL of 80%. These low LCS results were associated with 13 of the 31 sediment SDGs validated. SDGs 0407074, 0409146, 0409147, 0409148, 0409149, 0409155, 0409162, 0410091, and 0502058 all had 4,4-DDMU LCS percent recovery values below the LCL. SDG 0410086 had a 2,4-DDE LCS percent recovery value below the LCL. SDG 0410085 had 2,4-DDE and 4,4-DDMU LCS percent recovery values below the LCL. In SDG 0407075, 2,4-DDD, 4,4-DDD, 4,4-DDT, and 4,4-DDMU LCS percent recovery values were below the LCL. In SDG 0409150, 2,4-DDD, 2,4-DDE, 2,4-DDT, and 4,4-DDMU LCS percent recovery values were below the LCL. All sample results in the thirteen SDGs associated with these low LCS results were qualified as estimated (J). 4,4-DDT was above the UCL of 120% in the LCSs analyzed with SDGs 0409154 and 0410087. As a result, positive 4,4-DDT results associated with these SDGs were qualified as estimated (J). All other LCS criteria were met. These qualified data points are considered acceptable but estimated, and will be used to support further recommendations.

The RRM sediment samples were the fourth QC type used to assess analytical accuracy. Thirty RRMs were analyzed for DDE with results falling within 35 percent of the mean consensus value of 10,100 µg/Kg dry weight and a range of 6,560 to 15,300 µg/Kg with one exception. The RRM analyzed with SDG 0407076 had a value of 6,500 µg/Kg for 4,4-DDE. Since this was not significantly outside criteria and the LCS recovery was acceptable for 4,4-DDE, no action or qualifiers were applied. RRM results are summarized in Table A-12.

All supporting QC information cited above as qualitatively evaluated with respect to the analytical accuracy DQO. Based on the evaluation of the surrogates, MS/MSDs, LCS, and RRM results summarized in the data quality assessment, laboratory accuracy has been determined to be acceptable for all analyses, and as such, the analytical DQO for accuracy has been met, except where noted.

Method blank analysis was conducted with each analytical lot of environmental samples analyzed. Field QC blanks (i.e., equipment rinsate blanks) were obtained to determine the degree of cross-contamination or ensure successful decontamination procedures. No data validation qualifiers were applied based on method or field QC blanks.

Based on an evaluation of the compounds detected in the field QC blanks, the overall accuracy is acceptable, except where noted. As a result, the field DQO for accuracy is considered to have been met.

A.2.3 Representativeness

Based on the sample precision and accuracy assessment presented above, the samples collected during the PV supplemental sampling are considered representative of the environmental condition at the site.

A.2.4 Comparability

Based on the sample precision and accuracy assessment presented above, as well as the agreement between GC/MS and gas chromatography (GC)-electron capture detector (ECD) measurements, the data collected during the PV supplemental sampling are considered to be comparable with the data collected during previous investigations.

A.2.5 Completeness

Completeness measures the amount of valid data obtained from the laboratory analysis process and sampling. For data to be considered valid, they must have met all acceptance criteria, including accuracy and precision, as well as any other criteria specified by the analytical methods used. Furthermore, project completeness was defined as the percentage of data used to determine the extent of the contamination above standards and upon which recommendations for further study were to be based. For analytical data to be considered usable to determine the extent of the contamination above standards, each data point must be satisfactorily validated. Results that have been qualified "J" and "UJ" for various reasons may be considered to have encountered minor problems with limited impact on the data quality. DQOs for the PV supplemental sampling were set at 100 percent for the field sampling and laboratory completeness. Based on the evaluation of the field and laboratory QC results presented in data quality assessment section, 100 percent of the sediment and field QC blank data collected during the PV Shelf Pilot Cap Monitoring Program supplemental sampling were used as the basis for all recommendations presented in this report.

Table A-1. Data Qualifiers.

Sample ID	Matrix	Test Name	Method	SDG	Data Qualifier	Reason Code
7CXR2-56-58	Sediment	44DDT	8081	410087	UJ	2
7CXR3-04-06	Sediment	44DDT	8081	410087	UJ	2
7CXR3-14-16	Sediment	44DDT	8081	410088	J	2
7CXR3-16-18	Sediment	44DDT	8081	410088	J	2
7CXR3-18-20	Sediment	44DDT	8081	410088	J	2
7CXR3-20-22	Sediment	44DDT	8081	410088	J	2
7CXR3-22-24	Sediment	44DDT	8081	410088	J	2
7CXR3-24-26	Sediment	44DDT	8081	410088	J	2
7CXR3-26-28	Sediment	44DDT	8081	410088	J	2
7CXR3-28-30	Sediment	44DDT	8081	410088	J	2
7CXR4-00-02	Sediment	44DDT	8081	410088	J	2
7CXR4-02-04	Sediment	44DDT	8081	410088	J	2
7CXR4-04-06	Sediment	44DDT	8081	410088	J	2
7CXR4-06-08	Sediment	44DDT	8081	410088	J	2
7CXR4-08-10	Sediment	44DDT	8081	410088	J	2
7CXR4-10-12	Sediment	44DDT	8081	410088	J	2
7CXR4-12-14	Sediment	44DDT	8081	410088	J	2
7CXR4-14-16	Sediment	44DDT	8081	410088	J	2
7CXR4-16-18	Sediment	44DDT	8081	410088	J	2
7CXR4-18-20	Sediment	44DDT	8081	410088	J	2
MRS032803	Sediment	44DDT	8081	410088	J	2
PV-0704-7CB-1 22-24	Sediment	44DDT	8081	409154	UJ	2
PV-0704-K1-R2 0-4	Sediment	44DDMU	8081	409157	J	2
PV-0704-K1-R2 12-16	Sediment	44DDMU	8081	409157	J	2
PV-0704-K1-R2 16-20	Sediment	44DDMU	8081	409157	J	2
PV-0704-K1-R2 20-24	Sediment	44DDMU	8081	409157	J	2
PV-0704-K1-R2 24-28	Sediment	44DDMU	8081	409157	J	2
PV-0704-K1-R2 28-32	Sediment	44DDMU	8081	409157	J	2
PV-0704-K1-R2 32-36	Sediment	44DDMU	8081	409157	J	2
PV-0704-K1-R2 36-40	Sediment	44DDMU	8081	409157	J	2
PV-0704-K1-R2 40-44	Sediment	44DDMU	8081	409157	J	2
PV-0704-K1-R2 44-48	Sediment	44DDMU	8081	409157	J	2
PV-0704-K1-R2 4-8	Sediment	44DDMU	8081	409157	J	2
PV-0704-K1-R2 8-12	Sediment	44DDMU	8081	409157	J	2
PV-0704-K1-R3 0-4	Sediment	44DDMU	8081	409157	J	2
PV-0704-K1-R3 12-16	Sediment	44DDMU	8081	409158	J	2
PV-0704-K1-R3 12-16 dup	Sediment	44DDMU	8081	409158	J	2
PV-0704-K1-R3 16-20	Sediment	44DDMU	8081	409158	J	2
PV-0704-K1-R3 24-28	Sediment	44DDMU	8081	409158	J	2
PV-0704-K1-R3 32-36	Sediment	44DDMU	8081	409158	J	2
PV-0704-K1-R3 36-40	Sediment	44DDMU	8081	409158	J	2
PV-0704-K1-R3 40-44	Sediment	44DDMU	8081	409158	J	2
PV-0704-K1-R3 4-8	Sediment	44DDMU	8081	409158	J	2
PV-0704-K1-R3 8-12	Sediment	44DDMU	8081	409158	J	2
PV-0704-K2-K3 28-32	Sediment	44DDMU	8081	409157	J	2

PV-0704-K2-K3 32-36	Sediment	44DDMU	8081	409157	J	2
PV-0704-K2-K3 36-40	Sediment	44DDMU	8081	409157	J	2
PV-0704-K2-K3 40-44	Sediment	44DDMU	8081	409157	J	2
PV-0704-K2-K3 40-44 dup	Sediment	44DDMU	8081	409157	J	2
PV-0704-K2-K3 44-48	Sediment	44DDMU	8081	409157	J	2
PV-0704-K2-R1 0-4	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R1 12-16	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R1 16-20	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R1 20-24	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R1 24-28	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R1 28-32	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R1 36-40	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R1 40-44	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R1 44-48	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R1 4-8	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R1 48-50	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R1 8-12	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R3 0-4	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R3 12-16	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R3 16-20	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R3 20-24	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R3 24-28	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R3 4-8	Sediment	44DDMU	8081	409156	J	2
PV-0704-K2-R3 8-12	Sediment	44DDMU	8081	409156	J	2
PV-0704-K3 0-4	Sediment	44DDT	8081	407074	J	2
PV-0704-K3 12-16	Sediment	44DDT	8081	407074	J	2
PV-0704-K3 16-20	Sediment	44DDT	8081	407074	J	2
PV-0704-K3 20-24	Sediment	44DDT	8081	407074	J	2
PV-0704-K3 24-28	Sediment	44DDT	8081	407074	J	2
PV-0704-K3 4-8	Sediment	44DDT	8081	407074	J	2
PV-0704-K3 8-12	Sediment	44DDT	8081	407074	J	2
PV-0704-K4 12-16	Sediment	44DDT	8081	407074	J	2
PV-0704-K4 16-20	Sediment	44DDT	8081	407074	J	2
PV-0704-K4 20-24	Sediment	44DDT	8081	407074	J	2
PV-0704-K4 24-28	Sediment	44DDT	8081	407074	J	2
PV-0704-K4 24-28 dup	Sediment	44DDT	8081	407074	J	2
PV-0704-K4 36-40	Sediment	44DDT	8081	407074	J	2
PV-0704-K4 40-44	Sediment	44DDT	8081	407074	J	2
PV-0704-K4 44-49	Sediment	44DDT	8081	407074	J	2
PV-0704-K4 4-8	Sediment	44DDT	8081	407074	J	2
PV-0704-K4 8-12	Sediment	44DDT	8081	407074	J	2
PV-0704-K-R1 0-4	Sediment	44DDMU	8081	409158	J	2
PV-0704-K-R1 12-16	Sediment	44DDMU	8081	409158	J	2
PV-0704-K-R1 16-20	Sediment	44DDMU	8081	409158	J	2
PV-0704-K-R1 36-40	Sediment	44DDMU	8081	409159	J	2
PV-0704-K-R1 4-8	Sediment	44DDMU	8081	409158	J	2
PV-0704-K-R3 12-16	Sediment	44DDMU	8081	409159	J	2
PV-0704-N1-R1 28-32	Sediment	44DDMU	8081	409161	J	2
PV-0704-N1-R1 32-36	Sediment	44DDMU	8081	409161	J	2
PV-0704-N1-R1 36-40	Sediment	44DDMU	8081	409161	J	2

PV-0704-N-R1 20-24	Sediment	44DDMU	8081	409160	J	2
PV-0704-N-R1 36-40	Sediment	44DDMU	8081	409160	J	2
PV-0704-N-R1 40-45	Sediment	44DDMU	8081	409160	J	2
PV-0704-N-R2 0-4	Sediment	44DDMU	8081	409160	J	2
PV-0704-N-R2 40-45	Sediment	44DDMU	8081	409160	J	2
PV-0704-N-R2 4-8	Sediment	44DDMU	8081	409160	J	2
PV-0704-N-R2 8-12	Sediment	44DDMU	8081	409160	J	2
PV-0704-RinseC	Water	44DDT	8081	407117	UJ	2
PV-0704-RINSEC-01	Water	44DDT	8081	407117	UJ	2
7CXR2-02-04	Sediment	24DDD	8270	501089	J	2
7CXR2-12-14	Sediment	24DDD	8270	501089	J	2
7CXR2-20-22	Sediment	24DDD	8270	501089	J	2
7CXR2-22-24	Sediment	24DDD	8270	501089	J	2
7CXR2-24-26	Sediment	24DDD	8270	501089	J	2
7CXR2-26-28	Sediment	24DDD	8270	501089	J	2
7CXR2-28-30	Sediment	24DDD	8270	501089	J	2
PV-0704-7C-1 12-14	Sediment	24DDD	8270	501089	J	2
PV-0704-7C-1 14-16	Sediment	24DDD	8270	501089	J	2
PV-0704-7C-1 18-20	Sediment	24DDD	8270	501089	J	2
PV-0704-7C-1 22-24	Sediment	24DDD	8270	501089	J	2
PV-0704-7C-1 24-26	Sediment	24DDD	8270	501089	J	2
PV-0704-7C-1 26-28	Sediment	24DDD	8270	501089	J	2
PV-0704-7C-1 28-30	Sediment	24DDD	8270	501089	J	2
PV-0704-7C-1 34-36	Sediment	24DDD	8270	501089	J	2
PV-0704-7C-1 4-6	Sediment	24DDD	8270	501089	J	2
PV-0704-7C-1 6-8	Sediment	24DDD	8270	501089	J	2
PV-0704-A-R-1 44-46	Sediment	24DDD	8270	501089	J	2
PV-0704-A-R2 0-2	Sediment	24DDD	8270	501089	J	2
PV-0704-A-R2 10-12	Sediment	24DDD	8270	501089	J	2
PV-0704-A-R2 12-14	Sediment	24DDD	8270	501089	J	2
PV-0704-A-R2 14-16	Sediment	24DDD	8270	501089	J	2
PV-0704-A-R2 18-20	Sediment	24DDD	8270	501089	J	2
PV-0704-A-R2 22-24	Sediment	24DDD	8270	501089	J	2
PV-0704-A-R2 2-4	Sediment	24DDD	8270	501089	J	2
PV-0704-A-R2 4-6	Sediment	24DDD	8270	501089	J	2
PV-0704-A-R2 6-8	Sediment	24DDD	8270	501089	J	2
7C-00-02	Sediment	24DDT	8081	410089	UJ	4
7C-00-02	Sediment	44DDT	8081	410089	J	4
7C-02-04	Sediment	24DDT	8081	410089	UJ	4
7C-02-04	Sediment	44DDT	8081	410089	J	4
7C-04-06	Sediment	24DDT	8081	410089	UJ	4
7C-04-06	Sediment	44DDT	8081	410089	J	4
7C-06-08	Sediment	24DDT	8081	410089	UJ	4
7C-06-08	Sediment	44DDT	8081	410089	J	4
7C-08-10	Sediment	24DDT	8081	410089	UJ	4
7C-08-10	Sediment	44DDT	8081	410089	J	4
7C-10-12	Sediment	24DDT	8081	410089	UJ	4
7C-10-12	Sediment	44DDT	8081	410089	J	4
7C-12-14	Sediment	24DDT	8081	410089	UJ	4
7C-12-14	Sediment	44DDT	8081	410089	J	4

7C-14-16	Sediment	24DDT	8081	410089	UJ	4
7C-14-16	Sediment	44DDT	8081	410089	J	4
7C-16-18	Sediment	24DDT	8081	410089	UJ	4
7C-16-18	Sediment	44DDT	8081	410089	J	4
7C-18-20	Sediment	24DDT	8081	410089	UJ	4
7C-18-20	Sediment	44DDT	8081	410089	J	4
7C-20-22	Sediment	24DDT	8081	410089	UJ	4
7C-20-22	Sediment	44DDT	8081	410089	J	4
7C-22-24	Sediment	24DDT	8081	410089	UJ	4
7C-24-26	Sediment	24DDT	8081	410090	UJ	4
7C-24-26	Sediment	44DDT	8081	410090	UJ	4
7C-26-28	Sediment	24DDT	8081	410090	UJ	4
7C-28-30	Sediment	24DDT	8081	410090	UJ	4
7C-30-32	Sediment	24DDT	8081	410090	UJ	4
7C-30-32	Sediment	44DDT	8081	410090	UJ	4
7C-32-34	Sediment	24DDT	8081	410090	UJ	4
7C-34-36	Sediment	24DDT	8081	410090	UJ	4
7C-34-36	Sediment	44DDT	8081	410090	UJ	4
7C-36-38	Sediment	24DDT	8081	410090	UJ	4
7C-38-40	Sediment	24DDT	8081	410090	UJ	4
7C-38-40	Sediment	44DDT	8081	410090	UJ	4
7C-40-42	Sediment	24DDT	8081	410090	UJ	4
7C-40-42	Sediment	44DDT	8081	410090	UJ	4
7C-42-44	Sediment	24DDT	8081	410090	UJ	4
7C-42-44	Sediment	44DDT	8081	410090	J	4
7C-44-46	Sediment	24DDT	8081	410090	UJ	4
7C-44-46	Sediment	44DDT	8081	410090	UJ	4
7C-46-48	Sediment	24DDT	8081	410090	UJ	4
7C-46-48	Sediment	44DDT	8081	410090	J	4
7C-48-50	Sediment	24DDT	8081	410090	UJ	4
7C-48-50	Sediment	44DDT	8081	410090	J	4
7C-50-52	Sediment	24DDT	8081	410090	UJ	4
7C-50-52	Sediment	44DDT	8081	410090	J	4
7C-52-54	Sediment	24DDT	8081	410090	UJ	4
7C-54-56	Sediment	24DDT	8081	410090	UJ	4
7C-54-56	Sediment	44DDT	8081	410090	UJ	4
7C-56-58	Sediment	24DDT	8081	410090	UJ	4
7C-56-58	Sediment	44DDT	8081	410090	J	4
7C-58-60	Sediment	24DDT	8081	410090	UJ	4
7C-58-60	Sediment	44DDT	8081	410090	UJ	4
7C-62-64	Sediment	24DDT	8081	410090	UJ	4
7C-62-64	Sediment	44DDT	8081	410090	J	4
PV-0704-A-R2 20-22	Sediment	44DDT	8081	409144	J	4
PV-0704-A-R2 22-24	Sediment	44DDT	8081	409144	J	4
PV-0704-A-R2 24-26	Sediment	44DDT	8081	409144	J	4
PV-0704-A-R2 26-28	Sediment	44DDT	8081	409144	J	4
PV-0704-A-R2 28-30	Sediment	44DDT	8081	409144	J	4
PV-0704-N4 16-20	Sediment	44DDD	8081	409150	J	4
PV-0704-N4 16-20 dup	Sediment	44DDD	8081	409150	J	4
PV-0704-N4 24-28	Sediment	44DDD	8081	409150	J	4

PV-0704-N4 28-32	Sediment	44DDD	8081	409150	J	4
PV-0704-N4 32-36 dup	Sediment	44DDD	8081	409150	J	4
PV-0704-N4 36-40E	Sediment	44DDD	8081	409150	J	4
PV-0704-N4 40-44	Sediment	44DDD	8081	409150	J	4
PV-0704-N4 48-51	Sediment	44DDD	8081	409150	J	4
PV-0704-N-R3 36-40 dup	Sediment	44DDD	8081	409150	J	4
7CXR2-22-24E	Sediment	24DDT	8081	410086	UJ	9
7CXR2-22-24E	Sediment	44DDD	8081	410086	J	9
7CXR2-22-24E	Sediment	44DDE	8081	410086	J	9
7CXR2-22-24E	Sediment	44DDMU	8081	410086	J	9
7CXR2-22-24E	Sediment	44DDT	8081	410086	UJ	9
PV-0704-A-R3 30-32E	Sediment	24DDD	8081	409146	J	9
PV-0704-A-R3 30-32E	Sediment	24DDE	8081	409146	J	9
PV-0704-A-R3 30-32E	Sediment	24DDT	8081	409146	UJ	9
PV-0704-A-R3 30-32E	Sediment	44DDD	8081	409146	J	9
PV-0704-A-R3 30-32E	Sediment	44DDE	8081	409146	J	9
PV-0704-A-R3 30-32E	Sediment	44DDMU	8081	409146	J	9
PV-0704-A-R3 30-32E	Sediment	44DDT	8081	409146	UJ	9
PV-0704-K2-R1 32-36	Sediment	24DDD	8081	409156	J	9
PV-0704-K2-R1 32-36	Sediment	24DDE	8081	409156	J	9
PV-0704-K2-R1 32-36	Sediment	44DDD	8081	409156	J	9
PV-0704-K2-R1 32-36	Sediment	44DDE	8081	409156	J	9
PV-0704-K2-R1 32-36	Sediment	44DDT	8081	409156	J	9
PV-0704-K2-R2 32-36	Sediment	24DDE	8081	407075	J	9
PV-0704-K2-R2 32-36	Sediment	44DDE	8081	407075	J	9
PV-0704-K2-R2 40-44	Sediment	24DDE	8081	407075	J	9
PV-0704-K2-R2 40-44	Sediment	44DDE	8081	407075	J	9
PV-0704-K3 28-32	Sediment	24DDE	8081	407075	J	9
PV-0704-K3 28-32	Sediment	44DDE	8081	407075	J	9
PV-0704-K4 28-32	Sediment	24DDE	8081	407074	J	9
PV-0704-K4 28-32	Sediment	44DDD	8081	407074	J	9
PV-0704-K4 28-32	Sediment	44DDE	8081	407074	J	9
PV-0704-K4 32-36	Sediment	24DDE	8081	407074	J	9
PV-0704-K4 32-36	Sediment	44DDD	8081	407074	J	9
PV-0704-K4 32-36	Sediment	44DDE	8081	407074	J	9
PV-0704-K-R3 28-32E	Sediment	24DDE	8081	409159	J	9
PV-0704-K-R3 28-32E	Sediment	24DDT	8081	409159	UJ	9
PV-0704-K-R3 28-32E	Sediment	44DDD	8081	409159	J	9
PV-0704-K-R3 28-32E	Sediment	44DDE	8081	409159	J	9
PV-0704-K-R3 28-32E	Sediment	44DDT	8081	409159	J	9
PV-0704-K-R3 32-36E	Sediment	24DDD	8081	409159	J	9
PV-0704-K-R3 32-36E	Sediment	24DDE	8081	409159	J	9
PV-0704-K-R3 32-36E	Sediment	24DDT	8081	409159	UJ	9
PV-0704-K-R3 32-36E	Sediment	44DDD	8081	409159	J	9
PV-0704-K-R3 32-36E	Sediment	44DDE	8081	409159	J	9
PV-0704-K-R3 32-36E	Sediment	44DDT	8081	409159	J	9
PV-0704-K-R3 36-40E	Sediment	24DDD	8081	409159	J	9
PV-0704-K-R3 36-40E	Sediment	24DDE	8081	409159	J	9
PV-0704-K-R3 36-40E	Sediment	24DDT	8081	409159	UJ	9
PV-0704-K-R3 36-40E	Sediment	44DDD	8081	409159	J	9

PV-0704-K-R3 36-40E	Sediment	44DDE	8081	409159	J	9
PV-0704-K-R3 36-40E	Sediment	44DDT	8081	409159	J	9
PV-0704-N3 28-32	Sediment	24DDD	8081	409147	J	9
PV-0704-N3 28-32	Sediment	24DDE	8081	409147	J	9
PV-0704-N3 28-32	Sediment	44DDD	8081	409147	J	9
PV-0704-N3 28-32	Sediment	44DDE	8081	409147	J	9
PV-0704-N3 28-32	Sediment	44DDMU	8081	409147	J	9
PV-0704-N3 28-32	Sediment	44DDT	8081	409147	J	9
PV-0704-N-R1 24-28E	Sediment	24DDE	8081	409160	J	9
PV-0704-N-R1 24-28E	Sediment	24DDT	8081	409160	UJ	9
PV-0704-N-R1 24-28E	Sediment	44DDD	8081	409160	J	9
PV-0704-N-R1 24-28E	Sediment	44DDE	8081	409160	J	9
PV-0704-N-R1 24-28E	Sediment	44DDT	8081	409160	J	9
PV-0704-N-R1 28-32E	Sediment	24DDD	8081	409160	J	9
PV-0704-N-R1 28-32E	Sediment	24DDE	8081	409160	J	9
PV-0704-N-R1 28-32E	Sediment	24DDT	8081	409160	UJ	9
PV-0704-N-R1 28-32E	Sediment	44DDD	8081	409160	J	9
PV-0704-N-R1 28-32E	Sediment	44DDE	8081	409160	J	9
PV-0704-N-R1 28-32E	Sediment	44DDMU	8081	409160	J	9
PV-0704-N-R1 28-32E	Sediment	44DDT	8081	409160	J	9
PV-0704-N-R1 32-36E	Sediment	24DDD	8081	409160	J	9
PV-0704-N-R1 32-36E	Sediment	24DDE	8081	409160	J	9
PV-0704-N-R1 32-36E	Sediment	24DDT	8081	409160	UJ	9
PV-0704-N-R1 32-36E	Sediment	44DDD	8081	409160	J	9
PV-0704-N-R1 32-36E	Sediment	44DDE	8081	409160	J	9
PV-0704-N-R1 32-36E	Sediment	44DDMU	8081	409160	J	9
PV-0704-N-R1 32-36E	Sediment	44DDT	8081	409160	J	9
PV-0704-N-R2 28-32E	Sediment	24DDE	8081	409160	J	9
PV-0704-N-R2 28-32E	Sediment	24DDT	8081	409160	UJ	9
PV-0704-N-R2 28-32E	Sediment	44DDD	8081	409160	J	9
PV-0704-N-R2 28-32E	Sediment	44DDE	8081	409160	J	9
PV-0704-N-R2 28-32E	Sediment	44DDMU	8081	409160	J	9
PV-0704-N-R2 28-32E	Sediment	44DDT	8081	409160	J	9
PV-0704-N-R2 32-36E	Sediment	24DDD	8081	409160	J	9
PV-0704-N-R2 32-36E	Sediment	24DDE	8081	409160	J	9
PV-0704-N-R2 32-36E	Sediment	24DDT	8081	409160	UJ	9
PV-0704-N-R2 32-36E	Sediment	44DDD	8081	409160	J	9
PV-0704-N-R2 32-36E	Sediment	44DDE	8081	409160	J	9
PV-0704-N-R2 32-36E	Sediment	44DDMU	8081	409160	J	9
PV-0704-N-R2 32-36E	Sediment	44DDT	8081	409160	J	9
PV-0704-N-R3 36-40 dupE	Sediment	44DDD	8081	409150	J	9
PV-0704-N-R3 36-40 dupE	Sediment	44DDE	8081	409150	J	9
PV-0704-N-R3 36-40 dupE	Sediment	44DDT	8081	409150	J	9
7CB-18-20	Sediment	44DDD	8270	501089	J	9
7CB-18-20	Sediment	44DDMU	8270	501089	J	9
7CB-18-20	Sediment	44DDT	8270	501089	J	9
7CXR2-10-12	Sediment	24DDE	8270	501089	J	9
7CXR2-10-12	Sediment	44DDD	8270	501089	J	9
7CXR2-10-12	Sediment	44DDE	8270	501089	J	9
7CXR2-10-12	Sediment	44DDMU	8270	501089	J	9

7CXR2-10-12	Sediment	44DDT	8270	501089	J	9
7CXR2-14-16	Sediment	24DDE	8270	501089	J	9
7CXR2-14-16	Sediment	44DDD	8270	501089	J	9
7CXR2-14-16	Sediment	44DDE	8270	501089	J	9
7CXR2-14-16	Sediment	44DDMU	8270	501089	J	9
7CXR2-14-16	Sediment	44DDT	8270	501089	J	9
7CXR2-16-18	Sediment	24DDE	8270	501089	J	9
7CXR2-16-18	Sediment	44DDD	8270	501089	J	9
7CXR2-16-18	Sediment	44DDE	8270	501089	J	9
7CXR2-16-18	Sediment	44DDMU	8270	501089	J	9
7C-60-62	Sediment	44DDE	8081	410090	J	10
7CB-40-42	Sediment	44DDMU	8081	410086	J	10
7CXR3-28-30	Sediment	24DDE	8081	410088	J	10
7CXR3-28-30	Sediment	44DDE	8081	410088	J	10
7CXR3-28-30	Sediment	44DDMU	8081	410088	J	10
PV-0704-K1-R3 40-44	Sediment	44DDE	8081	409158	J	10
PV-0704-K4 0-4	Sediment	44DDD	8081	407074	J	10
PV-0704-K-R3 40-44 dup	Sediment	44DDT	8081	409159	J	10
PV-0704-N1-R3 16-20	Sediment	44DDD	8081	409162	J	10
PV-0704-N1-R3 16-20	Sediment	44DDT	8081	409162	J	10
PV-0704-N2-R1 44-46	Sediment	24DDE	8081	409149	J	10
PV-0704-N2-R1 44-46	Sediment	44DDT	8081	409149	J	10
PV-0704-N2-R1 44-46E	Sediment	24DDE	8081	409149	J	10
PV-0704-N2-R1 44-46E	Sediment	44DDE	8081	409149	J	10
PV-0704-N2-R1 44-46E	Sediment	44DDT	8081	409149	J	10
PV-0704-N2-R2 44-47	Sediment	44DDE	8081	502058	J	10
PV-0704-N2-R2 44-47	Sediment	44DDT	8081	502058	J	10
PV-0704-N4 44-48	Sediment	44DDE	8081	409150	J	10
7CB-02-04	Sediment	24DDE	8081	410085	J	11
7CB-02-04	Sediment	44DDMU	8081	410085	J	11
7CB-04-06	Sediment	24DDE	8081	410085	J	11
7CB-04-06	Sediment	44DDMU	8081	410085	J	11
7CB-06-08	Sediment	24DDE	8081	410085	J	11
7CB-06-08	Sediment	44DDMU	8081	410085	J	11
7CB-08-10	Sediment	24DDE	8081	410085	J	11
7CB-08-10	Sediment	44DDMU	8081	410085	J	11
7CB-10-12	Sediment	24DDE	8081	410085	J	11
7CB-10-12	Sediment	44DDMU	8081	410085	J	11
7CB-12-14	Sediment	24DDE	8081	410085	J	11
7CB-12-14	Sediment	44DDMU	8081	410085	J	11
7CB-14-16	Sediment	24DDE	8081	410085	J	11
7CB-14-16	Sediment	44DDMU	8081	410085	J	11
7CB-16-18	Sediment	24DDE	8081	410085	J	11
7CB-16-18	Sediment	44DDMU	8081	410085	J	11
7CB-18-20	Sediment	24DDE	8081	410085	J	11
7CB-18-20	Sediment	44DDMU	8081	410085	J	11
7CB-20-22	Sediment	24DDE	8081	410085	J	11
7CB-20-22	Sediment	44DDMU	8081	410085	J	11
7CB-22-24	Sediment	24DDE	8081	410085	J	11
7CB-22-24	Sediment	44DDMU	8081	410085	J	11

7CB-24-26	Sediment	24DDE	8081	410085	J	11
7CB-24-26	Sediment	44DDMU	8081	410085	J	11
7CB-26-28	Sediment	24DDE	8081	410085	J	11
7CB-26-28	Sediment	44DDMU	8081	410085	J	11
7CB-28-30	Sediment	24DDE	8081	410085	J	11
7CB-28-30	Sediment	44DDMU	8081	410085	J	11
7CB-30-32	Sediment	24DDE	8081	410085	J	11
7CB-30-32	Sediment	44DDMU	8081	410085	J	11
7CB-32-34	Sediment	24DDE	8081	410085	J	11
7CB-32-34	Sediment	44DDMU	8081	410085	J	11
7CB-34-36	Sediment	24DDE	8081	410085	J	11
7CB-34-36	Sediment	44DDMU	8081	410085	J	11
7CB-36-38	Sediment	24DDE	8081	410085	J	11
7CB-36-38	Sediment	44DDMU	8081	410085	J	11
7CB-38-40	Sediment	24DDE	8081	410085	J	11
7CB-38-40	Sediment	44DDMU	8081	410085	J	11
7CB-38-40E	Sediment	24DDE	8081	410085	J	11
7CB-38-40E	Sediment	44DDMU	8081	410085	J	11
7CB-40-42E	Sediment	24DDE	8081	410086	J	11
7CB-42-44	Sediment	24DDE	8081	410086	J	11
7CB-44-46	Sediment	24DDE	8081	410086	J	11
7CB-46-48	Sediment	24DDE	8081	410086	J	11
7CB-48-50	Sediment	24DDE	8081	410086	J	11
7CXR2-00-02	Sediment	24DDE	8081	410086	J	11
7CXR2-02-04	Sediment	24DDE	8081	410086	J	11
7CXR2-04-06	Sediment	24DDE	8081	410086	J	11
7CXR2-06-08	Sediment	24DDE	8081	410086	J	11
7CXR2-08-10	Sediment	24DDE	8081	410086	J	11
7CXR2-10-12	Sediment	24DDE	8081	410086	J	11
7CXR2-12-14	Sediment	24DDE	8081	410086	J	11
7CXR2-12-14E	Sediment	24DDE	8081	410086	J	11
7CXR2-14-16	Sediment	24DDE	8081	410086	J	11
7CXR2-16-18	Sediment	24DDE	8081	410086	J	11
7CXR2-16-18E	Sediment	24DDE	8081	410086	J	11
7CXR2-18-20	Sediment	24DDE	8081	410086	J	11
7CXR2-20-22	Sediment	24DDE	8081	410086	J	11
7CXR2-22-24	Sediment	24DDE	8081	410086	J	11
7CXR2-24-26	Sediment	24DDE	8081	410086	J	11
7CXR2-26-28	Sediment	24DDE	8081	410086	J	11
7CXR2-28-30	Sediment	24DDE	8081	410086	J	11
MRS032803	Sediment	44DDMU	8081	409162	J	11
PV-0704-7C-1 0-2	Sediment	24DDE	8081	409150	J	11
PV-0704-7C-1 0-2	Sediment	24DDT	8081	409150	UJ	11
PV-0704-7C-1 0-2	Sediment	44DDMU	8081	409150	J	11
PV-0704-7C-1 0-2 dup	Sediment	24DDE	8081	409150	J	11
PV-0704-7C-1 0-2 dup	Sediment	24DDT	8081	409150	UJ	11
PV-0704-7C-1 0-2 dup	Sediment	44DDMU	8081	409150	J	11
PV-0704-7C-1 2-4	Sediment	24DDE	8081	409150	J	11
PV-0704-7C-1 2-4	Sediment	24DDT	8081	409150	UJ	11
PV-0704-7C-1 2-4	Sediment	44DDMU	8081	409150	J	11

PV-0704-7CB-1 40-42	Sediment	44DDMU	8081	409155	J	11
PV-0704-7CB-1 42-44	Sediment	44DDMU	8081	409155	J	11
PV-0704-7CB-1 44-46	Sediment	44DDMU	8081	409155	J	11
PV-0704-7CB-1 44-46E	Sediment	44DDMU	8081	409155	J	11
PV-0704-7CB-1 46-48	Sediment	44DDMU	8081	409155	J	11
PV-0704-7CB-1 46-48E	Sediment	44DDMU	8081	409155	J	11
PV-0704-7CB-1 48-50	Sediment	44DDMU	8081	409155	J	11
PV-0704-A-R3 2-4 dup	Sediment	44DDMU	8081	409146	J	11
PV-0704-F 28-32 dup	Sediment	44DDMU	8081	409147	J	11
PV-0704-K2-R2 0-4	Sediment	24DDD	8081	407075	J	11
PV-0704-K2-R2 0-4	Sediment	44DDD	8081	407075	J	11
PV-0704-K2-R2 0-4	Sediment	44DDMU	8081	407075	J	11
PV-0704-K2-R2 12-16	Sediment	44DDD	8081	407075	J	11
PV-0704-K2-R2 12-16	Sediment	44DDMU	8081	407075	J	11
PV-0704-K2-R2 16-20	Sediment	44DDD	8081	407075	J	11
PV-0704-K2-R2 16-20	Sediment	44DDMU	8081	407075	J	11
PV-0704-K2-R2 20-24	Sediment	44DDD	8081	407075	J	11
PV-0704-K2-R2 20-24	Sediment	44DDMU	8081	407075	J	11
PV-0704-K2-R2 24-28	Sediment	44DDD	8081	407075	J	11
PV-0704-K2-R2 24-28	Sediment	44DDMU	8081	407075	J	11
PV-0704-K2-R2 24-28 dup	Sediment	44DDD	8081	407075	J	11
PV-0704-K2-R2 28-32	Sediment	44DDD	8081	407075	J	11
PV-0704-K2-R2 28-32	Sediment	44DDMU	8081	407075	J	11
PV-0704-K2-R2 36-40	Sediment	24DDD	8081	407075	J	11
PV-0704-K2-R2 36-40	Sediment	44DDD	8081	407075	J	11
PV-0704-K2-R2 36-40	Sediment	44DDMU	8081	407075	J	11
PV-0704-K2-R2 44-48	Sediment	24DDD	8081	407075	J	11
PV-0704-K2-R2 44-48	Sediment	44DDD	8081	407075	J	11
PV-0704-K2-R2 4-8	Sediment	24DDD	8081	407075	J	11
PV-0704-K2-R2 4-8	Sediment	44DDD	8081	407075	J	11
PV-0704-K2-R2 4-8	Sediment	44DDMU	8081	407075	J	11
PV-0704-K2-R2 48-51	Sediment	24DDD	8081	407075	J	11
PV-0704-K2-R2 48-51	Sediment	44DDD	8081	407075	J	11
PV-0704-K2-R2 8-12	Sediment	44DDD	8081	407075	J	11
PV-0704-K2-R2 8-12	Sediment	44DDMU	8081	407075	J	11
PV-0704-K3 0-4	Sediment	44DDMU	8081	407074	J	11
PV-0704-K3 12-16	Sediment	44DDMU	8081	407074	J	11
PV-0704-K3 16-20	Sediment	44DDMU	8081	407074	J	11
PV-0704-K3 20-24	Sediment	44DDMU	8081	407074	J	11
PV-0704-K3 24-28	Sediment	44DDMU	8081	407074	J	11
PV-0704-K3 32-36	Sediment	24DDD	8081	407075	J	11
PV-0704-K3 32-36	Sediment	44DDD	8081	407075	J	11
PV-0704-K3 32-36	Sediment	44DDMU	8081	407075	J	11
PV-0704-K3 32-36 dup	Sediment	24DDD	8081	407075	J	11
PV-0704-K3 32-36 dup	Sediment	44DDD	8081	407075	J	11
PV-0704-K3 32-36 dup	Sediment	44DDMU	8081	407075	J	11
PV-0704-K3 36-40	Sediment	24DDD	8081	407075	J	11
PV-0704-K3 36-40	Sediment	44DDD	8081	407075	J	11
PV-0704-K3 36-40	Sediment	44DDMU	8081	407075	J	11
PV-0704-K3 40-44	Sediment	24DDD	8081	407075	J	11

PV-0704-K3 40-44	Sediment	44DDD	8081	407075	J	11
PV-0704-K3 40-44	Sediment	44DDMU	8081	407075	J	11
PV-0704-K3 44-46	Sediment	24DDD	8081	407075	J	11
PV-0704-K3 44-46	Sediment	44DDD	8081	407075	J	11
PV-0704-K3 44-46	Sediment	44DDMU	8081	407075	J	11
PV-0704-K3 4-8	Sediment	44DDMU	8081	407074	J	11
PV-0704-K3 8-12	Sediment	44DDMU	8081	407074	J	11
PV-0704-K4 12-16	Sediment	44DDMU	8081	407074	J	11
PV-0704-K4 16-20	Sediment	44DDMU	8081	407074	J	11
PV-0704-K4 20-24	Sediment	44DDMU	8081	407074	J	11
PV-0704-K4 24-28	Sediment	44DDMU	8081	407074	J	11
PV-0704-K4 24-28 dup	Sediment	44DDMU	8081	407074	J	11
PV-0704-K4 36-40	Sediment	44DDMU	8081	407074	J	11
PV-0704-K4 40-44	Sediment	44DDMU	8081	407074	J	11
PV-0704-K4 44-49	Sediment	44DDMU	8081	407074	J	11
PV-0704-K4 4-8	Sediment	44DDMU	8081	407074	J	11
PV-0704-K4 8-12	Sediment	44DDMU	8081	407074	J	11
PV-0704-K-R2 28-32	Sediment	44DDMU	8081	407076	J	11
PV-0704-N1-R2 0-4	Sediment	44DDMU	8081	409148	J	11
PV-0704-N1-R2 0-4 dup	Sediment	44DDMU	8081	409148	J	11
PV-0704-N1-R2 12-16	Sediment	44DDMU	8081	409148	J	11
PV-0704-N1-R2 16-20	Sediment	44DDMU	8081	409148	J	11
PV-0704-N1-R2 20-24	Sediment	44DDMU	8081	409148	J	11
PV-0704-N1-R2 24-28	Sediment	44DDMU	8081	409148	J	11
PV-0704-N1-R2 28-32	Sediment	44DDMU	8081	409148	J	11
PV-0704-N1-R2 32-36	Sediment	44DDMU	8081	409148	J	11
PV-0704-N1-R2 36-40	Sediment	44DDMU	8081	409148	J	11
PV-0704-N1-R2 40-44	Sediment	44DDMU	8081	409148	J	11
PV-0704-N1-R2 44-49	Sediment	44DDMU	8081	409148	J	11
PV-0704-N1-R2 4-8	Sediment	44DDMU	8081	409148	J	11
PV-0704-N1-R2 8-12	Sediment	44DDMU	8081	409148	J	11
PV-0704-N1-R3 28-32	Sediment	44DDMU	8081	409162	J	11
PV-0704-N1-R3 32-36	Sediment	44DDMU	8081	409162	J	11
PV-0704-N2-R1 0-4	Sediment	44DDMU	8081	409148	J	11
PV-0704-N2-R1 12-16	Sediment	44DDMU	8081	409149	J	11
PV-0704-N2-R1 16-20	Sediment	44DDMU	8081	409149	J	11
PV-0704-N2-R1 20-24	Sediment	44DDMU	8081	409149	J	11
PV-0704-N2-R1 24-28	Sediment	44DDMU	8081	409149	J	11
PV-0704-N2-R1 28-32	Sediment	44DDMU	8081	409149	J	11
PV-0704-N2-R1 32-36	Sediment	44DDMU	8081	409149	J	11
PV-0704-N2-R1 36-40	Sediment	44DDMU	8081	409149	J	11
PV-0704-N2-R1 40-44	Sediment	44DDMU	8081	409149	J	11
PV-0704-N2-R1 4-8	Sediment	44DDMU	8081	409148	J	11
PV-0704-N2-R1 8-12	Sediment	44DDMU	8081	409148	J	11
PV-0704-N2-R1 8-12 dup	Sediment	44DDMU	8081	409149	J	11
PV-0704-N2-R2 28-32	Sediment	44DDMU	8081	409162	J	11
PV-0704-N2-R2 32-36	Sediment	44DDMU	8081	409162	J	11
PV-0704-N2-R2 36-40	Sediment	44DDMU	8081	409162	J	11
PV-0704-N3 32-36 dup	Sediment	44DDMU	8081	409148	J	11
PV-0704-N3 36-40	Sediment	44DDMU	8081	409148	J	11

PV-0704-N3 40-44	Sediment	44DDMU	8081	409148	J	11
PV-0704-N4 0-4	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 0-4	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 0-4	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 12-16	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 12-16	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 12-16	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 16-20	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 16-20	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 16-20	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 16-20 dup	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 16-20 dup	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 16-20 dup	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 20-24	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 20-24	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 20-24	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 24-28	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 24-28	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 24-28	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 28-32	Sediment	24DDD	8081	409150	J	11
PV-0704-N4 28-32	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 28-32	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 28-32	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 32-36	Sediment	24DDD	8081	409150	J	11
PV-0704-N4 32-36	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 32-36	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 32-36	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 32-36 dup	Sediment	24DDD	8081	409150	J	11
PV-0704-N4 32-36 dup	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 32-36 dup	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 32-36 dup	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 36-40	Sediment	24DDD	8081	409150	J	11
PV-0704-N4 36-40	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 36-40	Sediment	24DDT	8081	409150	J	11
PV-0704-N4 36-40	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 36-40E	Sediment	24DDD	8081	409150	J	11
PV-0704-N4 36-40E	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 36-40E	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 36-40E	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 40-44	Sediment	24DDD	8081	409150	J	11
PV-0704-N4 40-44	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 40-44	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 40-44	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 44-48	Sediment	24DDD	8081	409150	J	11
PV-0704-N4 44-48	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 44-48	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 4-8	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 4-8	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 4-8	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 48-51	Sediment	24DDD	8081	409150	J	11

PV-0704-N4 48-51	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 48-51	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 48-51	Sediment	44DDMU	8081	409150	J	11
PV-0704-N4 8-12	Sediment	24DDE	8081	409150	J	11
PV-0704-N4 8-12	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N4 8-12	Sediment	44DDMU	8081	409150	J	11
PV-0704-N-R3 0-4	Sediment	44DDMU	8081	409149	J	11
PV-0704-N-R3 12-16	Sediment	44DDMU	8081	409149	J	11
PV-0704-N-R3 16-20	Sediment	44DDMU	8081	409149	J	11
PV-0704-N-R3 20-24	Sediment	44DDMU	8081	409149	J	11
PV-0704-N-R3 24-28	Sediment	44DDMU	8081	409149	J	11
PV-0704-N-R3 28-32	Sediment	44DDMU	8081	409149	J	11
PV-0704-N-R3 32-36	Sediment	44DDMU	8081	409149	J	11
PV-0704-N-R3 36-40 dup	Sediment	24DDD	8081	409150	J	11
PV-0704-N-R3 36-40 dup	Sediment	24DDE	8081	409150	J	11
PV-0704-N-R3 36-40 dup	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N-R3 36-40 dup	Sediment	44DDMU	8081	409150	J	11
PV-0704-N-R3 40-45	Sediment	24DDD	8081	409150	J	11
PV-0704-N-R3 40-45	Sediment	24DDE	8081	409150	J	11
PV-0704-N-R3 40-45	Sediment	24DDT	8081	409150	UJ	11
PV-0704-N-R3 40-45	Sediment	44DDMU	8081	409150	J	11
PV-0704-N-R3 4-8	Sediment	44DDMU	8081	409149	J	11
PV-0704-N-R3 8-12	Sediment	44DDMU	8081	409149	J	11
7CB-04-06	Sediment	24DDE	8270	501089	J	11
7CB-04-06	Sediment	44DDE	8270	501089	J	11
7CB-06-08	Sediment	24DDE	8270	501089	J	11
7CB-06-08	Sediment	44DDE	8270	501089	J	11
7CB-10-12	Sediment	24DDE	8270	501089	J	11
7CB-10-12	Sediment	44DDE	8270	501089	J	11
7CB-16-18	Sediment	24DDE	8270	501089	J	11
7CB-16-18	Sediment	44DDE	8270	501089	J	11
7CB-20-22	Sediment	24DDE	8270	501089	J	11
7CB-20-22	Sediment	44DDE	8270	501089	J	11
7CB-26-28	Sediment	24DDE	8270	501089	J	11
7CB-26-28	Sediment	44DDE	8270	501089	J	11
7CB-32-34	Sediment	24DDE	8270	501089	J	11
7CB-32-34	Sediment	44DDE	8270	501089	J	11
7CB-34-36	Sediment	24DDE	8270	501089	J	11
7CB-34-36	Sediment	44DDE	8270	501089	J	11
PV-0704-K2-R1 28-32	Sediment	24DDD	8270	503073	J	11
PV-0704-K2-R1 28-32	Sediment	24DDE	8270	503073	J	11
PV-0704-K2-R1 28-32	Sediment	44DDD	8270	503073	J	11
PV-0704-K2-R1 28-32	Sediment	44DDMU	8270	503073	J	11
PV-0704-K2-R3 24-28	Sediment	24DDD	8270	503073	J	11
PV-0704-K2-R3 24-28	Sediment	24DDE	8270	503073	J	11
PV-0704-K2-R3 24-28	Sediment	44DDD	8270	503073	J	11
PV-0704-K2-R3 24-28	Sediment	44DDMU	8270	503073	J	11
PV-0704-K-R1 28-32	Sediment	24DDD	8270	503073	J	11
PV-0704-K-R1 28-32	Sediment	24DDE	8270	503073	J	11
PV-0704-K-R1 28-32	Sediment	44DDD	8270	503073	J	11

PV-0704-K-R1 36-40	Sediment	24DDD	8270	503073	J	11
PV-0704-K-R1 36-40	Sediment	24DDE	8270	503073	J	11
PV-0704-K-R1 36-40	Sediment	44DDD	8270	503073	J	11
PV-0704-N4 0-4	Sediment	24DDD	8270	501089	J	11
PV-0704-N4 0-4	Sediment	24DDE	8270	501089	J	11
PV-0704-N4 0-4	Sediment	24DDT	8270	501089	UJ	11
PV-0704-N4 20-24	Sediment	24DDD	8270	501089	J	11
PV-0704-N4 20-24	Sediment	24DDE	8270	501089	J	11
PV-0704-N4 20-24	Sediment	24DDT	8270	501089	UJ	11
PV-0704-N-R1 16-20	Sediment	24DDD	8270	503073	J	11
PV-0704-N-R1 16-20	Sediment	24DDE	8270	503073	J	11
PV-0704-N-R1 36-40	Sediment	24DDD	8270	503073	J	11
PV-0704-N-R1 36-40	Sediment	24DDE	8270	503073	J	11
7CXR3-30-32E	Sediment	24DDD	8081	410088	J	12
7CXR3-30-32E	Sediment	24DDE	8081	410088	J	12
7CXR3-30-32E	Sediment	24DDT	8081	410088	UJ	12
7CXR3-30-32E	Sediment	44DDD	8081	410088	J	12
7CXR3-30-32E	Sediment	44DDE	8081	410088	J	12
7CXR3-30-32E	Sediment	44DDMU	8081	410088	J	12
PV-0704-A-R2 0-2	Sediment	24DDD	8081	409145	J	12
PV-0704-A-R2 0-2	Sediment	24DDE	8081	409145	J	12
PV-0704-A-R2 0-2	Sediment	24DDT	8081	409145	UJ	12
PV-0704-A-R2 0-2	Sediment	44DDD	8081	409145	J	12
PV-0704-A-R2 0-2	Sediment	44DDE	8081	409145	J	12
PV-0704-A-R2 0-2	Sediment	44DDMU	8081	409145	J	12
PV-0704-A-R2 0-2	Sediment	44DDT	8081	409145	J	12
PV-0704-A-R2 30-32	Sediment	24DDD	8081	409145	J	12
PV-0704-A-R2 30-32	Sediment	24DDE	8081	409145	J	12
PV-0704-A-R2 30-32	Sediment	24DDT	8081	409145	J	12
PV-0704-A-R2 30-32	Sediment	44DDD	8081	409145	J	12
PV-0704-A-R2 30-32	Sediment	44DDMU	8081	409145	J	12
PV-0704-A-R2 30-32	Sediment	44DDT	8081	409145	J	12
PV-0704-A-R2 32-34	Sediment	24DDD	8081	409145	J	12
PV-0704-A-R2 32-34	Sediment	24DDE	8081	409145	J	12
PV-0704-A-R2 32-34	Sediment	24DDT	8081	409145	UJ	12
PV-0704-A-R2 32-34	Sediment	44DDD	8081	409145	J	12
PV-0704-A-R2 32-34	Sediment	44DDMU	8081	409145	J	12
PV-0704-A-R2 32-34	Sediment	44DDT	8081	409145	J	12
PV-0704-A-R2 38-40	Sediment	24DDD	8081	409145	J	12
PV-0704-A-R2 38-40	Sediment	24DDE	8081	409145	J	12
PV-0704-A-R2 38-40	Sediment	24DDT	8081	409145	UJ	12
PV-0704-A-R2 38-40	Sediment	44DDD	8081	409145	J	12
PV-0704-A-R2 38-40	Sediment	44DDE	8081	409145	J	12
PV-0704-A-R2 38-40	Sediment	44DDMU	8081	409145	J	12
PV-0704-A-R2 38-40	Sediment	44DDT	8081	409145	J	12
PV-0704-A-R2 40-42	Sediment	24DDD	8081	409145	J	12
PV-0704-A-R2 40-42	Sediment	24DDE	8081	409145	J	12
PV-0704-A-R2 40-42	Sediment	24DDT	8081	409145	UJ	12
PV-0704-A-R2 40-42	Sediment	44DDD	8081	409145	J	12
PV-0704-A-R2 40-42	Sediment	44DDMU	8081	409145	J	12

PV-0704-A-R2 40-42	Sediment	44DDT	8081	409145	J	12
PV-0704-A-R2 42-44	Sediment	24DDD	8081	409145	J	12
PV-0704-A-R2 42-44	Sediment	24DDE	8081	409145	J	12
PV-0704-A-R2 42-44	Sediment	24DDT	8081	409145	J	12
PV-0704-A-R2 42-44	Sediment	44DDD	8081	409145	J	12
PV-0704-A-R2 42-44	Sediment	44DDE	8081	409145	J	12
PV-0704-A-R2 42-44	Sediment	44DDMU	8081	409145	J	12
PV-0704-A-R2 42-44	Sediment	44DDT	8081	409145	J	12
PV-0704-A-R2 6-8 dup	Sediment	24DDD	8081	409145	J	12
PV-0704-A-R2 6-8 dup	Sediment	24DDE	8081	409145	J	12
PV-0704-A-R2 6-8 dup	Sediment	24DDT	8081	409145	J	12
PV-0704-A-R2 6-8 dup	Sediment	44DDD	8081	409145	J	12
PV-0704-A-R2 6-8 dup	Sediment	44DDE	8081	409145	J	12
PV-0704-A-R2 6-8 dup	Sediment	44DDMU	8081	409145	J	12
PV-0704-A-R2 6-8 dup	Sediment	44DDT	8081	409145	J	12
PV-0704-A-R3 0-2	Sediment	24DDE	8081	409145	J	12
PV-0704-A-R3 0-2	Sediment	24DDT	8081	409145	UJ	12
PV-0704-A-R3 0-2	Sediment	44DDD	8081	409145	J	12
PV-0704-A-R3 0-2	Sediment	44DDE	8081	409145	J	12
PV-0704-A-R3 0-2	Sediment	44DDMU	8081	409145	J	12
PV-0704-A-R3 0-2	Sediment	44DDT	8081	409145	J	12
PV-0704-A-R3 2-4	Sediment	24DDD	8081	409145	J	12
PV-0704-A-R3 2-4	Sediment	24DDE	8081	409145	J	12
PV-0704-A-R3 2-4	Sediment	24DDT	8081	409145	UJ	12
PV-0704-A-R3 2-4	Sediment	44DDD	8081	409145	J	12
PV-0704-A-R3 2-4	Sediment	44DDE	8081	409145	J	12
PV-0704-A-R3 2-4	Sediment	44DDMU	8081	409145	J	12
PV-0704-A-R3 2-4	Sediment	44DDT	8081	409145	J	12
PV-0704-A-R3 4-6	Sediment	24DDD	8081	409145	J	12
PV-0704-A-R3 4-6	Sediment	24DDE	8081	409145	J	12
PV-0704-A-R3 4-6	Sediment	24DDT	8081	409145	UJ	12
PV-0704-A-R3 4-6	Sediment	44DDD	8081	409145	J	12
PV-0704-A-R3 4-6	Sediment	44DDE	8081	409145	J	12
PV-0704-A-R3 4-6	Sediment	44DDMU	8081	409145	J	12
PV-0704-A-R3 4-6	Sediment	44DDT	8081	409145	J	12
7C-00-02	Sediment	24DDD	8081	410089	J	15
7C-00-02	Sediment	44DDMU	8081	410089	J	15
7C-02-04	Sediment	44DDMU	8081	410089	J	15
7C-04-06	Sediment	24DDD	8081	410089	J	15
7C-04-06	Sediment	44DDMU	8081	410089	J	15
7C-08-10	Sediment	24DDD	8081	410089	J	15
7C-08-10	Sediment	44DDMU	8081	410089	J	15
7C-10-12	Sediment	24DDD	8081	410089	J	15
7C-10-12	Sediment	44DDMU	8081	410089	J	15
7C-12-14	Sediment	24DDD	8081	410089	J	15
7C-12-14	Sediment	44DDMU	8081	410089	J	15
7C-14-16	Sediment	24DDD	8081	410089	J	15
7C-14-16	Sediment	44DDMU	8081	410089	J	15
7C-16-18	Sediment	44DDMU	8081	410089	J	15
7C-18-20	Sediment	44DDMU	8081	410089	J	15

7C-20-22	Sediment	24DDD	8081	410089	J	15
7C-20-22	Sediment	44DDMU	8081	410089	J	15
7C-22-24	Sediment	24DDD	8081	410089	J	15
7C-22-24	Sediment	44DDMU	8081	410089	J	15
7C-24-26	Sediment	44DDMU	8081	410090	J	15
7C-26-28	Sediment	44DDMU	8081	410090	J	15
7C-28-30	Sediment	24DDD	8081	410090	J	15
7C-28-30	Sediment	44DDMU	8081	410090	J	15
7C-30-32	Sediment	24DDD	8081	410090	J	15
7C-32-34	Sediment	24DDD	8081	410090	J	15
7C-34-36	Sediment	24DDD	8081	410090	J	15
7C-40-42	Sediment	24DDD	8081	410090	J	15
7C-50-52	Sediment	44DDMU	8081	410090	J	15
7C-52-54	Sediment	44DDMU	8081	410090	J	15
7C-60-62	Sediment	44DDMU	8081	410090	J	15
7C-62-64	Sediment	44DDMU	8081	410090	J	15
7CB-00-02	Sediment	24DDD	8081	410085	J	15
7CB-02-04	Sediment	24DDD	8081	410085	J	15
7CB-04-06	Sediment	24DDD	8081	410085	J	15
7CB-06-08	Sediment	44DDT	8081	410085	J	15
7CB-10-12	Sediment	24DDD	8081	410085	J	15
7CB-12-14	Sediment	44DDT	8081	410085	J	15
7CB-16-18	Sediment	24DDD	8081	410085	J	15
7CB-16-18	Sediment	44DDT	8081	410085	J	15
7CB-18-20	Sediment	24DDD	8081	410085	J	15
7CB-20-22	Sediment	24DDD	8081	410085	J	15
7CB-22-24	Sediment	44DDT	8081	410085	J	15
7CB-40-42E	Sediment	44DDT	8081	410086	J	15
7CB-42-44	Sediment	44DDT	8081	410086	J	15
7CXR2-04-06	Sediment	24DDD	8081	410086	J	15
7CXR2-06-08	Sediment	24DDD	8081	410086	J	15
7CXR2-08-10	Sediment	24DDD	8081	410086	J	15
7CXR2-12-14	Sediment	44DDT	8081	410086	J	15
7CXR2-12-14E	Sediment	24DDD	8081	410086	J	15
7CXR2-14-16	Sediment	24DDD	8081	410086	J	15
7CXR2-16-18	Sediment	24DDD	8081	410086	J	15
7CXR2-16-18	Sediment	44DDT	8081	410086	J	15
7CXR2-16-18E	Sediment	24DDD	8081	410086	J	15
7CXR2-18-20	Sediment	24DDD	8081	410086	J	15
7CXR2-18-20	Sediment	44DDT	8081	410086	J	15
7CXR2-20-22	Sediment	24DDD	8081	410086	J	15
7CXR2-20-22	Sediment	44DDT	8081	410086	J	15
7CXR2-22-24	Sediment	24DDD	8081	410086	J	15
7CXR2-22-24	Sediment	44DDT	8081	410086	J	15
7CXR2-24-26	Sediment	44DDT	8081	410086	J	15
7CXR2-40-42	Sediment	24DDD	8081	410087	J	15
7CXR2-44-46	Sediment	24DDD	8081	410087	J	15
7CXR2-56-58	Sediment	44DDMU	8081	410087	J	15
7CXR3-00-02	Sediment	24DDD	8081	410087	J	15
7CXR3-10-12	Sediment	24DDD	8081	410087	J	15

7CXR3-12-14	Sediment	24DDD	8081	410088	J	15
7CXR4-02-04	Sediment	24DDD	8081	410088	J	15
7CXR4-06-08	Sediment	24DDD	8081	410088	J	15
7CXR4-10-12	Sediment	24DDD	8081	410088	J	15
7CXR4-24-26	Sediment	44DDT	8081	410089	J	15
7CXR4-28-30	Sediment	24DDD	8081	410089	J	15
7CXR4-28-30	Sediment	44DDMU	8081	410089	J	15
7CXR4-30-32	Sediment	44DDMU	8081	410089	J	15
7CXR4-30-32	Sediment	44DDT	8081	410089	J	15
7CXR4-32-34	Sediment	44DDMU	8081	410089	J	15
7CXR4-34-36	Sediment	24DDD	8081	410089	J	15
7CXR4-34-36	Sediment	44DDMU	8081	410089	J	15
PV-0704-7C-1 10-12	Sediment	24DDD	8081	409151	J	15
PV-0704-7C-1 16-18	Sediment	24DDD	8081	409151	J	15
PV-0704-7C-1 16-18	Sediment	44DDT	8081	409151	J	15
PV-0704-7C-1 28-30	Sediment	24DDD	8081	409151	J	15
PV-0704-7C-1 32-34	Sediment	24DDD	8081	409151	J	15
PV-0704-7C-1 32-34	Sediment	44DDT	8081	409151	J	15
PV-0704-7C-1 34-36	Sediment	24DDD	8081	409151	J	15
PV-0704-7C-1 34-36	Sediment	44DDT	8081	409151	J	15
PV-0704-7C-1 36-38	Sediment	24DDD	8081	409151	J	15
PV-0704-7C-1 38-40	Sediment	44DDT	8081	409151	J	15
PV-0704-7C-1 38-40 dup	Sediment	24DDD	8081	409151	J	15
PV-0704-7C-1 40-41	Sediment	44DDT	8081	409151	J	15
PV-0704-7C-1 4-6	Sediment	24DDD	8081	409151	J	15
PV-0704-7C-1 4-6	Sediment	44DDT	8081	409151	J	15
PV-0704-7C-1 8-10	Sediment	44DDT	8081	409151	J	15
PV-0704-7CB-1 12-14	Sediment	24DDD	8081	409154	J	15
PV-0704-7CB-1 16-18	Sediment	24DDD	8081	409154	J	15
PV-0704-7CB-1 20-22	Sediment	24DDD	8081	409154	J	15
PV-0704-7CB-1 22-24	Sediment	24DDD	8081	409154	J	15
PV-0704-7CB-1 22-24	Sediment	24DDE	8081	409154	J	15
PV-0704-7CB-1 22-24	Sediment	44DDMU	8081	409154	J	15
PV-0704-7CB-1 24-26	Sediment	24DDD	8081	409154	J	15
PV-0704-7CB-1 26-28	Sediment	24DDD	8081	409154	J	15
PV-0704-7CB-1 46-48E	Sediment	24DDD	8081	409155	J	15
PV-0704-7CB-1 46-48E	Sediment	44DDT	8081	409155	J	15
PV-0704-7CB-1 6-8	Sediment	24DDD	8081	409154	J	15
PV-0704-A-R-1 0-2	Sediment	24DDD	8081	409143	J	15
PV-0704-A-R-1 10-12	Sediment	24DDD	8081	409143	J	15
PV-0704-A-R-1 24-26	Sediment	24DDD	8081	409143	J	15
PV-0704-A-R-1 8-10	Sediment	24DDD	8081	409143	J	15
PV-0704-A-R2 12-14	Sediment	24DDD	8081	409144	J	15
PV-0704-A-R2 32-34 dup	Sediment	24DDD	8081	409145	J	15
PV-0704-A-R2 34-36	Sediment	44DDT	8081	409145	J	15
PV-0704-A-R2 36-38	Sediment	24DDD	8081	409145	J	15
PV-0704-A-R2 8-10	Sediment	24DDD	8081	409144	J	15
PV-0704-A-R3 12-14	Sediment	24DDD	8081	409145	J	15
PV-0704-A-R3 14-16	Sediment	24DDD	8081	409146	J	15
PV-0704-A-R3 16-18	Sediment	24DDD	8081	409146	J	15

PV-0704-A-R3 18-20	Sediment	24DDD	8081	409146	J	15
PV-0704-A-R3 18-20	Sediment	44DDT	8081	409146	J	15
PV-0704-A-R3 20-22	Sediment	24DDD	8081	409146	J	15
PV-0704-A-R3 22-24	Sediment	24DDD	8081	409146	J	15
PV-0704-A-R3 2-4 dup	Sediment	24DDD	8081	409146	J	15
PV-0704-A-R3 24-26	Sediment	24DDD	8081	409146	J	15
PV-0704-A-R3 24-26	Sediment	44DDT	8081	409146	J	15
PV-0704-A-R3 26-28	Sediment	24DDD	8081	409146	J	15
PV-0704-A-R3 28-30	Sediment	24DDD	8081	409146	J	15
PV-0704-A-R3 28-30 dup	Sediment	24DDD	8081	409146	J	15
PV-0704-A-R3 28-30 dup	Sediment	44DDT	8081	409146	J	15
PV-0704-A-R3 30-32	Sediment	44DDT	8081	409146	J	15
PV-0704-A-R3 6-8	Sediment	24DDD	8081	409145	J	15
PV-0704-A-R3 8-10	Sediment	24DDD	8081	409145	J	15
PV-0704-B 12-16	Sediment	24DDD	8081	409142	J	15
PV-0704-B 16-20	Sediment	24DDD	8081	409142	J	15
PV-0704-B 16-20 dup	Sediment	24DDD	8081	409142	J	15
PV-0704-B 20-24	Sediment	24DDD	8081	409142	J	15
PV-0704-B 24-28	Sediment	24DDD	8081	409142	J	15
PV-0704-B 28-32	Sediment	24DDD	8081	409142	J	15
PV-0704-B 32-36	Sediment	24DDD	8081	409142	J	15
PV-0704-B 4-8	Sediment	24DDD	8081	409142	J	15
PV-0704-F 0-4	Sediment	24DDD	8081	409147	J	15
PV-0704-F 12-16	Sediment	24DDD	8081	409147	J	15
PV-0704-F 16-20	Sediment	24DDD	8081	409147	J	15
PV-0704-F 20-24	Sediment	24DDD	8081	409147	J	15
PV-0704-F 24-28	Sediment	24DDD	8081	409147	J	15
PV-0704-F 28-32	Sediment	24DDD	8081	409147	J	15
PV-0704-F 28-32 dup	Sediment	24DDD	8081	409147	J	15
PV-0704-F 28-32 dup	Sediment	44DDT	8081	409147	J	15
PV-0704-F 32-36	Sediment	24DDD	8081	409147	J	15
PV-0704-F 4-8	Sediment	24DDD	8081	409147	J	15
PV-0704-K1-R1 12-16	Sediment	24DDD	8081	407076	J	15
PV-0704-K1-R1 20-24	Sediment	24DDD	8081	407076	J	15
PV-0704-K1-R1 20-24 dup	Sediment	24DDD	8081	407076	J	15
PV-0704-K1-R1 24-28	Sediment	24DDD	8081	407076	J	15
PV-0704-K1-R1 28-32	Sediment	24DDD	8081	407076	J	15
PV-0704-K1-R2 16-20	Sediment	24DDD	8081	409157	J	15
PV-0704-K1-R2 24-28	Sediment	24DDD	8081	409157	J	15
PV-0704-K1-R2 28-32	Sediment	24DDD	8081	409157	J	15
PV-0704-K1-R2 36-40 dup	Sediment	24DDD	8081	409157	J	15
PV-0704-K1-R2 4-8	Sediment	24DDD	8081	409157	J	15
PV-0704-K1-R3 12-16	Sediment	24DDD	8081	409158	J	15
PV-0704-K1-R3 20-24	Sediment	24DDD	8081	409158	J	15
PV-0704-K1-R3 24-28	Sediment	24DDD	8081	409158	J	15
PV-0704-K1-R3 8-12	Sediment	24DDD	8081	409158	J	15
PV-0704-K2-K3 28-32	Sediment	24DDD	8081	409157	J	15
PV-0704-K2-K3 44-48	Sediment	24DDD	8081	409157	J	15
PV-0704-K2-R1 28-32	Sediment	24DDD	8081	409156	J	15
PV-0704-K2-R1 40-44	Sediment	24DDD	8081	409156	J	15

PV-0704-K2-R1 44-48	Sediment	24DDD	8081	409156	J	15
PV-0704-K2-R1 8-12	Sediment	24DDD	8081	409156	J	15
PV-0704-K2-R3 0-4	Sediment	24DDD	8081	409156	J	15
PV-0704-K2-R3 16-20	Sediment	24DDD	8081	409156	J	15
PV-0704-K2-R3 24-28	Sediment	24DDD	8081	409156	J	15
PV-0704-K2-R3 4-8	Sediment	24DDD	8081	409156	J	15
PV-0704-K3 0-4	Sediment	24DDD	8081	407074	J	15
PV-0704-K3 12-16	Sediment	24DDD	8081	407074	J	15
PV-0704-K3 16-20	Sediment	24DDD	8081	407074	J	15
PV-0704-K3 20-24	Sediment	24DDD	8081	407074	J	15
PV-0704-K3 24-28	Sediment	24DDD	8081	407074	J	15
PV-0704-K3 4-8	Sediment	24DDD	8081	407074	J	15
PV-0704-K3 8-12	Sediment	24DDD	8081	407074	J	15
PV-0704-K4 12-16	Sediment	24DDD	8081	407074	J	15
PV-0704-K4 16-20	Sediment	24DDD	8081	407074	J	15
PV-0704-K4 20-24	Sediment	24DDD	8081	407074	J	15
PV-0704-K4 24-28	Sediment	24DDD	8081	407074	J	15
PV-0704-K4 24-28 dup	Sediment	24DDD	8081	407074	J	15
PV-0704-K4 4-8	Sediment	24DDD	8081	407074	J	15
PV-0704-K4 8-12	Sediment	24DDD	8081	407074	J	15
PV-0704-K-R1 0-4	Sediment	24DDD	8081	409158	J	15
PV-0704-K-R1 12-16	Sediment	24DDD	8081	409158	J	15
PV-0704-K-R1 20-24	Sediment	24DDD	8081	409158	J	15
PV-0704-K-R1 20-24 dup	Sediment	24DDD	8081	409159	J	15
PV-0704-K-R1 24-28	Sediment	24DDD	8081	409158	J	15
PV-0704-K-R1 24-28	Sediment	44DDT	8081	409158	J	15
PV-0704-K-R1 28-32	Sediment	24DDD	8081	409158	J	15
PV-0704-K-R1 28-32	Sediment	44DDT	8081	409158	J	15
PV-0704-K-R1 32-36	Sediment	24DDD	8081	409158	J	15
PV-0704-K-R1 4-8	Sediment	24DDD	8081	409158	J	15
PV-0704-K-R2 0-4	Sediment	24DDD	8081	407076	J	15
PV-0704-K-R-2 20-24 dup	Sediment	24DDD	8081	409142	J	15
PV-0704-K-R2 24-28	Sediment	24DDD	8081	407076	J	15
PV-0704-K-R2 28-32	Sediment	24DDD	8081	407076	J	15
PV-0704-K-R3 12-16	Sediment	24DDD	8081	409159	J	15
PV-0704-K-R3 20-24	Sediment	24DDD	8081	409159	J	15
PV-0704-K-R3 24-28	Sediment	24DDD	8081	409159	J	15
PV-0704-N1-R1 0-4	Sediment	24DDD	8081	409161	J	15
PV-0704-N1-R1 12-16	Sediment	24DDD	8081	409161	J	15
PV-0704-N1-R1 16-20 dup	Sediment	24DDD	8081	409161	J	15
PV-0704-N1-R1 20-24	Sediment	24DDD	8081	409161	J	15
PV-0704-N1-R1 24-28	Sediment	24DDD	8081	409161	J	15
PV-0704-N1-R1 28-32	Sediment	24DDD	8081	409161	J	15
PV-0704-N1-R1 32-36	Sediment	24DDD	8081	409161	J	15
PV-0704-N1-R1 32-36 dup	Sediment	24DDD	8081	409161	J	15
PV-0704-N1-R1 44-46	Sediment	24DDD	8081	409161	J	15
PV-0704-N1-R1 4-8	Sediment	24DDD	8081	409161	J	15
PV-0704-N1-R1 8-12	Sediment	24DDD	8081	409161	J	15
PV-0704-N1-R2 0-4	Sediment	24DDD	8081	409148	J	15
PV-0704-N1-R2 20-24	Sediment	44DDT	8081	409148	J	15

PV-0704-N1-R2 24-28	Sediment	24DDD	8081	409148	J	15
PV-0704-N1-R2 28-32	Sediment	44DDT	8081	409148	J	15
PV-0704-N1-R2 32-36	Sediment	44DDT	8081	409148	J	15
PV-0704-N1-R2 32-36 dup	Sediment	24DDD	8081	410091	J	15
PV-0704-N1-R2 8-12	Sediment	24DDD	8081	409148	J	15
PV-0704-N1-R3 0-4	Sediment	24DDD	8081	409161	J	15
PV-0704-N1-R3 16-20 dup	Sediment	24DDD	8081	409162	J	15
PV-0704-N1-R3 20-24	Sediment	24DDD	8081	409162	J	15
PV-0704-N1-R3 24-28	Sediment	24DDD	8081	409162	J	15
PV-0704-N1-R3 28-32	Sediment	24DDD	8081	409162	J	15
PV-0704-N1-R3 4-8	Sediment	24DDD	8081	409161	J	15
PV-0704-N1-R3 8-12	Sediment	24DDD	8081	409161	J	15
PV-0704-N2-R1 0-4	Sediment	24DDD	8081	409148	J	15
PV-0704-N2-R1 12-16	Sediment	24DDD	8081	409149	J	15
PV-0704-N2-R1 16-20	Sediment	44DDT	8081	409149	J	15
PV-0704-N2-R1 20-24	Sediment	24DDD	8081	409149	J	15
PV-0704-N2-R1 24-28	Sediment	24DDD	8081	409149	J	15
PV-0704-N2-R1 24-28	Sediment	44DDT	8081	409149	J	15
PV-0704-N2-R1 28-32	Sediment	24DDD	8081	409149	J	15
PV-0704-N2-R1 28-32	Sediment	44DDT	8081	409149	J	15
PV-0704-N2-R1 4-8	Sediment	24DDD	8081	409148	J	15
PV-0704-N2-R1 8-12 dup	Sediment	24DDD	8081	409149	J	15
PV-0704-N2-R2 0-4	Sediment	24DDD	8081	409162	J	15
PV-0704-N2-R2 0-4	Sediment	44DDT	8081	409162	J	15
PV-0704-N2-R2 12-16	Sediment	24DDD	8081	409162	J	15
PV-0704-N2-R2 20-24	Sediment	24DDD	8081	409162	J	15
PV-0704-N2-R2 24-28	Sediment	24DDD	8081	409162	J	15
PV-0704-N2-R2 28-32	Sediment	24DDD	8081	409162	J	15
PV-0704-N2-R2 32-36	Sediment	24DDD	8081	409162	J	15
PV-0704-N2-R2 4-8	Sediment	24DDD	8081	409162	J	15
PV-0704-N2-R2 8-12	Sediment	24DDD	8081	409162	J	15
PV-0704-N2-R3 0-4	Sediment	24DDD	8081	502058	J	15
PV-0704-N2-R3 16-20	Sediment	24DDD	8081	502058	J	15
PV-0704-N2-R3 20-24	Sediment	24DDD	8081	502058	J	15
PV-0704-N2-R3 24-28	Sediment	24DDD	8081	502058	J	15
PV-0704-N2-R3 28-32	Sediment	24DDD	8081	502058	J	15
PV-0704-N2-R3 32-36	Sediment	24DDD	8081	502058	J	15
PV-0704-N2-R3 4-8	Sediment	24DDD	8081	502058	J	15
PV-0704-N2-R3 8-12	Sediment	24DDD	8081	502058	J	15
PV-0704-N3 16-20	Sediment	24DDD	8081	409147	J	15
PV-0704-N3 20-24	Sediment	24DDD	8081	409147	J	15
PV-0704-N3 24-28	Sediment	24DDD	8081	409147	J	15
PV-0704-N3 8-12	Sediment	24DDD	8081	409147	J	15
PV-0704-N4 16-20	Sediment	44DDT	8081	409150	J	15
PV-0704-N4 16-20 dup	Sediment	44DDT	8081	409150	J	15
PV-0704-N4 4-8	Sediment	44DDT	8081	409150	J	15
PV-0704-N-R1 0-4	Sediment	24DDD	8081	409159	J	15
PV-0704-N-R1 16-20	Sediment	24DDD	8081	409160	J	15
PV-0704-N-R1 16-20 dup	Sediment	24DDD	8081	409160	J	15
PV-0704-N-R1 20-24	Sediment	24DDD	8081	409160	J	15

PV-0704-N-R1 24-28	Sediment	24DDD	8081	409160	J	15
PV-0704-N-R1 32-36	Sediment	24DDT	8081	409160	J	15
PV-0704-N-R2 16-20	Sediment	24DDD	8081	409160	J	15
PV-0704-N-R2 20-24	Sediment	24DDD	8081	409160	J	15
PV-0704-N-R2 24-28	Sediment	24DDD	8081	409160	J	15
PV-0704-N-R2 28-32	Sediment	24DDD	8081	409160	J	15
PV-0704-N-R2 8-12 dup	Sediment	24DDD	8081	409161	J	15
PV-0704-N-R3 0-4	Sediment	24DDD	8081	409149	J	15
PV-0704-N-R3 12-16	Sediment	24DDD	8081	409149	J	15
PV-0704-N-R3 16-20	Sediment	24DDD	8081	409149	J	15
PV-0704-N-R3 16-20	Sediment	44DDT	8081	409149	J	15
PV-0704-N-R3 20-24	Sediment	24DDD	8081	409149	J	15
PV-0704-N-R3 24-28	Sediment	24DDD	8081	409149	J	15
PV-0704-N-R3 24-28	Sediment	44DDT	8081	409149	J	15
PV-0704-N-R3 28-32	Sediment	24DDD	8081	409149	J	15
PV-0704-N-R3 4-8	Sediment	24DDD	8081	409149	J	15
PV-0704-N-R3 8-12	Sediment	24DDD	8081	409149	J	15
7CB-00-02	Sediment	24DDE	8081	410085	J	10, 11
7CB-40-42	Sediment	24DDE	8081	410086	J	10, 11
PV-0704-K4 0-4	Sediment	44DDMU	8081	407074	J	10, 11
PV-0704-N2-R1 44-46	Sediment	44DDMU	8081	409149	J	10, 11
PV-0704-N2-R1 44-46E	Sediment	44DDMU	8081	409149	J	10, 11
PV-0704-N4 44-48	Sediment	24DDT	8081	409150	UJ	10, 11
7CB-00-02	Sediment	44DDMU	8081	410085	J	10, 11, 15
PV-0704-7C-1 0-2	Sediment	24DDD	8081	409150	J	11, 15
PV-0704-7C-1 0-2 dup	Sediment	24DDD	8081	409150	J	11, 15
PV-0704-7C-1 2-4	Sediment	24DDD	8081	409150	J	11, 15
PV-0704-K2-R2 12-16	Sediment	24DDD	8081	407075	J	11, 15
PV-0704-K2-R2 16-20	Sediment	24DDD	8081	407075	J	11, 15
PV-0704-K2-R2 20-24	Sediment	24DDD	8081	407075	J	11, 15
PV-0704-K2-R2 24-28	Sediment	24DDD	8081	407075	J	11, 15
PV-0704-K2-R2 24-28 dup	Sediment	24DDD	8081	407075	J	11, 15
PV-0704-K2-R2 28-32	Sediment	24DDD	8081	407075	J	11, 15
PV-0704-K2-R2 8-12	Sediment	24DDD	8081	407075	J	11, 15
PV-0704-N4 0-4	Sediment	24DDD	8081	409150	J	11, 15
PV-0704-N4 12-16	Sediment	24DDD	8081	409150	J	11, 15
PV-0704-N4 16-20	Sediment	24DDD	8081	409150	J	11, 15
PV-0704-N4 16-20 dup	Sediment	24DDD	8081	409150	J	11, 15
PV-0704-N4 20-24	Sediment	24DDD	8081	409150	J	11, 15
PV-0704-N4 24-28	Sediment	24DDD	8081	409150	J	11, 15
PV-0704-N4 4-8	Sediment	24DDD	8081	409150	J	11, 15
PV-0704-N4 8-12	Sediment	24DDD	8081	409150	J	11, 15
PV-0704-A-R3 0-2	Sediment	24DDD	8081	409145	J	12, 15
PV-0704-K4 0-4	Sediment	44DDT	8081	407074	J	2, 10
PV-0704-N2-R2 44-47	Sediment	44DDMU	8081	502058	J	2, 10, 11
7CXR2-30-32	Sediment	44DDT	8081	410087	J	2, 11
7CXR2-32-34	Sediment	44DDT	8081	410087	J	2, 11
7CXR2-34-36	Sediment	44DDT	8081	410087	J	2, 11
7CXR2-36-38	Sediment	44DDT	8081	410087	J	2, 11
7CXR2-38-40	Sediment	44DDT	8081	410087	J	2, 11

7CXR2-40-42	Sediment	44DDT	8081	410087	J	2, 11
7CXR2-42-44	Sediment	44DDT	8081	410087	J	2, 11
7CXR2-44-46	Sediment	44DDT	8081	410087	J	2, 11
7CXR2-46-48	Sediment	44DDT	8081	410087	J	2, 11
7CXR2-48-50	Sediment	44DDT	8081	410087	J	2, 11
7CXR2-50-52	Sediment	44DDT	8081	410087	J	2, 11
7CXR2-52-54	Sediment	44DDT	8081	410087	J	2, 11
7CXR3-00-02	Sediment	44DDT	8081	410087	J	2, 11
7CXR3-02-04	Sediment	44DDT	8081	410087	J	2, 11
7CXR3-06-08	Sediment	44DDT	8081	410087	J	2, 11
7CXR3-08-10	Sediment	44DDT	8081	410087	J	2, 11
7CXR3-10-12	Sediment	44DDT	8081	410087	J	2, 11
PV-0704-7CB-1 0-2	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 10-12	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 12-14	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 14-16	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 16-18	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 18-20	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 20-22	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 2-4	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 24-26	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 26-28	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 30-32	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 32-34	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 34-36	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 36-38	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 38-40	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 4-6	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 6-8	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-7CB-1 8-10	Sediment	44DDT	8081	409154	J	2, 11
PV-0704-K2-R2 0-4	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K2-R2 12-16	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K2-R2 16-20	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K2-R2 20-24	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K2-R2 24-28	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K2-R2 24-28 dup	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K2-R2 28-32	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K2-R2 36-40	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K2-R2 44-48	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K2-R2 4-8	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K2-R2 48-51	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K2-R2 8-12	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K3 32-36	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K3 32-36 dup	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K3 36-40	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K3 40-44	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-K3 44-46	Sediment	44DDT	8081	407075	J	2, 11
PV-0704-N1-R2 32-36 dup	Sediment	44DDMU	8081	410091	J	2, 11
PV-0704-N1-R3 36-40	Sediment	44DDMU	8081	409162	J	2, 11
PV-0704-N2-R2 0-4	Sediment	44DDMU	8081	409162	J	2, 11

PV-0704-N2-R2 16-20 dup	Sediment	44DDMU	8081	502058	J	2, 11
PV-0704-N2-R2 8-12	Sediment	44DDMU	8081	409162	J	2, 11
PV-0704-N2-R3 0-4	Sediment	44DDMU	8081	502058	J	2, 11
PV-0704-N2-R3 12-16	Sediment	44DDMU	8081	502058	J	2, 11
PV-0704-N2-R3 16-20	Sediment	44DDMU	8081	502058	J	2, 11
PV-0704-N2-R3 20-24	Sediment	44DDMU	8081	502058	J	2, 11
PV-0704-N2-R3 24-28	Sediment	44DDMU	8081	502058	J	2, 11
PV-0704-N2-R3 28-32	Sediment	44DDMU	8081	502058	J	2, 11
PV-0704-N2-R3 32-36	Sediment	44DDMU	8081	502058	J	2, 11
PV-0704-N2-R3 36-40	Sediment	44DDMU	8081	502058	J	2, 11
PV-0704-N2-R3 36-40 dup	Sediment	44DDMU	8081	502058	J	2, 11
PV-0704-N2-R3 40-45	Sediment	44DDMU	8081	502058	J	2, 11
PV-0704-N2-R3 4-8	Sediment	44DDMU	8081	502058	J	2, 11
PV-0704-N2-R3 8-12	Sediment	44DDMU	8081	502058	J	2, 11
7CB-04-06	Sediment	24DDD	8270	501089	J	2, 11
7CB-06-08	Sediment	24DDD	8270	501089	J	2, 11
7CB-10-12	Sediment	24DDD	8270	501089	J	2, 11
7CB-16-18	Sediment	24DDD	8270	501089	J	2, 11
7CB-20-22	Sediment	24DDD	8270	501089	J	2, 11
7CB-26-28	Sediment	24DDD	8270	501089	J	2, 11
7CB-32-34	Sediment	24DDD	8270	501089	J	2, 11
7CB-34-36	Sediment	24DDD	8270	501089	J	2, 11
7C-64-66	Sediment	44DDMU	8081	410091	J	2, 11, 15
7C-66-68	Sediment	44DDMU	8081	410091	J	2, 11, 15
7C-68-70	Sediment	44DDMU	8081	410091	J	2, 11, 15
7C-70-72	Sediment	44DDMU	8081	410091	J	2, 11, 15
7CXR2-54-56	Sediment	44DDMU	8081	410091	J	2, 11, 15
PV-0704-7CB-1 28-30	Sediment	44DDT	8081	409154	J	2, 11, 15
PV-0704-N1-R3 16-20	Sediment	44DDMU	8081	409162	J	2, 11, 15
PV-0704-N1-R3 16-20 dup	Sediment	44DDMU	8081	409162	J	2, 11, 15
PV-0704-N1-R3 20-24	Sediment	44DDMU	8081	409162	J	2, 11, 15
PV-0704-N1-R3 24-28	Sediment	44DDMU	8081	409162	J	2, 11, 15
PV-0704-N1-R3 40-44	Sediment	44DDMU	8081	409162	J	2, 11, 15
PV-0704-N1-R3 44-46	Sediment	44DDMU	8081	409162	J	2, 11, 15
PV-0704-N2-R2 12-16	Sediment	44DDMU	8081	409162	J	2, 11, 15
PV-0704-N2-R2 16-20	Sediment	44DDMU	8081	409162	J	2, 11, 15
PV-0704-N2-R2 20-24	Sediment	44DDMU	8081	409162	J	2, 11, 15
PV-0704-N2-R2 24-28	Sediment	44DDMU	8081	409162	J	2, 11, 15
PV-0704-N2-R2 40-44	Sediment	44DDMU	8081	409162	J	2, 11, 15
PV-0704-N2-R2 4-8	Sediment	44DDMU	8081	409162	J	2, 11, 15
PV-0704-N3 44-47	Sediment	44DDMU	8081	410091	J	2, 11, 15
PV-0704-N-R3 36-40	Sediment	44DDMU	8081	410091	J	2, 11, 15
7CXR3-30-32E	Sediment	44DDT	8081	410088	J	2, 12
7CXR3-12-14	Sediment	44DDT	8081	410088	J	2, 15
PV-0704-K-R1 20-24 dup	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-K-R1 28-32 dup	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-K-R1 40-44	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-K-R3 0-4	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-K-R3 16-20	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-K-R3 20-24	Sediment	44DDMU	8081	409159	J	2, 15

PV-0704-K-R3 24-28	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-K-R3 32-36	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-K-R3 36-40	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-K-R3 40-44	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-K-R3 40-44 dup	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-K-R3 44-46	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-K-R3 4-8	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-K-R3 8-12	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-N1-R1 0-4	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R1 12-16	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R1 16-20	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R1 16-20 dup	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R1 20-24	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R1 24-28	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R1 32-36 dup	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R1 40-44	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R1 44-46	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R1 4-8	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R1 8-12	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R3 0-4	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R3 12-16	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R3 4-8	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N1-R3 8-12	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-N-R1 0-4	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-N-R1 12-16	Sediment	44DDMU	8081	409160	J	2, 15
PV-0704-N-R1 16-20	Sediment	44DDMU	8081	409160	J	2, 15
PV-0704-N-R1 4-8	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-N-R1 8-12	Sediment	44DDMU	8081	409159	J	2, 15
PV-0704-N-R2 12-16	Sediment	44DDMU	8081	409160	J	2, 15
PV-0704-N-R2 16-20	Sediment	44DDMU	8081	409160	J	2, 15
PV-0704-N-R2 8-12 dup	Sediment	44DDMU	8081	409161	J	2, 15
PV-0704-RINSET-01	Water	44DDT	8081	407117	J	2, 15
PV-0704-K2-R1 32-36	Sediment	44DDMU	8081	409156	J	2, 9
PV-0704-K4 28-32	Sediment	44DDT	8081	407074	J	2, 9
PV-0704-K4 32-36	Sediment	44DDT	8081	407074	J	2, 9
PV-0704-K-R3 28-32E	Sediment	44DDMU	8081	409159	J	2, 9
PV-0704-K-R3 32-36E	Sediment	44DDMU	8081	409159	J	2, 9
PV-0704-K-R3 36-40E	Sediment	44DDMU	8081	409159	J	2, 9
PV-0704-N-R1 24-28E	Sediment	44DDMU	8081	409160	J	2, 9
7CXR2-10-12	Sediment	24DDD	8270	501089	J	2, 9
7CXR2-14-16	Sediment	24DDD	8270	501089	J	2, 9
7CXR2-16-18	Sediment	24DDD	8270	501089	J	2, 9
PV-0704-K2-R2 32-36	Sediment	44DDT	8081	407075	J	2, 9, 11
PV-0704-K2-R2 40-44	Sediment	44DDT	8081	407075	J	2, 9, 11
PV-0704-K3 28-32	Sediment	44DDT	8081	407075	J	2, 9, 11
7CB-18-20	Sediment	24DDD	8270	501089	J	2, 9, 11
7CB-38-40	Sediment	44DDE	8081	410085	J	3A*
7CB-40-42	Sediment	44DDE	8081	410086	R	3A*
7CXR2-12-14	Sediment	44DDE	8081	410086	R	3A*
7CXR2-16-18	Sediment	44DDE	8081	410086	R	3A*

7CXR2-22-24	Sediment	44DDE	8081	410086	R	3A*
7CXR3-30-32	Sediment	44DDT	8081	410088	R	3A*
PV-0704-7CB-1 44-46	Sediment	44DDE	8081	409155	R	3A*
PV-0704-7CB-1 46-48	Sediment	44DDE	8081	409155	R	3A*
PV-0704-A-R2 30-32	Sediment	44DDE	8081	409145	R	3A*
PV-0704-A-R2 32-34	Sediment	44DDE	8081	409145	R	3A*
PV-0704-A-R2 40-42	Sediment	44DDE	8081	409145	R	3A*
PV-0704-A-R2 44-46	Sediment	44DDE	8081	409145	R	3A*
PV-0704-A-R3 30-32	Sediment	24DDE	8081	409146	J	3A*
PV-0704-A-R3 30-32	Sediment	44DDE	8081	409146	J	3A*
PV-0704-A-R3 30-32	Sediment	44DDMU	8081	409146	J	3A*
PV-0704-K-R3 28-32	Sediment	44DDE	8081	409159	R	3A*
PV-0704-K-R3 28-32	Sediment	44DDMU	8081	409159	R	3A*
PV-0704-K-R3 32-36	Sediment	44DDE	8081	409159	R	3A*
PV-0704-K-R3 36-40	Sediment	44DDE	8081	409159	R	3A*
PV-0704-N2-R1 44-46	Sediment	44DDE	8081	409149	R	3A*
PV-0704-N4 36-40	Sediment	44DDE	8081	409150	R	3A*
PV-0704-N-R1 24-28	Sediment	24DDE	8081	409160	R	3A*
PV-0704-N-R1 24-28	Sediment	44DDE	8081	409160	R	3A*
PV-0704-N-R1 24-28	Sediment	44DDMU	8081	409160	R	3A*
PV-0704-N-R1 28-32	Sediment	24DDE	8081	409160	R	3A*
PV-0704-N-R1 28-32	Sediment	44DDD	8081	409160	R	3A*
PV-0704-N-R1 28-32	Sediment	44DDE	8081	409160	R	3A*
PV-0704-N-R1 28-32	Sediment	44DDMU	8081	409160	R	3A*
PV-0704-N-R1 32-36	Sediment	24DDE	8081	409160	R	3A*
PV-0704-N-R1 32-36	Sediment	44DDD	8081	409160	R	3A*
PV-0704-N-R1 32-36	Sediment	44DDE	8081	409160	R	3A*
PV-0704-N-R1 32-36	Sediment	44DDMU	8081	409160	R	3A*
PV-0704-N-R1 32-36	Sediment	44DDT	8081	409160	R	3A*
PV-0704-N-R2 28-32	Sediment	24DDE	8081	409160	R	3A*
PV-0704-N-R2 28-32	Sediment	44DDE	8081	409160	R	3A*
PV-0704-N-R2 28-32	Sediment	44DDMU	8081	409160	R	3A*
PV-0704-N-R2 32-36	Sediment	24DDE	8081	409160	R	3A*
PV-0704-N-R2 32-36	Sediment	44DDE	8081	409160	R	3A*
PV-0704-N-R2 32-36	Sediment	44DDMU	8081	409160	R	3A*
PV-0704-N-R3 36-40 dup	Sediment	44DDE	8081	409150	R	3A*
7C-60-62	Sediment	24DDT	8081	410090	UJ	4, 10
7C-60-62	Sediment	44DDT	8081	410090	J	4, 10
PV-0704-K2-R2 24-28 dup	Sediment	44DDMU	8081	407075	J	4, 11
PV-0704-K2-R2 44-48	Sediment	44DDMU	8081	407075	J	4, 11
PV-0704-K2-R2 48-51	Sediment	44DDMU	8081	407075	J	4, 11
7C-22-24	Sediment	44DDT	8081	410089	J	4, 15
7C-26-28	Sediment	44DDT	8081	410090	J	4, 15
7C-28-30	Sediment	44DDT	8081	410090	J	4, 15
7C-32-34	Sediment	44DDT	8081	410090	J	4, 15
7C-36-38	Sediment	44DDT	8081	410090	J	4, 15
7C-52-54	Sediment	44DDT	8081	410090	J	4, 15
PV-0704-K2-R2 40-44	Sediment	44DDMU	8081	407075	J	4, 9, 11
7CXR2-22-24E	Sediment	24DDE	8081	410086	J	9, 11
PV-0704-K2-R2 32-36	Sediment	24DDD	8081	407075	J	9, 11

PV-0704-K2-R2 32-36	Sediment	44DDD	8081	407075	J	9, 11
PV-0704-K2-R2 32-36	Sediment	44DDMU	8081	407075	J	9, 11
PV-0704-K2-R2 40-44	Sediment	24DDD	8081	407075	J	9, 11
PV-0704-K2-R2 40-44	Sediment	44DDD	8081	407075	J	9, 11
PV-0704-K3 28-32	Sediment	24DDD	8081	407075	J	9, 11
PV-0704-K3 28-32	Sediment	44DDD	8081	407075	J	9, 11
PV-0704-K3 28-32	Sediment	44DDMU	8081	407075	J	9, 11
PV-0704-K4 28-32	Sediment	44DDMU	8081	407074	J	9, 11
PV-0704-K4 32-36	Sediment	44DDMU	8081	407074	J	9, 11
PV-0704-N-R3 36-40 dupE	Sediment	24DDD	8081	409150	UJ	9, 11
PV-0704-N-R3 36-40 dupE	Sediment	24DDE	8081	409150	J	9, 11
PV-0704-N-R3 36-40 dupE	Sediment	24DDT	8081	409150	UJ	9, 11
PV-0704-N-R3 36-40 dupE	Sediment	44DDMU	8081	409150	J	9, 11
7CXR2-22-24E	Sediment	24DDD	8081	410086	J	9, 15
PV-0704-K4 28-32	Sediment	24DDD	8081	407074	J	9, 15
PV-0704-K4 32-36	Sediment	24DDD	8081	407074	J	9, 15
PV-0704-K-R3 28-32E	Sediment	24DDD	8081	409159	J	9, 15
PV-0704-N-R1 24-28E	Sediment	24DDD	8081	409160	J	9, 15
PV-0704-N-R2 28-32E	Sediment	24DDD	8081	409160	J	9, 15
7CB-18-20	Sediment	24DDE	8270	501089	J	9,11
7CB-18-20	Sediment	44DDE	8270	501089	J	9,11

DATA VALIDATION QUALIFICATION REASON CODES

REASON CODE	DEFINITION
1	Holding times exceeded
2	Initial Calibration % RSD outside QC limits
3	Initial Calibration RRF result outside QC limits
3A	Compound/element exceeds the calibration range
4	Continuing calibration % difference outside QC limits
5	Continuing calibration RRF result outside QC limits
6	Laboratory Method Blank (Reagent Blank) contamination
6A	Negative concentration reported for preparation blank
7	Volatile Trip Blank contamination
8	Equipment Rinsate Blank contamination
9	Surrogate recovery results outside QC limits
10	Laboratory MS/MSD Results outside QC limits
11	Laboratory Control Sample results outside QC limits
12	Internal Standards (i.e., areas or retention times) outside QC limits
13	TIC(Common laboratory contaminate or artifact not found in the associated method blank)
14	System performance
15	Greater than 25% difference for detected concentrations of single responds pesticide between the two GC columns
16	ICV and/or CCV percent recovery outside QC limits
17	ICB and/or CCB contamination outside QC limits or negative ICB/CCB results greater than the IDL
17A	Negative concentration reported for instrument blank
18	ICP Interference Check Sample results outside QC limits

18A	Detection limit raised because interferences caused large negative values
19	Laboratory duplicate RPD outside QC limits
20	Laboratory Matrix Spike results outside QC limits
21	GFAA duplicate injection outside QC limits
22	GFAA Analytical spike recovery (post-digestion spike) outside QC limits
23	GFAA Correlation coefficient outside QC limits
24	ICP serial dilution result outside QC limits
25	Incorrect Internal Standard (IS) was used for quantitation
26	BFB over 12 hour tune time
27	Field blank contamination
28	Performance evaluation mixture % difference
29A	Does not meet the RT identification criteria.
29B	The calibration standard responses do not support the reported detection limit.
30	Common laboratory contaminant(target compound) not found in the associated method blank.
31	The second column confirmation was not performed
32	Ion Ratio Failed
33	Compound detected but considered nondetect due to interferences.
34	Reported result affected by interferences or high background.
35	CRDL standard failed acceptance criteria
36	Cooler temperatures greater than 6 degrees Celsius

Table A-2. Pesticide Analysis Initial Calibration and Continuing Calibration Verification QC Summary: Sediments
Palos Verdes Pilot Capping Projects, Supplemental Sampling Activities

Outliers	Number of ICC Analysis	Max %RSD	%RSD Control Limit	Number %RSD Within Control Limits	Number %RSD Outside Control Limits	Number of CCV Analysis	CCV Outlier Range	%D Control Limit	Number %D Within Control Limits	Number %D Outside Control Limits
Channel A										
2,4-DDD	6	No Outlier	15	6	0	177	No Outlier	20	177	0
2,4-DDE	6	No Outlier	15	6	0	177	No Outlier	20	177	0
2,4-DDT	6	No Outlier	15	6	0	177	29-52.3	20	170	7
4,4-DDD	6	No Outlier	15	6	0	177	23.5	20	176	1
4,4-DDE	6	No Outlier	15	6	0	177	No Outlier	20	177	0
4,4-DDT	6	18.9-19.5	15	4	2	177	20.6-64	20	164	13
4,4-DDMU	6	16.4	15	5	1	177	21.5	20	176	1
TCX	6	No Outlier	15	6	0	177	20.7	20	176	1
DCB	6	15.1-19.2	15	3	3	177	20.2-30.3	20	168	9
Channel B										
		No Outlier								
2,4-DDD	6	No Outlier	15	6	0	177	No Outlier	20	177	0
2,4-DDE	6	No Outlier	15	6	0	177	No Outlier	20	177	0
2,4-DDT	6	No Outlier	15	6	0	177	20.1-44.3	20	171	6
4,4-DDD	6	No Outlier	15	6	0	177	No Outlier	20	177	0
4,4-DDE	6	No Outlier	15	6	0	177	No Outlier	20	177	0
4,4-DDT	6	16.2-18.9	15	4	2	177	22.7-59.5	20	162	15
4,4-DDMU	6	No Outlier	15	6	0	177	No Outlier	20	177	0
TCX	6	No Outlier	15	6	0	177	No Outlier	20	177	0
DCB	6	16.3-19.9	15	2	4	177	21.3-32.3	20	166	11

ICC - Initial Calibration Curve
CCV-Continuing Calibration Verification

Table A-3. Pesticide Analysis Initial Calibration and Continuing Calibration Verification QC Summary: Field QC Blanks Palos Verdes Pilot Capping Projects, Supplemental Sampling Activities.

Outliers	Number of ICC Analysis	Max %RSD	%RSD Control Limit	Number %RSD Within Control Limits	Number %RSD Outside Control Limits	Number of CCV Analysis	CCV Outlier Range	%D Control Limit	Number %D Within Control Limits	Number %D Outside Control Limits
Channel A										
2,4-DDD	2	No Outlier	15	2	0	4	No Outlier	20	4	0
2,4-DDE	2	No Outlier	15	2	0	4	No Outlier	20	4	0
2,4-DDT	2	No Outlier	15	2	0	4	No Outlier	20	4	0
4,4-DDD	2	No Outlier	15	2	0	4	No Outlier	20	4	0
4,4-DDE	2	No Outlier	15	2	0	4	No Outlier	20	4	0
4,4-DDT	2	23.3-46.6	15	0	2	4	20.2	20	3	1
4,4-DDMU	2	No Outlier	15	2	0	4	No Outlier	20	4	0
TCX	2	No Outlier	15	2	0	4	26.9	20	3	1
DCB	2	No Outlier	15	2	0	4	No Outlier	20	4	0
Channel B										
2,4-DDD	2	No Outlier	15	2	0	4	No Outlier	20	4	0
2,4-DDE	2	No Outlier	15	2	0	4	No Outlier	20	4	0
2,4-DDT	2	No Outlier	15	2	0	4	No Outlier	20	4	0
4,4-DDD	2	No Outlier	15	2	0	4	No Outlier	20	4	0
4,4-DDE	2	No Outlier	15	2	0	4	No Outlier	20	4	0
4,4-DDT	2	36.8	15	1	1	4	No Outlier	20	4	0
4,4-DDMU	2	No Outlier	15	2	0	4	No Outlier	20	4	0
TCX	2	No Outlier	15	2	0	4	28	20	3	1
DCB	2	No Outlier	15	2	0	4	No Outlier	20	4	0

ICC - Initial Calibration Curve
CCV-Continuing Calibration Verification

Table A-4. GC/MS Confirmation Analysis Initial Calibration and Continuing Calibration Verification QC Summary: Sediments Palos Verdes Pilot Capping Projects, Supplemental Sampling Activities.

Outliers	Number of ICC Analysis	Max %RSD	%RSD Control Limit	Number %RSD Within Control Limits	Number %RSD Outside Control Limits	Number of CCV Analysis	CCV Outlier Range	%D Control Limit	Number %D Within Control Limits	Number %D Outside Control Limits
2,4-DDD	4	22	15	3	1	8	No Outlier	20	8	0
2,4-DDE	4	No Outlier	15	4	0	8	No Outlier	20	8	0
2,4-DDT	4	No Outlier	15	4	0	8	No Outlier	20	8	0
4,4-DDD	4	No Outlier	15	4	0	8	No Outlier	20	8	0
4,4-DDE	4	No Outlier	15	4	0	8	No Outlier	20	8	0
4,4-DDT	4	No Outlier	15	4	0	8	No Outlier	20	8	0
4,4-DDMU	4	No Outlier	15	4	0	8	No Outlier	20	8	0
TCX	4	No Outlier	15	4	0	8	No Outlier	20	8	0
DCB	4	No Outlier	15	4	0	8	No Outlier	20	8	0

ICC - Initial Calibration Curve
CCV-Continuing Calibration Verification

Table A-5. Pesticide Analysis Surrogate Recovery QC Summary: Sediments Palos Verdes Pilot Capping Projects, Supplemental Sampling Activities.

Surrogate	Total Number Analyses	Percent Recovery Range	Control Limits	Number Within Control Limits	Number Outside Control Limits
TCX	735	DL-164	30-150	723	12
DCB	735	DL-224	30-150	718	17

Table A-6. Pesticide Analysis Surrogate Recovery QC Summary: Field QC Blanks
Palos Verdes Pilot Capping Projects, Supplemental Sampling Activities.

Surrogate	Total Number Analyses	Percent Recovery Range	Control Limits	Number Within Control Limits	Number Outside Control Limits
TCX	12	43-71	30-150	12	0
DCB	12	45-76	30-150	12	0

Table A-7. GC/MS Confirmation Analysis Surrogate Recovery QC Summary: Sediments
Palos Verdes Pilot Capping Projects, Supplemental Sampling Activities.

Surrogates	Total Number Analyses	Percent Recovery Range	Control Limits	Number Within Control Limits	Number Outside Control Limits
TCX	73	45-190	30-150	69	4
DCB	73	62-124	30-150	73	0

Table A-8. Pesticide Analysis MS/MSD QC Summary: Sediments
Palos Verdes Pilot Capping Projects, Supplemental Sampling Activities.

ACCURACY						PRECISION				
MS/MSD Compound	**MS/MSD Calculated Recoveries**	**Percent Recovery Range**	**Control Limits**	**Number Within Control Limits**	**Number Outside Control Limits**	**MS/MSD Calculated RPD**	**Max RPD**	**RPD Limit**	**Number Within Control Limits**	**Number Outside Control Limits**
2,4-DDD	60	80-130	75-125	59	1	30	8	30	30	0
2,4-DDE	60	54-163	75-125	41	19	30	21	30	30	0
2,4-DDT	60	62-129	75-125	51	9	30	16	30	30	0
4,4-DDD	60	42-154	75-125	50	10	30	23	30	30	0
4,4-DDE	60	0-535	75-125	18	42	30	42	30	26	4
4,4-DDT	60	0-1236	75-125	32	28	30	108	30	21	9
4,4-DDMU	60	25-164	75-125	36	24	30	24	30	30	0

Table A-9. Pesticide Analysis LCS QC Summary: Sediments
Palos Verdes Pilot Capping Projects, Supplemental Sampling Activities.

LCS Compound	Total Number Analyses	Percent Recovery Range	Control Limits	Number Within Control Limits	Number Outside Control Limits
2,4-DDD	34	75-107	80-120	32	2
2,4-DDE	34	68-98	80-120	31	3
2,4-DDT	34	75-110	80-120	33	1
4,4-DDD	34	70-108	80-120	33	1
4,4-DDE	34	81-116	80-120	34	0
4,4-DDT	34	75-130	80-120	31	3
4,4-DDMU	34	72-92	80-120	22	12

Table A-10. Pesticide Analysis LCS/LCSD QC Summary: Field QC Blanks
Palos Verdes Pilot Capping Projects, Supplemental Sampling Activities.

ACCURACY						PRECISION				
LCS/LCSD Compound	LCS/LCSD Calculated Recoveries	Percent Recovery Range	Control Limits	Number Within Control Limits	Number Outside Control Limits	LCS/LCSD Calculated RPD	Max RPD	RPD Limit	Number Within Control Limits	Number Outside Control Limits
4,4-DDD	2	117	80-120	2	0	1	0	20	1	0
4,4-DDE	2	123-129	80-120	0	2	1	5	20	1	0
4,4-DDT	2	124-125	80-120	0	2	1	1	20	1	0
4,4-DDMU	2	107-114	80-120	2	0	1	6	20	1	0

Table A-11. GC/MS Confirmation Analysis LCS QC Summary: Sediments
Palos Verdes Pilot Capping Projects, Supplemental Sampling Activities.

LCS Compounds	Total Number Analyses	Percent Recovery Range	Control Limits	Number Within Control Limits	Number Outside Control Limits
2,4-DDD	10	75-95	80-120	5	5
2,4-DDE	10	70-85	80-120	5	5
2,4-DDT	10	70-109	80-120	9	1
4,4-DDD	10	78-101	80-120	8	2
4,4-DDE	10	72-97	80-120	9	1
4,4-DDT	10	97-116	80-120	10	0
4,4-DDMU	10	79-109	80-120	9	1

Table A-12. Pesticide Analysis Regional Reference Material QC Summary: Sediments
Palos Verdes Pilot Capping Projects, Supplemental Sampling Activities.

LCS Compound	Total Number Analyses	Percent Recovery Range	Control Limits	Number Within Control Limits	Number Outside Control Limits
4,4-DDE	30	6500-15000	6556-15297	29	1

B DDT CONCENTRATION DATA TABLE

Table B-1. Concentrations of DDT Isomers and Total DDT, and Contributions of Isomers to Total DDT.

				Concentration (ng/g)								% Total DDT						
Station	Depth (m)	Rep	Lab ID	op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU	Total DDTs	op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU
7C	0-2	1	0409150-18	44	230	ND	120	1800	130	370	2694	1.6	8.5	0.0	4.5	66.8	4.8	13.7
7C	2-4	1	0409150-20	31	150	ND	85	1200	60	240	1766	1.8	8.5	0.0	4.8	68.0	3.4	13.6
7C	4-6	1	0409151-01	18	100	ND	45	820	10	170	1163	1.5	8.6	0.0	3.9	70.5	0.9	14.6
7C	6-8	1	0409151-02	5.7	33	ND	18	260	21	57	394.7	1.4	8.4	0.0	4.6	65.9	5.3	14.4
7C	8-10	1	0409151-03	ND	18	ND	6.8	110	3.5	23	161.3	0.0	11.2	0.0	4.2	68.2	2.2	14.3
7C	10-12	1	0409151-04	9	52	ND	22	330	7.7	80	500.7	1.8	10.4	0.0	4.4	65.9	1.5	16.0
7C	12-14	1	0409151-05	89	540	ND	270	4100	140	780	5919	1.5	9.1	0.0	4.6	69.3	2.4	13.2
7C	14-16	1	0409151-06	110	670	ND	300	5000	ND	910	6990	1.6	9.6	0.0	4.3	71.5	0.0	13.0
7C	16-18	1	0409151-07	160	960	ND	410	6500	170	1300	9500	1.7	10.1	0.0	4.3	68.4	1.8	13.7
7C	18-20	1	0409151-08	240	1500	ND	720	11000	910	2200	16570	1.4	9.1	0.0	4.3	66.4	5.5	13.3
7C	20-22	1	0409151-09	360	2100	ND	1100	15000	1200	3400	23160	1.6	9.1	0.0	4.7	64.8	5.2	14.7
7C	22-24	1	0409151-10	300	1800	ND	830	13000	970	2800	19700	1.5	9.1	0.0	4.2	66.0	4.9	14.2
7C	24-26	1	0409151-11	250	1300	ND	640	9800	610	2200	14800	1.7	8.8	0.0	4.3	66.2	4.1	14.9
7C	26-28	1	0409151-12	250	1300	ND	590	10000	490	1800	14430	1.7	9.0	0.0	4.1	69.3	3.4	12.5
7C	28-30	1	0409151-13	250	1200	ND	580	10000	500	1900	14430	1.7	8.3	0.0	4.0	69.3	3.5	13.2
7C	30-32	1	0409151-14	360	1800	ND	740	15000	770	2600	21270	1.7	8.5	0.0	3.5	70.5	3.6	12.2
7C	32-34	1	0409151-15	420	2100	ND	840	16000	560	3700	23620	1.8	8.9	0.0	3.6	67.7	2.4	15.7
7C	34-36	1	0409151-16	520	2500	ND	3100	20000	480	4500	31100	1.7	8.0	0.0	10.0	64.3	1.5	14.5
7C	36-38	1	0409151-17	840	4200	ND	1200	32000	ND	5600	43840	1.9	9.6	0.0	2.7	73.0	0.0	12.8
7C	38-40	1	0409151-18	2100	14000	ND	3200	83000	1700	26000	130000	1.6	10.8	0.0	2.5	63.8	1.3	20.0
7C	40-41	1	0409151-19	2500	22000	ND	5900	120000	2300	32000	184700	1.4	11.9	0.0	3.2	65.0	1.2	17.3
7CB	0-2	1	0409154-01	19	99	ND	48	760	48	150	1124	1.7	8.8	0.0	4.3	67.6	4.3	13.3
7CB	2-4	1	0409154-02	19	98	ND	56	760	130	160	1223	1.6	8.0	0.0	4.6	62.1	10.6	13.1
7CB	4-6	1	0409154-03	8.9	47	ND	46	390	9.3	80	581.2	1.5	8.1	0.0	7.9	67.1	1.6	13.8
7CB	6-8	1	0409154-04	5.6	26	ND	13	190	59	43	336.6	1.7	7.7	0.0	3.9	56.4	17.5	12.8
7CB	8-10	1	0409154-05	19	110	ND	48	840	19	160	1196	1.6	9.2	0.0	4.0	70.2	1.6	13.4
7CB	10-12	1	0409154-06	57	330	ND	180	2400	140	450	3557	1.6	9.3	0.0	5.1	67.5	3.9	12.7
7CB	12-14	1	0409154-07	89	500	ND	240	3600	160	680	5269	1.7	9.5	0.0	4.6	68.3	3.0	12.9
7CB	14-16	1	0409154-08	110	600	ND	280	4800	200	830	6820	1.6	8.8	0.0	4.1	70.4	2.9	12.2
7CB	16-18	1	0409154-09	160	820	ND	410	6300	580	1000	9270	1.7	8.8	0.0	4.4	68.0	6.3	10.8
7CB	18-20	1	0409154-10	230	1200	ND	600	8600	960	1400	12990	1.8	9.2	0.0	4.6	66.2	7.4	10.8
7CB	20-22	1	0409154-11	330	1600	ND	680	12000	500	2800	17910	1.8	8.9	0.0	3.8	67.0	2.8	15.6
7CB	22-24	1	0409154-12	480	2400	ND	820	15000	ND	4100	22800	2.1	10.5	0.0	3.6	65.8	0.0	18.0
7CB	24-26	1	0409154-13	770	3500	ND	2400	25000	3700	6900	42270	1.8	8.3	0.0	5.7	59.1	8.8	16.3
7CB	26-28	1	0409154-14	950	5300	ND	1800	32000	1100	11000	52150	1.8	10.2	0.0	3.5	61.4	2.1	21.1
7CB	28-30	1	0409154-15	1500	11000	ND	2600	62000	1600	21000	99700	1.5	11.0	0.0	2.6	62.2	1.6	21.1
7CB	30-32	1	0409154-16	2100	17000	ND	4900	110000	4500	24000	162500	1.3	10.5	0.0	3.0	67.7	2.8	14.8
7CB	32-34	1	0409154-17	1500	8400	ND	4800	68000	4200	10000	96900	1.5	8.7	0.0	5.0	70.2	4.3	10.3
7CB	34-36	1	0409154-18	950	5200	ND	2900	35000	1600	6600	52250	1.8	10.0	0.0	5.6	67.0	3.1	12.6
7CB	36-38	1	0409154-19	590	3600	ND	2000	22000	3600	5700	37490	1.6	9.6	0.0	5.3	58.7	9.6	15.2
7CB	38-40	1	0409154-20	260	1300	ND	780	9200	620	1600	13760	1.9	9.4	0.0	5.7	66.9	4.5	11.6
7CB	40-42	1	0409155-01	39	140	ND	110	950	120	220	1579	2.5	8.9	0.0	7.0	60.2	7.6	13.9
7CB	42-44	1	0409155-02	38	150	ND	79	1100	140	200	1707	2.2	8.8	0.0	4.6	64.4	8.2	11.7
7CB	44-46	1	0409155-03	26	110	3.9	57	740	44	170	1150.9	2.3	9.6	0.3	5.0	64.3	3.8	14.8
7CB	46-48	1	0409155-04	20	100	ND	42	720	17	180	1079	1.9	9.3	0.0	3.9	66.7	1.6	16.7
7CB	48-50	1	0409155-05	17	73	ND	36	470	12	120	728	2.3	10.0	0.0	4.9	64.6	1.6	16.5
A	0-2	1	0409143-01	88	410	ND	220	3200	710	640	5268	1.7	7.8	0.0	4.2	60.7	13.5	12.1
A	2-4	1	0409143-02	ND	650	ND	300	4500	520	1100	7070	0.0	9.2	0.0	4.2	63.6	7.4	15.6
A	4-6	1	0409143-03	170	780	ND	340	5400	290	1400	8380	2.0	9.3	0.0	4.1	64.4	3.5	16.7
A	6-8	1	0409143-04	ND	560	ND	350	3900	550	890	6250	0.0	9.0	0.0	5.6	62.4	8.8	14.2
A	8-10	1	0409143-05	76	370	ND	190	3000	320	590	4546	1.7	8.1	0.0	4.2	66.0	7.0	13.0
A	10-12	1	0409143-06	55	260	ND	120	2100	120	430	3085	1.8	8.4	0.0	3.9	68.1	3.9	13.9
A	12-14	1	0409143-07	ND	180	ND	90	1300	73	290	1933	0.0	9.3	0.0	4.7	67.3	3.8	15.0
A	14-16	1	0409143-08	ND	84	ND	44	600	42	130	900	0.0	9.3	0.0	4.9	66.7	4.7	14.4
A	16-18	1	0409143-09	5.4	26	ND	28	200	160	39	458.4	1.2	5.7	0.0	6.1	43.6	34.9	8.5
A	18-20	1	0409143-10	ND	3.2	ND	1.3	20	ND	4	28.5	0.0	11.2	0.0	4.6	70.2	0.0	14.0
A	20-22	1	0409143-11	ND	1.9	ND	ND	11	ND	2.9	15.8	0.0	12.0	0.0	0.0	69.6	0.0	18.4
A	22-24	1	0409143-12	ND	18	ND	5.3	120	ND	32	175.3	0.0	10.3	0.0	3.0	68.5	0.0	18.3
A	24-26	1	0409143-13	100	450	ND	200	3200	91	610	4651	2.2	9.7	0.0	4.3	68.8	2.0	13.1
A	26-28	1	0409143-14	30	210	ND	58	1400	70	250	2018	1.5	10.4	0.0	2.9	69.4	3.5	12.4
A	28-30	1	0409143-15	ND	5.1	ND	1.3	31	ND	9.1	46.5	0.0	11.0	0.0	2.8	66.7	0.0	19.6
A	30-32	1	0409143-16	ND	3.1	ND	ND	18	ND	4	25.1	0.0	12.4	0.0	0.0	71.7	0.0	15.9
A	32-34	1	0409143-17	ND	ND	ND	ND	4.8	ND	1.5	6.3	0.0	0.0	0.0	0.0	76.2	0.0	23.8
A	34-36	1	0409143-18	13	100	ND	30	640	ND	90	873	1.5	11.5	0.0	3.4	73.3	0.0	10.3
A	36-38	1	0409143-19	130	780	ND	310	6000	86	1100	8406	1.5	9.3	0.0	3.7	71.4	1.0	13.1
A	38-40	1	0409143-20	98	560	ND	240	3200	54	1200	5352	1.8	10.5	0.0	4.5	59.8	1.0	22.4
A	40-42	1	0409144-01	29	120	ND	71	750	42	270	1282	2.3	9.4	0.0	5.5	58.5	3.3	21.1

Table B-1, continued.

Station	Depth (m)	Rep	Lab ID	op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU	Total DDTs	op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU
				Concentration (ng/g)								% Total DDT						
A	42-44	1	0409144-02	6.5	24	ND	13	120	ND	55	218.5	3.0	11.0	0.0	5.9	54.9	0.0	25.2
A	44-46	1	0409144-03	4.1	26	ND	7	170	2.8	49	258.9	1.6	10.0	0.0	2.7	65.7	1.1	18.9
A	46-48	1	0409144-04	5.2	23	ND	9.2	120	ND	110	267.4	1.9	8.6	0.0	3.4	44.9	0.0	41.1
A	48-50	1	0409144-05	100	680	ND	270	3500	ND	1500	6050	1.7	11.2	0.0	4.5	57.9	0.0	24.8
A	0-2	2	0409144-06	47	270	ND	180	2000	220	430	3147	1.5	8.6	0.0	5.7	63.6	7.0	13.7
A	2-4	2	0409144-07	46	280	ND	130	2100	51	460	3067	1.5	9.1	0.0	4.2	68.5	1.7	15.0
A	4-6	2	0409144-08	34	190	ND	280	1400	58	320	2282	1.5	8.3	0.0	12.3	61.3	2.5	14.0
A	6-8	2	0409144-09	5.6	32	ND	16	240	6.9	52	352.5	1.6	9.1	0.0	4.5	68.1	2.0	14.8
A	8-10	2	0409144-10	3.9	10	ND	3	47	ND	13	76.9	5.1	13.0	0.0	3.9	61.1	0.0	16.9
A	10-12	2	0409144-11	4.3	25	ND	11	170	ND	36	246.3	1.7	10.2	0.0	4.5	69.0	0.0	14.6
A	12-14	2	0409144-12	4.6	25	ND	12	150	6.2	52	249.8	1.8	10.0	0.0	4.8	60.0	2.5	20.8
A	14-16	2	0409144-13	22	140	ND	60	850	ND	260	1332	1.7	10.5	0.0	4.5	63.8	0.0	19.5
A	16-18	2	0409144-14	790	6000	ND	2200	34000	1300	10000	54290	1.5	11.1	0.0	4.1	62.6	2.4	18.4
A	18-20	2	0409144-15	1800	9200	ND	7700	66000	5800	17000	107500	1.7	8.6	0.0	7.2	61.4	5.4	15.8
A	20-22	2	0409144-16	1400	4800	ND	5200	37000	2300	8400	59100	2.4	8.1	0.0	8.8	62.6	3.9	14.2
A	22-24	2	0409144-17	550	1100	ND	2000	9000	1800	2200	16650	3.3	6.6	0.0	12.0	54.1	10.8	13.2
A	24-26	2	0409144-18	290	960	ND	1000	5600	390	4400	12640	2.3	7.6	0.0	7.9	44.3	3.1	34.8
A	26-28	2	0409144-19	200	940	ND	580	5600	300	2700	10320	1.9	9.1	0.0	5.6	54.3	2.9	26.2
A	28-30	2	0409144-20	52	240	ND	150	1400	76	1000	2918	1.8	8.2	0.0	5.1	48.0	2.6	34.3
A	30-32	2	0409145-01	29	120	3.3	86	840	78	350	1506.3	1.9	8.0	0.2	5.7	55.8	5.2	23.2
A	32-34	2	0409145-02	84	370	ND	230	2500	620	820	4624	1.8	8.0	0.0	5.0	54.1	13.4	17.7
A	34-36	2	0409145-03	76	370	ND	150	2100	76	840	3612	2.1	10.2	0.0	4.2	58.1	2.1	23.3
A	36-38	2	0409145-04	61	290	ND	120	2200	740	670	4081	1.5	7.1	0.0	2.9	53.9	18.1	16.4
A	38-40	2	0409145-05	81	440	ND	160	2700	480	1000	4861	1.7	9.1	0.0	3.3	55.5	9.9	20.6
A	40-42	2	0409145-06	35	160	ND	81	1000	68	410	1754	2.0	9.1	0.0	4.6	57.0	3.9	23.4
A	42-44	2	0409145-07	18	68	3.8	64	470	220	210	1053.8	1.7	6.5	0.4	6.1	44.6	20.9	19.9
A	44-46	2	0409145-08	11	41	ND	27	260	17	120	476	2.3	8.6	0.0	5.7	54.6	3.6	25.2
A	0-2	3	0409145-14	47	210	ND	120	1600	120	290	2387	2.0	8.8	0.0	5.0	67.0	5.0	12.1
A	2-4	3	0409145-15	41	190	ND	100	1600	54	290	2275	1.8	8.4	0.0	4.4	70.3	2.4	12.7
A	4-6	3	0409145-16	16	87	ND	48	720	280	120	1271	1.3	6.8	0.0	3.8	56.6	22.0	9.4
A	6-8	3	0409145-17	5.6	31	ND	15	250	110	40	451.6	1.2	6.9	0.0	3.3	55.4	24.4	8.9
A	8-10	3	0409145-18	6.1	27	2.3	14	200	22	36	307.4	2.0	8.8	0.7	4.6	65.1	7.2	11.7
A	10-12	3	0409145-19	41	210	ND	120	1500	610	310	2791	1.5	7.5	0.0	4.3	53.7	21.9	11.1
A	12-14	3	0409145-20	270	1200	ND	570	7700	790	1500	12030	2.2	10.0	0.0	4.7	64.0	6.6	12.5
A	14-16	3	0409146-01	290	1300	ND	600	9400	390	1900	13880	2.1	9.4	0.0	4.3	67.7	2.8	13.7
A	16-18	3	0409146-02	270	1400	ND	630	9700	520	1900	14420	1.9	9.7	0.0	4.4	67.3	3.6	13.2
A	18-20	3	0409146-03	330	1500	ND	680	11000	530	2000	16040	2.1	9.4	0.0	4.2	68.6	3.3	12.5
A	20-22	3	0409146-04	650	2600	ND	1100	19000	850	4800	29000	2.2	9.0	0.0	3.8	65.5	2.9	16.6
A	22-24	3	0409146-05	910	3800	ND	1400	26000	1400	6700	40210	2.3	9.5	0.0	3.5	64.7	3.5	16.7
A	24-26	3	0409146-06	1200	4800	ND	1600	34000	700	8500	50800	2.4	9.4	0.0	3.1	66.9	1.4	16.7
A	26-28	3	0409146-07	1200	5900	ND	1500	38000		9800	56400	2.1	10.5	0.0	2.7	67.4	0.0	17.4
A	28-30	3	0409146-08	1400	8400	ND	2000	49000	3800	14000	78600	1.8	10.7	0.0	2.5	62.3	4.8	17.8
A	30-32	3	0409146-09	2500	28000	180	5300	140000	1200	39000	216180	1.2	13.0	0.1	2.5	64.8	0.6	18.0
A	32-34	3	0409146-10	1600	14000	ND	4400	81000	1900	14000	116900	1.4	12.0	0.0	3.8	69.3	1.6	12.0
A	34-36	3	0409146-11	1100	7100	ND	4600	49000	1800	7800	71400	1.5	9.9	0.0	6.4	68.6	2.5	10.9
A	36-38	3	0409146-12	1900	7300	ND	7900	66000	4600	9800	97500	1.9	7.5	0.0	8.1	67.7	4.7	10.1
A	38-40	3	0409146-15	1100	3100	ND	3600	21000	2700	4400	35900	3.1	8.6	0.0	10.0	58.5	7.5	12.3
A	40-42	3	0409146-16	520	2800	ND	1400	19000	2000	3600	29320	1.8	9.5	0.0	4.8	64.8	6.8	12.3
A	42-44	3	0409146-17	67	240	ND	160	1600	62	440	2569	2.6	9.3	0.0	6.2	62.3	2.4	17.1
A	44-46	3	0409146-18	16	52	ND	34	380	5.6	120	607.6	2.6	8.6	0.0	5.6	62.5	0.9	19.7
B	0-4	1	0409142-09	ND	200	ND	84	1500	41	320	2145	0.0	9.3	0.0	3.9	69.9	1.9	14.9
B	4-8	1	0409142-10	15	76	ND	40	560	57	130	878	1.7	8.7	0.0	4.6	63.8	6.5	14.8
B	8-12	1	0409142-11	35	190	ND	79	1300	33	270	1907	1.8	10.0	0.0	4.1	68.2	1.7	14.2
B	12-16	1	0409142-12	130	690	ND	320	5000	280	970	7390	1.8	9.3	0.0	4.3	67.7	3.8	13.1
B	16-20	1	0409142-13	170	850	ND	370	6500	240	1300	9430	1.8	9.0	0.0	3.9	68.9	2.5	13.8
B	20-24	1	0409142-14	320	1700	ND	810	12000	2200	2500	19530	1.6	8.7	0.0	4.1	61.4	11.3	12.8
B	24-28	1	0409142-15	330	1500	ND	620	11000	420	2200	16070	2.1	9.3	0.0	3.9	68.5	2.6	13.7
B	28-32	1	0409142-16	650	2600	ND	960	20000	1100	4500	29810	2.2	8.7	0.0	3.2	67.1	3.7	15.1
B	32-36	1	0409142-17	1400	6800	ND	1500	48000	1200	12000	70900	2.0	9.6	0.0	2.1	67.7	1.7	16.9
B	36-40	1	0409142-18	2300	17000	ND	4800	99000	6000	25000	154100	1.5	11.0	0.0	3.1	64.2	3.9	16.2
B	40-45	1	0409142-19	1800	5100	ND	7000	46000	20000	9500	89400	2.0	5.7	0.0	7.8	51.5	22.4	10.6
F	0-4	1	0409147-01	41	190	ND	88	1500	81	280	2180	1.9	8.7	0.0	4.0	68.8	3.7	12.8
F	4-8	1	0409147-02	18	100	ND	42	730	ND	120	1010	1.8	9.9	0.0	4.2	72.3	0.0	11.9
F	8-12	1	0409147-03	130	660	ND	330	4600	260	930	6910	1.9	9.6	0.0	4.8	66.6	3.8	13.5
F	12-16	1	0409147-04	210	970	ND	500	7000	460	1300	10440	2.0	9.3	0.0	4.8	67.0	4.4	12.5
F	16-20	1	0409147-05	220	1000	ND	480	7400	140	1400	10640	2.1	9.4	0.0	4.5	69.5	1.3	13.2
F	20-24	1	0409147-06	260	1200	ND	470	9000	140	1500	12570	2.1	9.5	0.0	3.7	71.6	1.1	11.9
F	24-28	1	0409147-07	410	1700	ND	610	12000		3000	17720	2.3	9.6	0.0	3.4	67.7	0.0	16.9
F	28-32	1	0409147-08	1500	6400	ND	2000	47000	2800	9700	69400	2.2	9.2	0.0	2.9	67.7	4.0	14.0

Table B-1, continued.

				Concentration (ng/g)								% Total DDT						
Station	Depth (m)	Rep	Lab ID	op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU	Total DDTs	op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU
F	32-36	1	0409147-09	3900	32000	ND	4500	160000	ND	56000	256400	1.5	12.5	0.0	1.8	62.4	0.0	21.8
F	36-40	1	0409147-10	2600	18000	ND	7600	130000	7800	27000	193000	1.3	9.3	0.0	3.9	67.4	4.0	14.0
F	40-45	1	0409147-11	780	2200	ND	2400	18000	1600	3500	28480	2.7	7.7	0.0	8.4	63.2	5.6	12.3
K	0-4	1	0409158-12	68	300	ND	140	2000	98	400	3006	2.3	10.0	0.0	4.7	66.5	3.3	13.3
K	4-8	1	0409158-13	100	540	ND	220	3600	94	680	5234	1.9	10.3	0.0	4.2	68.8	1.8	13.0
K	8-12	1	0409158-14	170	920	ND	380	6000	250	1100	8820	1.9	10.4	0.0	4.3	68.0	2.8	12.5
K	12-16	1	0409158-15	260	1200	ND	580	8800	890	1600	13330	2.0	9.0	0.0	4.4	66.0	6.7	12.0
K	16-20	1	0409158-16	240	1300	ND	470	8500	210	1700	12420	1.9	10.5	0.0	3.8	68.4	1.7	13.7
K	20-24	1	0409158-17	400	2000	ND	700	12000	440	2600	18140	2.2	11.0	0.0	3.9	66.2	2.4	14.3
K	24-28	1	0409158-18	1000	5000	ND	2200	33000	370	6700	48270	2.1	10.4	0.0	4.6	68.4	0.8	13.9
K	28-32	1	0409158-19	3000	17000	ND	3100	100000	1200	21000	145300	2.1	11.7	0.0	2.1	68.8	0.8	14.5
K	32-36	1	0409158-20	2600	25000	ND	4000	130000	ND	28000	189600	1.4	13.2	0.0	2.1	68.6	0.0	14.8
K	36-40	1	0409159-01	1100	5800	ND	3100	42000	2000	8300	62300	1.8	9.3	0.0	5.0	67.4	3.2	13.3
K	40-44	1	0409159-02	130	300	ND	370	2200	400	780	4180	3.1	7.2	0.0	8.9	52.6	9.6	18.7
K	0-4	2	0407076-14	43	190	ND	110	1600	31	300	2274	1.9	8.4	0.0	4.8	70.4	1.4	13.2
K	4-8	2	0407076-15	ND	320	ND	130	2100	75	460	3085	0.0	10.4	0.0	4.2	68.1	2.4	14.9
K	8-12	2	0407076-16	150	800	ND	350	6000	250	1100	8650	1.7	9.2	0.0	4.0	69.4	2.9	12.7
K	12-16	2	0407076-17	210	1100	ND	520	8600	490	1500	12420	1.7	8.9	0.0	4.2	69.2	3.9	12.1
K	16-20	2	0407076-18	270	1400	ND	600	11000	670	1800	15740	1.7	8.9	0.0	3.8	69.9	4.3	11.4
K	20-24	2	0407076-19	ND	1400	ND	570	9800	ND	2300	14070	0.0	10.0	0.0	4.1	69.7	0.0	16.3
K	24-28	2	0407076-20	630	2500	ND	780	21000	650	4600	30160	2.1	8.3	0.0	2.6	69.6	2.2	15.3
K	28-32	2	0407076-21	1100	4700	ND	1300	38000	ND	7700	52800	2.1	8.9	0.0	2.5	72.0	0.0	14.6
K	32-36	2	0409142-01	2100	15000	ND	2800	98000	ND	18000	135900	1.5	11.0	0.0	2.1	72.1	0.0	13.2
K	36-40	2	0409142-02	3600	19000	ND	9500	170000	9100	33000	244200	1.5	7.8	0.0	3.9	69.6	3.7	13.5
K	40-44	2	0409142-03	1700	5600	ND	5200	48000	2300	6800	69600	2.4	8.0	0.0	7.5	69.0	3.3	9.8
K	44-47	2	0409142-04	170	730	ND	380	5600	190	980	8050	2.1	9.1	0.0	4.7	69.6	2.4	12.2
K	0-4	3	0409159-05	54	270	ND	110	1800	45	350	2629	2.1	10.3	0.0	4.2	68.5	1.7	13.3
K	4-8	3	0409159-06	98	550	ND	210	3500	110	660	5128	1.9	10.7	0.0	4.1	68.3	2.1	12.9
K	8-12	3	0409159-07	120	710	ND	280	4500	ND	850	6460	1.9	11.0	0.0	4.3	69.7	0.0	13.2
K	12-16	3	0409159-08	190	1100	ND	430	7400	330	1400	10850	1.8	10.1	0.0	4.0	68.2	3.0	12.9
K	16-20	3	0409159-09	240	1300	ND	630	8200	3300	1800	15470	1.6	8.4	0.0	4.1	53.0	21.3	11.6
K	20-24	3	0409159-10	270	1300	ND	500	9500	440	2100	14110	1.9	9.2	0.0	3.5	67.3	3.1	14.9
K	24-28	3	0409159-11	840	4300	ND	1100	28000	440	5900	40580	2.1	10.6	0.0	2.7	69.0	1.1	14.5
K	28-32	3	0409159-12	2200	17000	ND	2700	80000	1500	24000	127400	1.7	13.3	0.0	2.1	62.8	1.2	18.8
K	32-36	3	0409159-13	1900	17000	150	4800	110000	3800	12000	149650	1.3	11.4	0.1	3.2	73.5	2.5	8.0
K	36-40	3	0409159-14	1800	12000	ND	6900	90000	4800	13000	128500	1.4	9.3	0.0	5.4	70.0	3.7	10.1
K	40-44	3	0409159-15	750	2500	ND	2100	17000	1300	4900	28550	2.6	8.8	0.0	7.4	59.5	4.6	17.2
K	44-46	3	0409159-17	100	410	ND	220	2200	74	720	3724	2.7	11.0	0.0	5.9	59.1	2.0	19.3
K1	0-4	1	0407076-01	41	200	ND	140	1500	210	320	2411	1.7	8.3	0.0	5.8	62.2	8.7	13.3
K1	4-8	1	0407076-02	60	340	ND	140	2600	ND	460	3600	1.7	9.4	0.0	3.9	72.2	0.0	12.8
K1	8-12	1	0407076-03	140	720	ND	360	5800	460	1100	8580	1.6	8.4	0.0	4.2	67.6	5.4	12.8
K1	12-16	1	0407076-04	190	1100	ND	430	8200	240	1400	11560	1.6	9.5	0.0	3.7	70.9	2.1	12.1
K1	16-20	1	0407076-05	270	1400	ND	740	11000	660	1900	15970	1.7	8.8	0.0	4.6	68.9	4.1	11.9
K1	20-24	1	0407076-06	270	1300	ND	500	10000	200	2000	14270	1.9	9.1	0.0	3.5	70.1	1.4	14.0
K1	24-28	1	0407076-07	560	2100	ND	750	18000	1400	3800	26610	2.1	7.9	0.0	2.8	67.6	5.3	14.3
K1	28-32	1	0407076-08	890	3700	ND	1100	31000	640	6400	43730	2.0	8.5	0.0	2.5	70.9	1.5	14.6
K1	32-36	1	0407076-09	4200	29000	ND	5400	180000	3100	39000	260700	1.6	11.1	0.0	2.1	69.0	1.2	15.0
K1	36-40	1	0407076-10	2000	9200	ND	7000	83000	4200	17000	122400	1.6	7.5	0.0	5.7	67.8	3.4	13.9
K1	40-44	1	0407076-11	410	1300	ND	1300	9500	1300	2500	16310	2.5	8.0	0.0	8.0	58.2	8.0	15.3
K1	44-48	1	0407076-12	62	150	ND	220	1300	56	250	2038	3.0	7.4	0.0	10.8	63.8	2.7	12.3
K1	0-4	2	0409157-07	ND	390	ND	960	2400	160	610	4520	0.0	8.6	0.0	21.2	53.1	3.5	13.5
K1	4-8	2	0409157-08	110	560	ND	230	3500	97	680	5177	2.1	10.8	0.0	4.4	67.6	1.9	13.1
K1	8-12	2	0409157-09	200	1100	ND	400	6200	640	1400	9940	2.0	11.1	0.0	4.0	62.4	6.4	14.1
K1	12-16	2	0409157-10	220	1100	ND	420	6400	200	1800	10140	2.2	10.8	0.0	4.1	63.1	2.0	17.8
K1	16-20	2	0409157-11	270	1400	ND	550	8400	680	2000	13300	2.0	10.5	0.0	4.1	63.2	5.1	15.0
K1	20-24	2	0409157-12	280	1400	ND	570	8400	450	2000	13100	2.1	10.7	0.0	4.4	64.1	3.4	15.3
K1	24-28	2	0409157-13	360	1700	ND	1000	10000	ND	3400	16460	2.2	10.3	0.0	6.1	60.8	0.0	20.7
K1	28-32	2	0409157-14	1100	6100	ND	1800	34000	2000	14000	59000	1.9	10.3	0.0	3.1	57.6	3.4	23.7
K1	32-36	2	0409157-15	2900	25000	ND	4500	120000	1800	30000	184200	1.6	13.6	0.0	2.4	65.1	1.0	16.3
K1	36-40	2	0409157-16	2800	20000	ND	6300	120000	4100	24000	177200	1.6	11.3	0.0	3.6	67.7	2.3	13.5
K1	40-44	2	0409157-17	1200	4900	ND	3500	32000	2200	9200	53000	2.3	9.2	0.0	6.6	60.4	4.2	17.4
K1	44-48	2	0409157-18	75	220	ND	210	1900	49	270	2724	2.8	8.1	0.0	7.7	69.8	1.8	9.9
K1	0-4	3	0409157-20	54	280	ND	120	1800	73	390	2717	2.0	10.3	0.0	4.4	66.2	2.7	14.4
K1	4-8	3	0409158-01	120	580	ND	250	3800	88	830	5668	2.1	10.2	0.0	4.4	67.0	1.6	14.6
K1	8-12	3	0409158-02	180	880	ND	400	5500	270	1500	8730	2.1	10.1	0.0	4.6	63.0	3.1	17.2
K1	12-16	3	0409158-03	190	1000	ND	440	6600	500	1400	10130	1.9	9.9	0.0	4.3	65.2	4.9	13.8
K1	16-20	3	0409158-04	300	1500	ND	650	9100	740	2000	14290	2.1	10.5	0.0	4.5	63.7	5.2	14.0
K1	20-24	3	0409158-05	380	1900	ND	630	12000	260	2700	17870	2.1	10.6	0.0	3.5	67.2	1.5	15.1
K1	24-28	3	0409158-06	1000	5200	ND	1500	32000	1200	9200	50100	2.0	10.4	0.0	3.0	63.9	2.4	18.4

Table B-1, continued.

Station	Depth (m)	Rep	Lab ID	Concentration (ng/g) op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU	Total DDTs	% Total DDT op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU
K1	28-32	3	0409158-07	3400	31000	ND	4600	160000	7000	41000	247000	1.4	12.6	0.0	1.9	64.8	2.8	16.6
K1	32-36	3	0409158-08	1700	7000	ND	4700	47000	4000	9400	73800	2.3	9.5	0.0	6.4	63.7	5.4	12.7
K1	36-40	3	0409158-09	360	880	ND	1000	7600	350	1100	11290	3.2	7.8	0.0	8.9	67.3	3.1	9.7
K1	40-44	3	0409158-10	40	91	ND	100	560	61	160	1012	4.0	9.0	0.0	9.9	55.3	6.0	15.8
K2	0-4	1	0409156-01	61	290	ND	130	2100	69	420	3070	2.0	9.4	0.0	4.2	68.4	2.2	13.7
K2	4-8	1	0409156-02	ND	440	ND	160	2800	85	630	4115	0.0	10.7	0.0	3.9	68.0	2.1	15.3
K2	8-12	1	0409156-03	160	900	ND	340	5900	120	1200	8620	1.9	10.4	0.0	3.9	68.4	1.4	13.9
K2	12-16	1	0409156-04	ND	1300	ND	470	8300	290	1600	11960	0.0	10.9	0.0	3.9	69.4	2.4	13.4
K2	16-20	1	0409156-05	ND	1400	ND	540	8800	590	2000	13330	0.0	10.5	0.0	4.1	66.0	4.4	15.0
K2	20-24	1	0409156-06	ND	1400	ND	450	9500	ND	2400	13750	0.0	10.2	0.0	3.3	69.1	0.0	17.5
K2	24-28	1	0409156-07	600	3300	ND	900	19000	ND	6100	29900	2.0	11.0	0.0	3.0	63.5	0.0	20.4
K2	28-32	1	0409156-08	1200	7000	ND	1600	46000	1100	10000	66900	1.8	10.5	0.0	2.4	68.8	1.6	14.9
K2	32-36	1	0409156-09	3400	24000	ND	9000	170000	4500	25000	235900	1.4	10.2	0.0	3.8	72.1	1.9	10.6
K2	36-40	1	0409156-10	450	2000	ND	1100	12000	330	4700	20580	2.2	9.7	0.0	5.3	58.3	1.6	22.8
K2	40-44	1	0409156-11	13	58	ND	23	360	8.9	130	592.9	2.2	9.8	0.0	3.9	60.7	1.5	21.9
K2	44-48	1	0409156-12	140	660	ND	300	4500	660	950	7210	1.9	9.2	0.0	4.2	62.4	9.2	13.2
K2	48-50	1	0409156-13	250	1300	ND	540	8900	200	1700	12890	1.9	10.1	0.0	4.2	69.0	1.6	13.2
K2	0-4	2	0407075-07	130	640	ND	280	4500	190	760	6500	2.0	9.8	0.0	4.3	69.2	2.9	11.7
K2	4-8	2	0407075-08	ND	680	ND	300	4800	230	940	6950	0.0	9.8	0.0	4.3	69.1	3.3	13.5
K2	8-12	2	0407075-09	230	1300	ND	630	9800	1400	1600	14960	1.5	8.7	0.0	4.2	65.5	9.4	10.7
K2	12-16	2	0407075-10	280	1400	ND	760	10000	2100	1900	16440	1.7	8.5	0.0	4.6	60.8	12.8	11.6
K2	16-20	2	0407075-11	340	1900	ND	710	14000	1800	3000	21750	1.6	8.7	0.0	3.3	64.4	8.3	13.8
K2	20-24	2	0407075-12	780	3700	ND	1100	25000	300	7600	38480	2.0	9.6	0.0	2.9	65.0	0.8	19.8
K2	24-28	2	0407075-13	1600	8500	ND	2000	60000	1200	13000	86300	1.9	9.8	0.0	2.3	69.5	1.4	15.1
K2	28-32	2	0407075-14	3200	19000	ND	3500	120000	ND	21000	166700	1.9	11.4	0.0	2.1	72.0	0.0	12.6
K2	32-36	2	0407075-15	3400	19000	ND	10000	150000	2900	22000	207300	1.6	9.2	0.0	4.8	72.4	1.4	10.6
K2	36-40	2	0407075-16	2500	9800	ND	8800	83000	3500	12000	119600	2.1	8.2	0.0	7.4	69.4	2.9	10.0
K2	40-44	2	0407075-17	1100	5000	ND	3100	38000	1000	5400	53600	2.1	9.3	0.0	5.8	70.9	1.9	10.1
K2	44-48	2	0407075-18	140	440	ND	430	3200	390	950	5550	2.5	7.9	0.0	7.7	57.7	7.0	17.1
K2	48-51	2	0407075-19	270	710	ND	800	4900	850	1600	9130	3.0	7.8	0.0	8.8	53.7	9.3	17.5
K2	0-4	3	0409156-14	46	250	ND	110	1600	270	310	2586	1.8	9.7	0.0	4.3	61.9	10.4	12.0
K2	4-8	3	0409156-15	130	640	ND	270	3900	520	820	6280	2.1	10.2	0.0	4.3	62.1	8.3	13.1
K2	8-12	3	0409156-16	190	930	ND	410	6400	150	1200	9280	2.0	10.0	0.0	4.4	69.0	1.6	12.9
K2	12-16	3	0409156-17	240	1100	ND	510	7600	580	1500	11530	2.1	9.5	0.0	4.4	65.9	5.0	13.0
K2	16-20	3	0409156-18	260	950	ND	360	6700	390	1200	9860	2.6	9.6	0.0	3.7	68.0	4.0	12.2
K2	20-24	3	0409156-19	380	1600	ND	540	11000	280	3000	16800	2.3	9.5	0.0	3.2	65.5	1.7	17.9
K2	24-28	3	0409156-20	760	3500	ND	1300	26000	1600	5500	38660	2.0	9.1	0.0	3.4	67.3	4.1	14.2
K2	28-32	3	0409157-01	1500	8200	ND	1800	52000	1200	13000	77700	1.9	10.6	0.0	2.3	66.9	1.5	16.7
K2	32-36	3	0409157-02	2200	17000	ND	4200	94000	7000	22000	146400	1.5	11.6	0.0	2.9	64.2	4.8	15.0
K2	36-40	3	0409157-03	830	4100	ND	2100	28000	1600	5100	41730	2.0	9.8	0.0	5.0	67.1	3.8	12.2
K2	40-44	3	0409157-04	52	240	ND	130	1800	170	330	2722	1.9	8.8	0.0	4.8	66.1	6.2	12.1
K2	44-48	3	0409157-05	69	420	ND	87	2100	ND	680	3356	2.1	12.5	0.0	2.6	62.6	0.0	20.3
K3	0-4	1	0407074-14	92	570	ND	230	3800	370	780	5842	1.6	9.8	0.0	3.9	65.0	6.3	13.4
K3	4-8	1	0407074-15	120	630	ND	330	4800	460	890	7230	1.7	8.7	0.0	4.6	66.4	6.4	12.3
K3	8-12	1	0407074-16	230	1400	ND	500	9200	190	1700	13220	1.7	10.6	0.0	3.8	69.6	1.4	12.9
K3	12-16	1	0407074-17	380	1900	ND	870	14000	890	2500	20540	1.9	9.3	0.0	4.2	68.2	4.3	12.2
K3	16-20	1	0407074-18	390	1800	ND	820	13000	1100	2300	19410	2.0	9.3	0.0	4.2	67.0	5.7	11.8
K3	20-24	1	0407074-19	960	4300	ND	1500	34000	320	7100	48180	2.0	8.9	0.0	3.1	70.6	0.7	14.7
K3	24-28	1	0407074-20	3100	18000	ND	2900	120000	830	19000	163830	1.9	11.0	0.0	1.8	73.2	0.5	11.6
K3	28-32	1	0407075-01	3500	21000	ND	8700	150000	7300	25000	215500	1.6	9.7	0.0	4.0	69.6	3.4	11.6
K3	32-36	1	0407075-02	1300	4100	ND	4200	37000	2500	7500	56600	2.3	7.2	0.0	7.4	65.4	4.4	13.3
K3	36-40	1	0407075-03	400	1600	ND	1200	14000	950	2400	20550	1.9	7.8	0.0	5.8	68.1	4.6	11.7
K3	40-44	1	0407075-04	19	64	ND	48	460	13	200	804	2.4	8.0	0.0	6.0	57.2	1.6	24.9
K3	44-46	1	0407075-05	200	760	ND	490	6100	350	1300	9200	2.2	8.3	0.0	5.3	66.3	3.8	14.1
K4	0-4	1	0407074-01	79	240	29	210	1800	140	320	2818	2.8	8.5	1.0	7.5	63.9	5.0	11.4
K4	4-8	1	0407074-02	100	470	ND	240	3600	180	630	5220	1.9	9.0	0.0	4.6	69.0	3.4	12.1
K4	8-12	1	0407074-03	190	940	ND	400	7200	170	1300	10200	1.9	9.2	0.0	3.9	70.6	1.7	12.7
K4	12-16	1	0407074-04	220	1300	ND	500	9400	480	1600	13500	1.6	9.6	0.0	3.7	69.6	3.6	11.9
K4	16-20	1	0407074-05	350	1600	ND	620	13000	320	2700	18590	1.9	8.6	0.0	3.3	69.9	1.7	14.5
K4	20-24	1	0407074-06	700	3100	ND	1200	24000	990	5500	35490	2.0	8.7	0.0	3.4	67.6	2.8	15.5
K4	24-28	1	0407074-07	1200	5400	ND	1700	43000	1100	8200	60600	2.0	8.9	0.0	2.8	71.0	1.8	13.5
K4	28-32	1	0407074-08	2300	11000	ND	2700	84000	1300	12000	113300	2.0	9.7	0.0	2.4	74.1	1.1	10.6
K4	32-36	1	0407074-09	5000	41000	ND	6900	230000	3500	61000	347400	1.4	11.8	0.0	2.0	66.2	1.0	17.6
K4	36-40	1	0407074-10	1300	4600	ND	4000	39000	2600	6700	58200	2.2	7.9	0.0	6.9	67.0	4.5	11.5
K4	40-44	1	0407074-11	170	690	ND	480	5300	250	890	7780	2.2	8.9	0.0	6.2	68.1	3.2	11.4
K4	44-49	1	0407074-12	190	1000	ND	460	6400	160	2300	10510	1.8	9.5	0.0	4.4	60.9	1.5	21.9
N	0-4	1	0409159-18	60	330	ND	150	2200	130	400	3270	1.8	10.1	0.0	4.6	67.3	4.0	12.2
N	4-8	1	0409159-19	110	540	ND	240	3400	88	600	4978	2.2	10.8	0.0	4.8	68.3	1.8	12.1
N	8-12	1	0409159-20	160	970	ND	1400	6500	1100	1100	11230	1.4	8.6	0.0	12.5	57.9	9.8	9.8

Table B-1, continued.

Station	Depth (m)	Rep	Lab ID	Concentration (ng/g) op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU	Total DDTs	% Total DDT op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU
N	12-16	1	0409160-01	280	1500	ND	660	9700	560	2000	14700	1.9	10.2	0.0	4.5	66.0	3.8	13.6
N	16-20	1	0409160-02	380	1900	ND	700	14000	560	2400	19940	1.9	9.5	0.0	3.5	70.2	2.8	12.0
N	20-24	1	0409160-03	980	4900	ND	1700	30000	3400	7800	48780	2.0	10.0	0.0	3.5	61.5	7.0	16.0
N	24-28	1	0409160-04	2600	30000	ND	3300	160000	2000	37000	234900	1.1	12.8	0.0	1.4	68.1	0.9	15.8
N	28-32	1	0409160-05	3200	26000	140	6100	150000	2000	22000	209440	1.5	12.4	0.1	2.9	71.6	1.0	10.5
N	32-36	1	0409160-06	2300	14000	420	10000	100000	13000	22000	161720	1.4	8.7	0.3	6.2	61.8	8.0	13.6
N	36-40	1	0409160-07	420	1100	ND	1300	8300	1900	1800	14820	2.8	7.4	0.0	8.8	56.0	12.8	12.1
N	40-45	1	0409160-08	14	41	ND	23	220	ND	98	396	3.5	10.4	0.0	5.8	55.6	0.0	24.7
N	0-4	2	0409160-10	ND	390	ND	150	2300	92	470	3402	0.0	11.5	0.0	4.4	67.6	2.7	13.8
N	4-8	2	0409160-11	ND	610	ND	240	3800	210	730	5590	0.0	10.9	0.0	4.3	68.0	3.8	13.1
N	8-12	2	0409160-12	140	790	ND	340	5200	380	880	7730	1.8	10.2	0.0	4.4	67.3	4.9	11.4
N	12-16	2	0409160-13	210	1200	ND	470	7700	280	1400	11260	1.9	10.7	0.0	4.2	68.4	2.5	12.4
N	16-20	2	0409160-14	270	1200	ND	510	7900	250	1700	11830	2.3	10.1	0.0	4.3	66.8	2.1	14.4
N	20-24	2	0409160-15	680	3000	ND	1100	22000	1400	5200	33380	2.0	9.0	0.0	3.3	65.9	4.2	15.6
N	24-28	2	0409160-16	1400	6700	ND	11000	44000	860	10000	73960	1.9	9.1	0.0	14.9	59.5	1.2	13.5
N	28-32	2	0409160-17	3800	30000	ND	4400	160000	3100	39000	240300	1.6	12.5	0.0	1.8	66.6	1.3	16.2
N	32-36	2	0409160-18	2500	28000	220	5500	140000	3000	36000	215220	1.2	13.0	0.1	2.6	65.0	1.4	16.7
N	36-40	2	0409160-19	970	3300	ND	3700	26000	6200	4600	44770	2.2	7.4	0.0	8.3	58.1	13.8	10.3
N	40-45	2	0409160-20	160	420	ND	530	3400	410	640	5560	2.9	7.6	0.0	9.5	61.2	7.4	11.5
N	0-4	3	0409149-11	54	260	ND	130	1800	360	380	2984	1.8	8.7	0.0	4.4	60.3	12.1	12.7
N	4-8	3	0409149-12	38	180	14	82	1300	74	230	1918	2.0	9.4	0.7	4.3	67.8	3.9	12.0
N	8-12	3	0409149-13	140	720	ND	340	4900	310	950	7360	1.9	9.8	0.0	4.6	66.6	4.2	12.9
N	12-16	3	0409149-14	220	1100	ND	510	7800	640	1400	11670	1.9	9.4	0.0	4.4	66.8	5.5	12.0
N	16-20	3	0409149-15	260	1200	ND	490	9200	180	1500	12830	2.0	9.4	0.0	3.8	71.7	1.4	11.7
N	20-24	3	0409149-16	400	1500	ND	1200	12000	ND	1900	17000	2.4	8.8	0.0	7.1	70.6	0.0	11.2
N	24-28	3	0409149-17	940	3500	ND	1100	26000	1100	5400	38040	2.5	9.2	0.0	2.9	68.3	2.9	14.2
N	28-32	3	0409149-18	3800	22000	ND	3700	130000	ND	31000	190500	2.0	11.5	0.0	1.9	68.2	0.0	16.3
N	32-36	3	0409149-19	2300	11000	ND	6600	72000	4300	17000	113200	2.0	9.7	0.0	5.8	63.6	3.8	15.0
N	36-40	3	0410091-07	580	2400	ND	1300	19000	1100	2600	26980	2.1	8.9	0.0	4.8	70.4	4.1	9.6
N	40-45	3	0409150-01	15	45	ND	37	320	8.4	91	516.4	2.9	8.7	0.0	7.2	62.0	1.6	17.6
N1	0-4	1	0409161-02	34	180	ND	83	1200	200	220	1917	1.8	9.4	0.0	4.3	62.6	10.4	11.5
N1	4-8	1	0409161-03	58	320	ND	140	2100	380	330	3328	1.7	9.6	0.0	4.2	63.1	11.4	9.9
N1	8-12	1	0409161-04	120	690	ND	320	4600	970	740	7440	1.6	9.3	0.0	4.3	61.8	13.0	9.9
N1	12-16	1	0409161-05	200	1100	ND	460	7200	260	1100	10320	1.9	10.7	0.0	4.5	69.8	2.5	10.7
N1	16-20	1	0409161-06	210	930	ND	390	6900	270	1200	9900	2.1	9.4	0.0	3.9	69.7	2.7	12.1
N1	20-24	1	0409161-07	530	2200	ND	3100	14000	ND	4000	23830	2.2	9.2	0.0	13.0	58.7	0.0	16.8
N1	24-28	1	0409161-08	1200	5600	ND	1300	34000	ND	9700	51800	2.3	10.8	0.0	2.5	65.6	0.0	18.7
N1	28-32	1	0409161-09	3100	28000	ND	3300	130000	ND	36000	200400	1.5	14.0	0.0	1.6	64.9	0.0	18.0
N1	32-36	1	0409161-10	2200	21000	ND	3900	100000	1500	23000	151600	1.5	13.9	0.0	2.6	66.0	1.0	15.2
N1	36-40	1	0409161-11	1200	7000	ND	3800	47000	3400	11000	73400	1.6	9.5	0.0	5.2	64.0	4.6	15.0
N1	40-44	1	0409161-12	120	460	ND	400	3400	560	720	5660	2.1	8.1	0.0	7.1	60.1	9.9	12.7
N1	44-46	1	0409161-13	120	440	ND	330	3700	840	480	5910	2.0	7.4	0.0	5.6	62.6	14.2	8.1
N1	0-4	2	0409148-05	42	200	ND	97	1600	87	ND	2026	2.1	9.9	0.0	4.8	79.0	4.3	0.0
N1	4-8	2	0409148-06	28	160	ND	65	1100	18	210	1581	1.8	10.1	0.0	4.1	69.6	1.1	13.3
N1	8-12	2	0409148-07	81	430	ND	190	3100	150	540	4491	1.8	9.6	0.0	4.2	69.0	3.3	12.0
N1	12-16	2	0409148-08	240	1200	ND	600	9000	720	1500	13260	1.8	9.0	0.0	4.5	67.9	5.4	11.3
N1	16-20	2	0409148-09	240	1100	ND	490	8200	180	1400	11610	2.1	9.5	0.0	4.2	70.6	1.6	12.1
N1	20-24	2	0409148-10	680	2800	ND	3300	20000	600	4500	31880	2.1	8.8	0.0	10.4	62.7	1.9	14.1
N1	24-28	2	0409148-11	1400	5700	ND	1800	41000	ND	6700	56600	2.5	10.1	0.0	3.2	72.4	0.0	11.8
N1	28-32	2	0409148-12	6500	36000	ND	9800	230000	2800	25000	310100	2.1	11.6	0.0	3.2	74.2	0.9	8.1
N1	32-36	2	0409148-13	5100	51000	ND	7300	280000	2400	46000	391800	1.3	13.0	0.0	1.9	71.5	0.6	11.7
N1	36-40	2	0409148-14	2700	18000	ND	7900	130000	4300	21000	183900	1.5	9.8	0.0	4.3	70.7	2.3	11.4
N1	40-44	2	0409148-15	1100	3300	ND	4300	25000	4800	5700	44200	2.5	7.5	0.0	9.7	56.6	10.9	12.9
N1	44-49	2	0409148-16	64	220	ND	200	1400	25	510	2419	2.6	9.1	0.0	8.3	57.9	1.0	21.1
N1	0-4	3	0409161-16	36	210	ND	85	1400	150	250	2131	1.7	9.9	0.0	4.0	65.7	7.0	11.7
N1	4-8	3	0409161-17	75	410	ND	190	2600	180	440	3895	1.9	10.5	0.0	4.9	66.8	4.6	11.3
N1	8-12	3	0409161-18	140	730	ND	300	4900	120	830	7020	2.0	10.4	0.0	4.3	69.8	1.7	11.8
N1	12-16	3	0409161-19	250	1200	ND	780	7600	340	1300	11470	2.2	10.5	0.0	6.8	66.3	3.0	11.3
N1	16-20	3	0409162-01	240	1100	ND	490	7500	420	1300	11050	2.2	10.0	0.0	4.4	67.9	3.8	11.8
N1	20-24	3	0409162-02	360	1600	ND	1900	12000	1200	2100	19160	1.9	8.4	0.0	9.9	62.6	6.3	11.0
N1	24-28	3	0409162-03	680	3200	ND	980	21000	480	4400	30740	2.2	10.4	0.0	3.2	68.3	1.6	14.3
N1	28-32	3	0409162-04	4000	20000	ND	4000	120000	ND	21000	169000	2.4	11.8	0.0	2.4	71.0	0.0	12.4
N1	32-36	3	0409162-05	3300	30000	ND	5000	150000	ND	26000	214300	1.5	14.0	0.0	2.3	70.0	0.0	12.1
N1	36-40	3	0409162-06	1300	4500	ND	4300	37000	1900	5400	54400	2.4	8.3	0.0	7.9	68.0	3.5	9.9
N1	40-44	3	0409162-07	150	360	ND	420	2600	460	500	4490	3.3	8.0	0.0	9.4	57.9	10.2	11.1
N1	44-46	3	0409162-08	86	220	ND	250	1500	66	460	2582	3.3	8.5	0.0	9.7	58.1	2.6	17.8
N2	0-4	1	0409148-18	51	280	ND	120	2100	80	390	3021	1.7	9.3	0.0	4.0	69.5	2.6	12.9
N2	4-8	1	0409148-19	100	540	ND	280	4000	210	680	5810	1.7	9.3	0.0	4.8	68.8	3.6	11.7
N2	8-12	1	0409148-20	170	1000	ND	440	7000	240	1300	10150	1.7	9.9	0.0	4.3	69.0	2.4	12.8

Table B-1, continued.

Station	Depth (m)	Rep	Lab ID	Concentration (ng/g) op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU	Total DDTs	% Total DDT op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU
N2	12-16	1	0409149-01	240	1200	ND	580	8600	900	1700	13220	1.8	9.1	0.0	4.4	65.1	6.8	12.9
N2	16-20	1	0409149-02	ND	1200	ND	530	8200	350	1700	11980	0.0	10.0	0.0	4.4	68.4	2.9	14.2
N2	20-24	1	0409149-03	570	2300	ND	790	16000	ND	4100	23760	2.4	9.7	0.0	3.3	67.3	0.0	17.3
N2	24-28	1	0409149-04	810	3000	ND	1000	22000	920	5800	33530	2.4	8.9	0.0	3.0	65.6	2.7	17.3
N2	28-32	1	0409149-05	1600	7600	ND	1700	46000	1100	13000	71000	2.3	10.7	0.0	2.4	64.8	1.5	18.3
N2	32-36	1	0409149-06	4800	36000	ND	7700	200000	6400	48000	302900	1.6	11.9	0.0	2.5	66.0	2.1	15.8
N2	36-40	1	0409149-07	2400	9800	ND	8600	80000	7800	14000	122600	2.0	8.0	0.0	7.0	65.3	6.4	11.4
N2	40-44	1	0409149-08	220	630	ND	580	4200	330	1100	7060	3.1	8.9	0.0	8.2	59.5	4.7	15.6
N2	44-46	1	0409149-09	22	90	1.7	56	700	48	140	1057.7	2.1	8.5	0.2	5.3	66.2	4.5	13.2
N2	0-4	2	0409162-10	50	260	ND	100	1700	25	330	2465	2.0	10.5	0.0	4.1	69.0	1.0	13.4
N2	4-8	2	0409162-11	83	400	ND	160	2600	67	490	3800	2.2	10.5	0.0	4.2	68.4	1.8	12.9
N2	8-12	2	0409162-12	110	640	ND	270	4000	160	790	5970	1.8	10.7	0.0	4.5	67.0	2.7	13.2
N2	12-16	2	0409162-13	180	920	ND	370	6100	89	1400	9059	2.0	10.2	0.0	4.1	67.3	1.0	15.5
N2	16-20	2	0409162-14	210	1100	ND	420	7000	190	1400	10320	2.0	10.7	0.0	4.1	67.8	1.8	13.6
N2	20-24	2	0409162-15	300	1400	ND	480	9500	210	2000	13890	2.2	10.1	0.0	3.5	68.4	1.5	14.4
N2	24-28	2	0409162-16	790	4100	ND	1500	26000	500	7700	40590	1.9	10.1	0.0	3.7	64.1	1.2	19.0
N2	28-32	2	0409162-17	2700	17000	ND	5400	100000	ND	17000	142100	1.9	12.0	0.0	3.8	70.4	0.0	12.0
N2	32-36	2	0409162-18	1000	8100	ND	1600	38000	570	12000	61270	1.6	13.2	0.0	2.6	62.0	0.9	19.6
N2	36-40	2	0409162-19	1900	12000	ND	5600	81000	4200	20000	124700	1.5	9.6	0.0	4.5	65.0	3.4	16.0
N2	40-44	2	0409162-20	790	2600	ND	2700	20000	1500	4200	31790	2.5	8.2	0.0	8.5	62.9	4.7	13.2
N2	44-47	2	0502058-01	200	1000	ND	410	5600	400	1500	9110	2.2	11.0	0.0	4.5	61.5	4.4	16.5
N2	0-4	3	0502058-03	66	390	ND	140	2300	82	470	3448	1.9	11.3	0.0	4.1	66.7	2.4	13.6
N2	4-8	3	0502058-04	64	360	ND	130	2200	55	400	3209	2.0	11.2	0.0	4.1	68.6	1.7	12.5
N2	8-12	3	0502058-05	100	590	ND	240	3700	260	690	5580	1.8	10.6	0.0	4.3	66.3	4.7	12.4
N2	12-16	3	0502058-06	150	820	ND	360	5600	450	980	8360	1.8	9.8	0.0	4.3	67.0	5.4	11.7
N2	16-20	3	0502058-07	220	1100	ND	470	7300	310	1300	10700	2.1	10.3	0.0	4.4	68.2	2.9	12.1
N2	20-24	3	0502058-08	300	1300	ND	520	9600	290	1500	13510	2.2	9.6	0.0	3.8	71.1	2.1	11.1
N2	24-28	3	0502058-09	470	2000	ND	710	14000	340	3000	20520	2.3	9.7	0.0	3.5	68.2	1.7	14.6
N2	28-32	3	0502058-10	2800	17000	ND	3300	90000	1400	27000	141500	2.0	12.0	0.0	2.3	63.6	1.0	19.1
N2	32-36	3	0502058-11	3100	24000	ND	4300	120000	1000	22000	174400	1.8	13.8	0.0	2.5	68.8	0.6	12.6
N2	36-40	3	0502058-12	800	4500	ND	2300	28000	1600	7400	44600	1.8	10.1	0.0	5.2	62.8	3.6	16.6
N2	40-45	3	0502058-13	190	560	ND	420	4500	960	610	7240	2.6	7.7	0.0	5.8	62.2	13.3	8.4
N3	0-4	1	0409147-12	68	380	ND	300	2600	140	500	3988	1.7	9.5	0.0	7.5	65.2	3.5	12.5
N3	4-8	1	0409147-13	160	890	ND	450	6400	610	1200	9710	1.6	9.2	0.0	4.6	65.9	6.3	12.4
N3	8-12	1	0409147-14	230	1200	ND	600	9000	370	1600	13000	1.8	9.2	0.0	4.6	69.2	2.8	12.3
N3	12-16	1	0409147-15	320	1700	ND	750	11000	ND	2300	16070	2.0	10.6	0.0	4.7	68.5	0.0	14.3
N3	16-20	1	0409147-16	630	3000	ND	870	20000	580	4600	29680	2.1	10.1	0.0	2.9	67.4	2.0	15.5
N3	20-24	1	0409147-17	1600	11000	ND	2300	52000	ND	18000	84900	1.9	13.0	0.0	2.7	61.2	0.0	21.2
N3	24-28	1	0409147-18	2400	23000	ND	2800	140000	ND	27000	195200	1.2	11.8	0.0	1.4	71.7	0.0	13.8
N3	28-32	1	0409147-19	2400	17000	ND	7000	120000	2700	16000	165100	1.5	10.3	0.0	4.2	72.7	1.6	9.7
N3	32-36	1	0409147-20	2400	9000	ND	11000	82000	6400	15000	125800	1.9	7.2	0.0	8.7	65.2	5.1	11.9
N3	36-40	1	0409148-01	410	1200	ND	1400	8600	1900	1400	14910	2.7	8.0	0.0	9.4	57.7	12.7	9.4
N3	40-44	1	0409148-02	7.4	15	ND	25	140	11	33	231.4	3.2	6.5	0.0	10.8	60.5	4.8	14.3
N3	44-47	1	0410091-08	110	200	ND	340	1800	140	330	2920	3.8	6.8	0.0	11.6	61.6	4.8	11.3
N4	0-4	1	0409150-03	67	330	ND	200	2500	310	500	3907	1.7	8.4	0.0	5.1	64.0	7.9	12.8
N4	4-8	1	0409150-04	130	690	ND	340	5100	110	930	7300	1.8	9.5	0.0	4.7	69.9	1.5	12.7
N4	8-12	1	0409150-05	240	1400	ND	660	9300	1100	2000	14700	1.6	9.5	0.0	4.5	63.3	7.5	13.6
N4	12-16	1	0409150-06	220	1100	ND	600	8200	570	1700	12390	1.8	8.9	0.0	4.8	66.2	4.6	13.7
N4	16-20	1	0409150-07	570	2500	ND	1000	18000	420	4700	27190	2.1	9.2	0.0	3.7	66.2	1.5	17.3
N4	20-24	1	0409150-08	2800	11000	ND	3200	83000	3300	17000	120300	2.3	9.1	0.0	2.7	69.0	2.7	14.1
N4	24-28	1	0409150-09	2800	22000	ND	4600	140000		34000	203400	1.4	10.8	0.0	2.3	68.8	0.0	16.7
N4	28-32	1	0409150-10	2300	17000	ND	5400	100000	2600	22000	149300	1.5	11.4	0.0	3.6	67.0	1.7	14.7
N4	32-36	1	0409150-11	3400	18000	ND	15000	150000	9300	25000	220700	1.5	8.2	0.0	6.8	68.0	4.2	11.3
N4	36-40	1	0409150-12	490	1100	38	1900	10000	2300	1500	17328	2.8	6.3	0.2	11.0	57.7	13.3	8.7
N4	40-44	1	0409150-13	56	230	ND	200	1800	420	450	3156	1.8	7.3	0.0	6.3	57.0	13.3	14.3
N4	44-48	1	0409150-14	22	55	ND	91	500	32	150	850	2.6	6.5	0.0	10.7	58.8	3.8	17.6
N4	48-51	1	0409150-15	12	46	ND	30	300	18	150	556	2.2	8.3	0.0	5.4	54.0	3.2	27.0
Reference Materials																		
REF	NA	1	0407074-21	370	2100	ND	630	13000	210	2800	19110	1.9	11.0	0.0	3.3	68.0	1.1	14.7
REF	NA	1	0407075-21	340	1800	ND	680	11000	1300	2600	17720	1.9	10.2	0.0	3.8	62.1	7.3	14.7
REF	NA	1	0407076-22	290	1600	ND	520	11000	220	2300	15930	1.8	10.0	0.0	3.3	69.1	1.4	14.4
REF	NA	1	0409142-21	340	1800	ND	560	12000	160	2500	17360	2.0	10.4	0.0	3.2	69.1	0.9	14.4
REF	NA	1	0409143-21	320	1900	ND	650	12000	750	2500	18120	1.8	10.5	0.0	3.6	66.2	4.1	13.8
REF	NA	1	0409144-21	310	1900	ND	680	12000	270	2900	18060	1.7	10.5	0.0	3.8	66.4	1.5	16.1
REF	NA	1	0409145-21	420	2100	80	1000	12000	510	2700	18810	2.2	11.2	0.4	5.3	63.8	2.7	14.4
REF	NA	1	0409148-21	310	1900	ND	610	11000	300	2400	16520	1.9	11.5	0.0	3.7	66.6	1.8	14.5
REF	NA	1	0409149-21	400	2100	ND	670	14000	180	2900	20250	2.0	10.4	0.0	3.3	69.1	0.9	14.3
REF	NA	1	0409150-21	340	1900	ND	660	12000	400	3200	18500	1.8	10.3	0.0	3.6	64.9	2.2	17.3
REF	NA	1	0409154-21	300	1900	ND	570	12000	300	2800	17870	1.7	10.6	0.0	3.2	67.2	1.7	15.7

Table B-1, continued.

Station	Depth (m)	Rep	Lab ID	Concentration (ng/g) op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU	Total DDTs	% Total DDT op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU
REF	NA	1	0409155-06	260	1400	ND	520	8800	420	1900	13300	2.0	10.5	0.0	3.9	66.2	3.2	14.3
REF	NA	1	0409158-21	380	2200	ND	690	12000	220	2700	18190	2.1	12.1	0.0	3.8	66.0	1.2	14.8
REF	NA	1	0409159-21	340	2100	ND	690	12000	760	2600	18490	1.8	11.4	0.0	3.7	64.9	4.1	14.1
REF	NA	1	0409160-21	390	2400	ND	750	13000	240	3000	19780	2.0	12.1	0.0	3.8	65.7	1.2	15.2
REF	NA	1	0409160-21X	330	2000	ND	620	11000	220	2400	16570	2.0	12.1	0.0	3.7	66.4	1.3	14.5
REF	NA	1	0409161-20	290	1600	ND	580	9200	560	2100	14330	2.0	11.2	0.0	4.0	64.2	3.9	14.7
REF	NA	1	0409162-21	290	1700	ND	520	9200	160	2100	13970	2.1	12.2	0.0	3.7	65.9	1.1	15.0
REF	NA	1	0410086-21	340	1900	ND	790	12000	690	2800	18520	1.8	10.3	0.0	4.3	64.8	3.7	15.1
REF	NA	1	0410087-21	300	1800	ND	600	11000	400	2700	16800	1.8	10.7	0.0	3.6	65.5	2.4	16.1
REF	NA	1	0410088-21	290	1800	ND	610	11000	270	2800	16770	1.7	10.7	0.0	3.6	65.6	1.6	16.7
REF	NA	1	0410089-21	340	2300	ND	600	14000	150	3400	20790	1.6	11.1	0.0	2.9	67.3	0.7	16.4
REF	NA	1	0410090-21	280	1900	ND	500	12000	140	2700	17520	1.6	10.8	0.0	2.9	68.5	0.8	15.4
REF	NA	1	0410091-05	360	1900	ND	670	11000	250	2500	16680	2.2	11.4	0.0	4.0	65.9	1.5	15.0
REF	NA	1	0502058-15	360	2100	ND	680	15000	720	2500	21360	1.7	9.8	0.0	3.2	70.2	3.4	11.7
7C	0-2	1	0410089-09	80	490	ND	180	3100	260	610	4720	1.7	10.4	0.0	3.8	65.7	5.5	12.9
7C	2-4	1	0410089-10	56	390	ND	160	2900	80	500	4086	1.4	9.5	0.0	3.9	71.0	2.0	12.2
7C	4-6	1	0410089-11	37	240	ND	120	1800	91	330	2618	1.4	9.2	0.0	4.6	68.8	3.5	12.6
7C	6-8	1	0410089-12	18	96	ND	760	800	580	130	2384	0.8	4.0	0.0	31.9	33.6	24.3	5.5
7C	8-10	1	0410089-13	24	160	ND	110	1200	570	220	2284	1.1	7.0	0.0	4.8	52.5	25.0	9.6
7C	10-12	1	0410089-14	65	400	ND	170	2800	71	510	4016	1.6	10.0	0.0	4.2	69.7	1.8	12.7
7C	12-14	1	0410089-15	100	670	ND	300	5000	130	820	7020	1.4	9.5	0.0	4.3	71.2	1.9	11.7
7C	14-16	1	0410089-16	220	1200	ND	440	8200	440	1500	12000	1.8	10.0	0.0	3.7	68.3	3.7	12.5
7C	16-18	1	0410089-17	190	1300	ND	510	8900	220	1800	12920	1.5	10.1	0.0	3.9	68.9	1.7	13.9
7C	18-20	1	0410089-18	280	1600	ND	690	11000	480	2400	16450	1.7	9.7	0.0	4.2	66.9	2.9	14.6
7C	20-22	1	0410089-19	300	2000	ND	660	12000	260	3000	18220	1.6	11.0	0.0	3.6	65.9	1.4	16.5
7C	22-24	1	0410089-20	260	1600	ND	540	11000	210	1900	15510	1.7	10.3	0.0	3.5	70.9	1.4	12.3
7C	24-26	1	0410090-01	240	1200	ND	470	9700	810	1400	13820	1.7	8.7	0.0	3.4	70.2	5.9	10.1
7C	26-28	1	0410090-02	260	1300	ND	460	11000	210	2100	15330	1.7	8.5	0.0	3.0	71.8	1.4	13.7
7C	28-30	1	0410090-03	560	2800	ND	910	24000	480	4700	33450	1.7	8.4	0.0	2.7	71.7	1.4	14.1
7C	30-32	1	0410090-04	740	4400	ND	1100	29000	ND	7400	42640	1.7	10.3	0.0	2.6	68.0	0.0	17.4
7C	32-34	1	0410090-05	1300	7200	ND	1400	50000	950	8800	69650	1.9	10.3	0.0	2.0	71.8	1.4	12.6
7C	34-36	1	0410090-06	3200	18000	ND	3600	120000	ND	17000	161800	2.0	11.1	0.0	2.2	74.2	0.0	10.5
7C	36-38	1	0410090-07	5200	31000	ND	8300	210000	3000	21000	278500	1.9	11.1	0.0	3.0	75.4	1.1	7.5
7C	38-40	1	0410090-08	3800	36000	ND	6000	210000	ND	25000	280800	1.4	12.8	0.0	2.1	74.8	0.0	8.9
7C	40-42	1	0410090-09	2200	21000	ND	4400	140000	ND	15000	182600	1.2	11.5	0.0	2.4	76.7	0.0	8.2
7C	42-44	1	0410090-10	2200	16000	ND	6000	120000	1600	11000	156800	1.4	10.2	0.0	3.8	76.5	1.0	7.0
7C	44-46	1	0410090-11	2300	19000	ND	6500	170000	ND	29000	226800	1.0	8.4	0.0	2.9	75.0	0.0	12.8
7C	46-48	1	0410090-12	2300	9100	ND	12000	86000	4400	14000	127800	1.8	7.1	0.0	9.4	67.3	3.4	11.0
7C	48-50	1	0410090-13	1300	3200	ND	4800	31000	2300	6600	49200	2.6	6.5	0.0	9.8	63.0	4.7	13.4
7C	50-52	1	0410090-14	440	1800	ND	1400	14000	660	3400	21700	2.0	8.3	0.0	6.5	64.5	3.0	15.7
7C	52-54	1	0410090-15	110	490	ND	260	4200	120	790	5970	1.8	8.2	0.0	4.4	70.4	2.0	13.2
7C	54-56	1	0410090-16	59	270	ND	120	2400	ND	470	3319	1.8	8.1	0.0	3.6	72.3	0.0	14.2
7C	56-58	1	0410090-17	62	190	ND	160	1400	97	890	2799	2.2	6.8	0.0	5.7	50.0	3.5	31.8
7C	58-60	1	0410090-18	ND	150	ND	44	860	ND	430	1484	0.0	10.1	0.0	3.0	58.0	0.0	29.0
7C	60-62	1	0410090-19	4.9	26	ND	11	180	2.8	79	303.7	1.6	8.6	0.0	3.6	59.3	0.9	26.0
7C	62-64	1	0410090-20	30	150	ND	61	1100	20	320	1681	1.8	8.9	0.0	3.6	65.4	1.2	19.0
7C	64-66	1	0410091-01	1.8	4.9	ND	3.9	29	3	12	54.6	3.3	9.0	0.0	7.1	53.1	5.5	22.0
7C	66-68	1	0410091-02	1.7	6.6	ND	2.7	25	2.5	20	58.5	2.9	11.3	0.0	4.6	42.7	4.3	34.2
7C	68-70	1	0410091-03	ND	2.3	ND	ND	8.9	2.3	4.7	18.2	0.0	12.6	0.0	0.0	48.9	12.6	25.8
7C	70-72	1	0410091-04	22	120	ND	45	770	ND	260	1217	1.8	9.9	0.0	3.7	63.3	0.0	21.4
7CB	0-2	1	0410085-01	20	97	ND	57	810	30	200	1214	1.6	8.0	0.0	4.7	66.7	2.5	16.5
7CB	2-4	1	0410085-02	17	73	ND	46	610	41	130	917	1.9	8.0	0.0	5.0	66.5	4.5	14.2
7CB	4-6	1	0410085-03	15	81	ND	49	650	54	130	979	1.5	8.3	0.0	5.0	66.4	5.5	13.3
7CB	6-8	1	0410085-04	39	220	ND	120	1700	60	310	2449	1.6	9.0	0.0	4.9	69.4	2.4	12.7
7CB	8-10	1	0410085-05	69	370	ND	240	2700	180	470	4029	1.7	9.2	0.0	6.0	67.0	4.5	11.7
7CB	10-12	1	0410085-06	88	470	ND	310	3800	410	640	5718	1.5	8.2	0.0	5.4	66.5	7.2	11.2
7CB	12-14	1	0410085-07	120	630	ND	330	5300	110	830	7320	1.6	8.6	0.0	4.5	72.4	1.5	11.3
7CB	14-16	1	0410085-08	160	840	ND	540	6900	420	1000	9860	1.6	8.5	0.0	5.5	70.0	4.3	10.1
7CB	16-18	1	0410085-09	220	970	ND	550	7700	320	1500	11260	2.0	8.6	0.0	4.9	68.4	2.8	13.3
7CB	18-20	1	0410085-10	310	1400	ND	880	12000	1800	1900	18290	1.7	7.7	0.0	4.8	65.6	9.8	10.4
7CB	20-22	1	0410085-11	610	2800	ND	1500	22000	2100	4000	33010	1.8	8.5	0.0	4.5	66.6	6.4	12.1
7CB	22-24	1	0410085-12	780	4600	ND	1700	27000	1100	9700	44880	1.7	10.2	0.0	3.8	60.2	2.5	21.6
7CB	24-26	1	0410085-13	1200	9000	ND	3000	51000	2800	15000	82000	1.5	11.0	0.0	3.7	62.2	3.4	18.3
7CB	26-28	1	0410085-14	1400	8900	ND	4600	62000	3500	12000	92400	1.5	9.6	0.0	5.0	67.1	3.8	13.0
7CB	28-30	1	0410085-15	720	3900	ND	2900	31000	3200	4000	45720	1.6	8.5	0.0	6.3	67.8	7.0	8.7
7CB	30-32	1	0410085-16	750	3400	ND	2200	27000	2400	3500	39250	1.9	8.7	0.0	5.6	68.8	6.1	8.9
7CB	32-34	1	0410085-17	300	1600	ND	1000	14000	1200	1900	20000	1.5	8.0	0.0	5.0	70.0	6.0	9.5
7CB	34-36	1	0410085-18	88	490	ND	240	3600	140	730	5288	1.7	9.3	0.0	4.5	68.1	2.6	13.8
7CB	36-38	1	0410085-19	43	210	ND	110	1400	79	400	2242	1.9	9.4	0.0	4.9	62.4	3.5	17.8

Table B-1, continued.

Station	Depth (m)	Rep	Lab ID	Concentration (ng/g) op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU	Total DDTs	% Total DDT op-DDD	op-DDE	op-DDT	pp-DDD	pp-DDE	pp-DDT	pp-DDMU
7CB	38-40	1	0410085-20	24	120	7.7	65	690	57	240	1203.7	2.0	10.0	0.6	5.4	57.3	4.7	19.9
7CB	40-42	1	0410086-01	16	98	1.9	34	570	12	160	891.9	1.8	11.0	0.2	3.8	63.9	1.3	17.9
7CB	42-44	1	0410086-02	10	51	ND	27	350	8.4	100	546.4	1.8	9.3	0.0	4.9	64.1	1.5	18.3
7CB	44-46	1	0410086-03	ND	38	ND	14	190	35	190	467	0.0	8.1	0.0	3.0	40.7	7.5	40.7
7CB	46-48	1	0410086-04	4.5	16	ND	10	86	5.3	44	165.8	2.7	9.7	0.0	6.0	51.9	3.2	26.5
7CB	48-50	1	0410086-05	3.4	14	ND	8.5	94	6.6	27	153.5	2.2	9.1	0.0	5.5	61.2	4.3	17.6
7CX	0-2	1	0410086-06	ND	160	ND	73	1200	ND	260	1693	0.0	9.5	0.0	4.3	70.9	0.0	15.4
7CX	2-4	1	0410086-07	30	120	26	110	840	140	160	1426	2.1	8.4	1.8	7.7	58.9	9.8	11.2
7CX	4-6	1	0410086-08	15	66	ND	35	520	20	120	776	1.9	8.5	0.0	4.5	67.0	2.6	15.5
7CX	6-8	1	0410086-09	13	78	ND	37	580	12	130	850	1.5	9.2	0.0	4.4	68.2	1.4	15.3
7CX	8-10	1	0410086-10	66	370	ND	210	2800	220	560	4226	1.6	8.8	0.0	5.0	66.3	5.2	13.3
7CX	10-12	1	0410086-11	180	890	ND	500	7100	290	1400	10360	1.7	8.6	0.0	4.8	68.5	2.8	13.5
7CX	12-14	1	0410086-12	190	930	ND	440	6000	130	1200	8890	2.1	10.5	0.0	4.9	67.5	1.5	13.5
7CX	14-16	1	0410086-13	280	1400	ND	670	12000	600	2300	17250	1.6	8.1	0.0	3.9	69.6	3.5	13.3
7CX	16-18	1	0410086-14	520	2400	ND	1100	14000	240	4400	22660	2.3	10.6	0.0	4.9	61.8	1.1	19.4
7CX	18-20	1	0410086-15	620	2800	ND	1100	23000	580	4700	32800	1.9	8.5	0.0	3.4	70.1	1.8	14.3
7CX	20-22	1	0410086-16	990	5300	ND	1300	37000	840	8900	54330	1.8	9.8	0.0	2.4	68.1	1.5	16.4
7CX	22-24	1	0410086-17	2400	20000	ND	2900	84000	1400	31000	141700	1.7	14.1	0.0	2.0	59.3	1.0	21.9
7CX	24-26	1	0410086-18	2400	24000	ND	3400	120000	2300	39000	191100	1.3	12.6	0.0	1.8	62.8	1.2	20.4
7CX	26-28	1	0410086-19	2600	23000	ND	7100	130000	7800	34000	204500	1.3	11.2	0.0	3.5	63.6	3.8	16.6
7CX	28-30	1	0410086-20	2500	17000	ND	9300	130000	5600	30000	194400	1.3	8.7	0.0	4.8	66.9	2.9	15.4
7CX	30-32	1	0410087-01	2400	12000	ND	9300	110000	7100	15000	155800	1.5	7.7	0.0	6.0	70.6	4.6	9.6
7CX	32-34	1	0410087-02	1500	4700	ND	7100	48000	8100	8100	77500	1.9	6.1	0.0	9.2	61.9	10.5	10.5
7CX	34-36	1	0410087-03	540	1800	ND	1800	15000	1000	3400	23540	2.3	7.6	0.0	7.6	63.7	4.2	14.4
7CX	36-38	1	0410087-04	150	670	ND	450	5800	290	860	8220	1.8	8.2	0.0	5.5	70.6	3.5	10.5
7CX	38-40	1	0410087-05	34	130	ND	79	860	84	200	1387	2.5	9.4	0.0	5.7	62.0	6.1	14.4
7CX	40-42	1	0410087-06	22	150	ND	31	970	29	140	1342	1.6	11.2	0.0	2.3	72.3	2.2	10.4
7CX	42-44	1	0410087-07	ND	76	ND	23	460	94	84	737	0.0	10.3	0.0	3.1	62.4	12.8	11.4
7CX	44-46	1	0410087-08	6.4	36	ND	15	250	59	67	433.4	1.5	8.3	0.0	3.5	57.7	13.6	15.5
7CX	46-48	1	0410087-09	12	36	ND	28	220	10	99	405	3.0	8.9	0.0	6.9	54.3	2.5	24.4
7CX	48-50	1	0410087-10	4.9	14	ND	12	63	3.4	53	150.3	3.3	9.3	0.0	8.0	41.9	2.3	35.3
7CX	50-52	1	0410087-11	6.4	25	ND	17	140	3.4	110	301.8	2.1	8.3	0.0	5.6	46.4	1.1	36.4
7CX	52-54	1	0410087-12	ND	4.4	ND	2.8	29	3.4	13	52.6	0.0	8.4	0.0	5.3	55.1	6.5	24.7
7CX	54-56	1	0410091-09	ND	3.7	ND	ND	16	1.6	5.6	26.9	0.0	13.8	0.0	0.0	59.5	5.9	20.8
7CX	56-58	1	0410087-14	ND	4.6	ND	1.8	23	ND	12	41.4	0.0	11.1	0.0	4.3	55.6	0.0	29.0
7CX	0-2	2	0410087-15	25	130	ND	63	970	85	210	1483	1.7	8.8	0.0	4.2	65.4	5.7	14.2
7CX	2-4	2	0410087-16	7	39	ND	18	300	7	62	433	1.6	9.0	0.0	4.2	69.3	1.6	14.3
7CX	4-6	2	0410087-17	1.4	8.6	ND	3.5	58	ND	14	85.5	1.6	10.1	0.0	4.1	67.8	0.0	16.4
7CX	6-8	2	0410087-18	ND	77	ND	63	530	740	120	1530	0.0	5.0	0.0	4.1	34.6	48.4	7.8
7CX	8-10	2	0410087-19	210	1200	ND	520	8100	230	1900	12160	1.7	9.9	0.0	4.3	66.6	1.9	15.6
7CX	10-12	2	0410087-20	1100	5700	ND	1700	37000	1200	11000	57700	1.9	9.9	0.0	2.9	64.1	2.1	19.1
7CX	12-14	2	0410088-01	1900	17000	ND	3000	76000	1800	36000	135700	1.4	12.5	0.0	2.2	56.0	1.3	26.5
7CX	14-16	2	0410088-02	1100	6600	ND	4400	49000	4000	11000	76100	1.4	8.7	0.0	5.8	64.4	5.3	14.5
7CX	16-18	2	0410088-03	1300	4600	ND	4900	42000	2800	8000	63600	2.0	7.2	0.0	7.7	66.0	4.4	12.6
7CX	18-20	2	0410088-04	970	3600	280	2800	24000	2100	8300	42050	2.3	8.6	0.7	6.7	57.1	5.0	19.7
7CX	20-22	2	0410088-05	450	1400	ND	1400	10000	1000	3000	17250	2.6	8.1	0.0	8.1	58.0	5.8	17.4
7CX	22-24	2	0410088-06	190	980	ND	470	5600	210	2500	9950	1.9	9.8	0.0	4.7	56.3	2.1	25.1
7CX	24-26	2	0410088-07	84	380	ND	210	2300	210	1300	4484	1.9	8.5	0.0	4.7	51.3	4.7	29.0
7CX	26-28	2	0410088-08	22	130	ND	52	820	66	300	1390	1.6	9.4	0.0	3.7	59.0	4.7	21.6
7CX	28-30	2	0410088-09	13	78	ND	35	470	15	160	771	1.7	10.1	0.0	4.5	61.0	1.9	20.8
7CX	30-32	2	0410088-10	11	42	2.8	37	250	520	180	1042.8	1.1	4.0	0.3	3.5	24.0	49.9	17.3
7CX	0-2	3	0410088-11	25	140	ND	73	1100	180	230	1748	1.4	8.0	0.0	4.2	62.9	10.3	13.2
7CX	2-4	3	0410088-12	23	140	ND	63	1000	43	210	1479	1.6	9.5	0.0	4.3	67.6	2.9	14.2
7CX	4-6	3	0410088-13	11	69	ND	30	520	11	100	741	1.5	9.3	0.0	4.0	70.2	1.5	13.5
7CX	6-8	3	0410088-14	10	65	ND	26	470	11	99	681	1.5	9.5	0.0	3.8	69.0	1.6	14.5
7CX	8-10	3	0410088-15	5.6	34	ND	14	260	4.4	59	377	1.5	9.0	0.0	3.7	69.0	1.2	15.6
7CX	10-12	3	0410088-16	13	78	ND	36	560	62	120	869	1.5	9.0	0.0	4.1	64.4	7.1	13.8
7CX	12-14	3	0410088-17	100	540	ND	280	4200	480	830	6430	1.6	8.4	0.0	4.4	65.3	7.5	12.9
7CX	14-16	3	0410088-18	1700	9800	ND	3400	52000	1500	12000	80400	2.1	12.2	0.0	4.2	64.7	1.9	14.9
7CX	16-18	3	0410088-19	2000	15000	ND	5200	100000	2500	21000	145700	1.4	10.3	0.0	3.6	68.6	1.7	14.4
7CX	18-20	3	0410088-20	2000	7900	ND	7200	71000	4800	8900	101800	2.0	7.8	0.0	7.1	69.7	4.7	8.7
7CX	20-22	3	0410089-01	1000	3100	ND	3500	26000	2600	4800	41000	2.4	7.6	0.0	8.5	63.4	6.3	11.7
7CX	22-24	3	0410089-02	850	4200	ND	2600	27000	1300	4800	40750	2.1	10.3	0.0	6.4	66.3	3.2	11.8
7CX	24-26	3	0410089-03	470	2900	ND	1200	16000	360	7700	28630	1.6	10.1	0.0	4.2	55.9	1.3	26.9
7CX	26-28	3	0410089-04	130	660	ND	390	3700	190	2400	7470	1.7	8.8	0.0	5.2	49.5	2.5	32.1
7CX	28-30	3	0410089-05	49	200	ND	79	1000	ND	480	1808	2.7	11.1	0.0	4.4	55.3		26.5
7CX	30-32	3	0410089-06	6.9	27	ND	13	190	3.4	100	340.3	2.0	7.9	0.0	3.8	55.8	1.0	29.4
7CX	32-34	3	0410089-07	5.7	24	3.2	18	130	120	85	385.9	1.5	6.2	0.8	4.7	33.7	31.1	22.0
7CX	34-36	3	0410089-08	12	70	ND	16	440	19	77	634	1.9	11.0	0.0	2.5	69.4	3.0	12.1