Exxon Valdez Oil Spill State/Federal
Natural Resource Damage Assessment Final Report

Prespill and Postspill Concentrations of Hydrocarbons in Sediments and Mussels at Intertidal Sites in Prince William Sound and the Gulf of Alaska

Coastal Habitat Study Number 1B
Final Report

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Study History: This study began with the collection of mussels and sediments for petroleum hydrocarbon analyses at stations established in 1977-1980 along the tanker route in Prince William Sound, Alaska. Funded in 1989 under Coastal Habitat Study 1B, it continued in 1990 and 1991 under that designation. Part of this work represents a comparison of petroleum hydrocarbons in sediments and mussels at historically established sites, the benchmark is the publication, Karinen, J. F., M. M. Babcock, D. W. Brown, W. D. MacLeod, Jr., L. S. Ramos, and J. W. Short. 1993. Hydrocarbons in intertidal sediments and mussels from Prince William Sound, Alaska, 1977-1980: Characterization and probable sources. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-9, 69 p. A manuscript summarizing the results of this study has been submitted to the *Exxon Valdez* Oil Spill Symposium Proceedings; Short, J.W. and M.B. Babcock, Prespill and postspill concentrations of hydrocarbons in sediments and mussels in Prince William Sound, Alaska.

Abstract: Beaches in Prince William Sound were generally free of petroleum hydrocarbon contamination before the T/V *Exxon Valdez* oil spill. We compared hydrocarbon concentrations in mussels (*Mytilus trossulus*) and sediments from beaches before and after oil contaminated beaches in the Sound and the Gulf of Alaska. Mussels and sediments collected outside the path of floating oil or before it became beached, indicated that other sources of hydrocarbons were negligible compared with the spilled oil. Mussel concentrations were near detection limits or were mainly naphthalenes, with total polynuclear aromatic hydrocarbons <500 ng/g. Mussel contamination was highest immediately postspill, then declined. The highest polynuclear aromatic hydrocarbon concentrations were at Green Island in April 1989— >200,000 ng/g. In sediments from stations away from the spilled oil, polynuclear aromatic hydrocarbons were usually less than 100 ng/g. Oiled sediments showed a trend similar to the mussels; impacted sediments showing derivation from this oil were <1,000 ng/g. Results for stations not impacted by the Spill can be used to determine quantitative restoration criteria for oiled beaches. Oiled beaches should be considered restored when polynuclear aromatic hydrocarbon concentrations in sediments are <100 ng/g and mussels less than 200-400 ng/g.

Key Words: *Exxon Valdez*, mussels, *Mytilus trossulus*, oil, petroleum hydrocarbons, Prince William Sound, sediments

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EXECUTIVE SUMMARY

We compared hydrocarbon concentrations in samples of lower-intertidal sediments and of mussels from Prince William Sound collected before and after oil spilled from the T/V *Exxon Valdez* contaminated beaches in the Sound, to determine the changes in hydrocarbon contamination of these matrices caused by the spilled oil. Of the 13 stations, 6 were established in 1977 by Karinen et al. (1993), 7 were sampled in March 1989 before *Exxon Valdez* oil became beached in PWS, and 5 were outside the path of the spilled oil through the Sound. Results from the PWS stations were also compared with 12 stations sampled from the northern Gulf of Alaska after beaches were contaminated by the spilled oil. Samples were collected from the 25 total stations of this study beginning March 1989 through May 1991. Comparison of petroleum hydrocarbon concentrations at stations (1) inside and outside the path followed by the spilled oil through the Sound, and (2) before and after landfall of the spilled oil are used to evaluate the significance of petroleum hydrocarbon contaminants found at stations within the spill path after the Spill, to establish restoration criteria for impacted beaches, and to determine natural recovery rates for these beaches.

Sediments and mussels were analyzed with selected ion mode gas chromatography/mass spectrometry for the most abundant 2- to 5-ring polynuclear aromatic hydrocarbons in the spilled oil, and with gas chromatography/flame ionization detection for alkane hydrocarbons, including pristane, phytane, and normal alkanes of 10 to 34 carbon atoms.

Our results show that contamination of mussels by the spilled oil was highest during the first few weeks after the Spill, followed by a consistent decline during the remainder of 1989 and later. Concentrations of contaminating hydrocarbons derived from the spilled oil were highest and most persistent in mussels on or near heavily-oiled beaches. The highest polynuclear aromatic hydrocarbons concentrations were observed at Green Island in April 1989 where the total concentration exceeded 200,000 ng/g on a dry weight basis. However, these concentrations declined by about a factor of 10 by 1990 and again by 1991.

Results from mussels collected from stations outside the path traversed by the spilled oil, or from stations sampled before oil became beached, indicate that other aromatic hydrocarbon sources were almost negligible compared with the spilled oil. Background sources included diesel oil and an unknown source for naphthalenes found in mussels collected in March 1989. Total PAH concentrations due to these other sources combined were usually less than 500 ng/g, which indicates that seawater in the spill-affected area was generally free of anthropogenic hydrocarbon pollution. Contamination of mussels by aromatic hydrocarbons derived from natural sources such as marine oil seeps was not detected. However, concentrations of the alkane hydrocarbon pristane were substantially higher in mussels collected during spring compared with those collected during other seasons, which confirms previous observations of seasonal variability of this alkane in Prince William Sound mussels.

Results from sediments show contamination of lower intertidal sediments was slight even at stations where upper intertidal sediments were heavily oiled. Contamination of lower intertidal sediments by polynuclear aromatic hydrocarbons derived from the spilled oil was less than 1,000 ng/g even when concentrations found in adjacent upper intertidal sediments were higher by factors exceeding ten. As with mussels, concentrations derived from the spilled oil in lower intertidal sediments consistently declined (and were detected less frequently) during the years succeeding the Spill.

Polynuclear aromatic hydrocarbons in lower-intertidal sediments derived from other anthropogenic or natural sources were usually near detection limits, except at stations near Hinchinbrook Entrance. At stations not affected by the spilled oil, concentrations in lower intertidal sediments were usually less than 100 ng/g. However, near Hinchinbrook Entrance at Constantine Harbor and at Rocky Bay, concentrations of lower intertidal sediments ranged from about 300 to 600 ng/g, and varied less than ±15% during the three years of this study. The relative concentrations of polynuclear aromatic hydrocarbons found at these stations were not consistent with those of the spilled oil, and are attributed to a geologic source external to Prince William Sound.

Results from this study for stations that were not impacted by the oil spill may be used to determine quantitative restoration criteria for beaches that were oiled by the Spill. Specifically, oiled beaches should be considered as fully restored when the dry weight total polynuclear aromatic hydrocarbon concentration of (1) intertidal sediments is less than 100 ng/g, and (2) mussels is less than about 200 to 400 ng/g, with the higher mussel concentrations due mainly to naphthalenes.

INTRODUCTION

The *Exxon Valdez* oil spill (EVOS) of March 24, 1989 provided a unique opportunity to assess the impacts of spilled crude oil on a subarctic intertidal ecosystem. A rigorous baseline hydrocarbon monitoring study had been conducted that demonstrated the general absence of substantial petroleum hydrocarbons prior to this Spill. As a result, it is possible to compare hydrocarbon contamination concentrations found in intertidal sediments and mussels before and after the Spill. The impacts of the spilled oil on these sediments and mussels are therefore uniquely definitive— unique, because no other major marine oil spill has occurred in a largely pristine environment where prior hydrocarbon contaminant concentrations had been established, and definitive, because the impacts of the Spill on intertidal sediments and mussels are generally not obscured by other hydrocarbon sources.

When shipment of North Slope crude oil through Prince William Sound (PWS) began following the opening of the Alaska pipeline and Valdez tanker terminal in 1977, our Laboratory conducted a survey of selected hydrocarbons in the Sound for comparison with future evidence of hydrocarbon contamination associated with oil transport (Karinen et al., 1993). Samples of intertidal sediments and of mussels *(Mytilus trossulus)* were collected two to three times annually, 1977 through 1979, and once in 1980 at eight sampling stations in PWS. These were analyzed for alkanes and mainly unsubstituted polynuclear aromatic hydrocarbons (PAHs).

After the Spill we resumed sampling at these stations within two days, and all of the stations were sampled before landfall of any of the spilled crude oil. Subsequently, 18 additional stations were established and sampled within the path followed by the spilled oil through the Sound, along the Kenai Peninsula, and on Kodiak Island. Sample collection after the Spill involved use of collection methods that were identical with those used for the hydrocarbon baseline monitoring study of 1977-1980, and the hydrocarbon analytical methods used had comparable accuracy, precision, and detection limits. However, more alkyl-substituted PAHs were measured in samples collected after the Spill, which provides additional corroborating evidence for hydrocarbon source identification compared with the more limited range of PAHs determined for the 1977-1980 hydrocarbon baseline monitoring study.

The primary objective of this study was to compare petroleum hydrocarbon concentrations in lower intertidal sediments and mussels both geographically and temporally. Comparison of petroleum hydrocarbon concentrations at stations (1) inside and outside the path followed by the spilled oil through the Sound, and (2) before and after landfall of the spilled oil may be used to evaluate the significance of petroleum hydrocarbon contaminants found at stations within the spill path after the Spill, to establish restoration criteria for impacted beaches, and to determine natural recovery rates for these beaches.

Study Area

PWS

Mussels and sediments were collected from 13 stations in PWS beginning March 26, 1989 through May 2, 1991 (Fig. 1, Table 1). Of the 13 stations, 6 were established in 1977 by Karinen et al. (1993) and denoted in this study as reference stations, 7 were sampled in March 1989 before *Exxon Valdez* oil (EVO) became beached in PWS, and 5 were outside the path of the spilled oil through PWS. These 13 stations were sampled two to five times in 1989 during the period March through August. Twelve of the stations were each sampled in April, June, and August of 1990, and in April or May 1991. The Green Island station was not sampled during these times.

Gulf of Alaska

Mussels and sediments were collected from 12 stations in the Gulf of Alaska beginning April 9, 1989 through June 24, 1990 (Fig. 2, Table 1). Of the 12 stations, 4 were on the Kenai Peninsula and 8 were on or near Kodiak Island. These 12 stations were sampled one to three times in 1989, and three of the stations on the Kenai Peninsula were sampled twice in 1990.

METHODS

Sample Collection

Sample collection methods were identical with those of Karinen et al. (1993). Sediment collection transect lines (30 m) were located parallel to the water line from the -0.75 m to +0.75 m tide levels. Sediment cores were collected using a dichloromethane-rinsed, hydrocarbon-free stainless steel cookie cutter. At each station, triplicate samples of sediment were collected by pooling 10 cores (diameter 3.2 cm x depth 1.25 cm) taken along the 30 m transect into each sample container. At the Elrington Island station, triplicate sediment samples were also collected from a visibly-oiled area in the upper intertidal in May 1989 for comparison with the lower intertidal sediments there.

Mussel collection transects were located in mussel bands parallel to the water line, and usually just above the sediment transects (ca. +1 m tide level). Mussel samples were collected in triplicate by collecting 30 mussels each along the 30 m transect. Composite sediment and mussels were placed in dichloromethane-rinsed, hydrocarbon-free glass jars, temporarily stored with ice packs, and frozen within 2-3 h of collection.

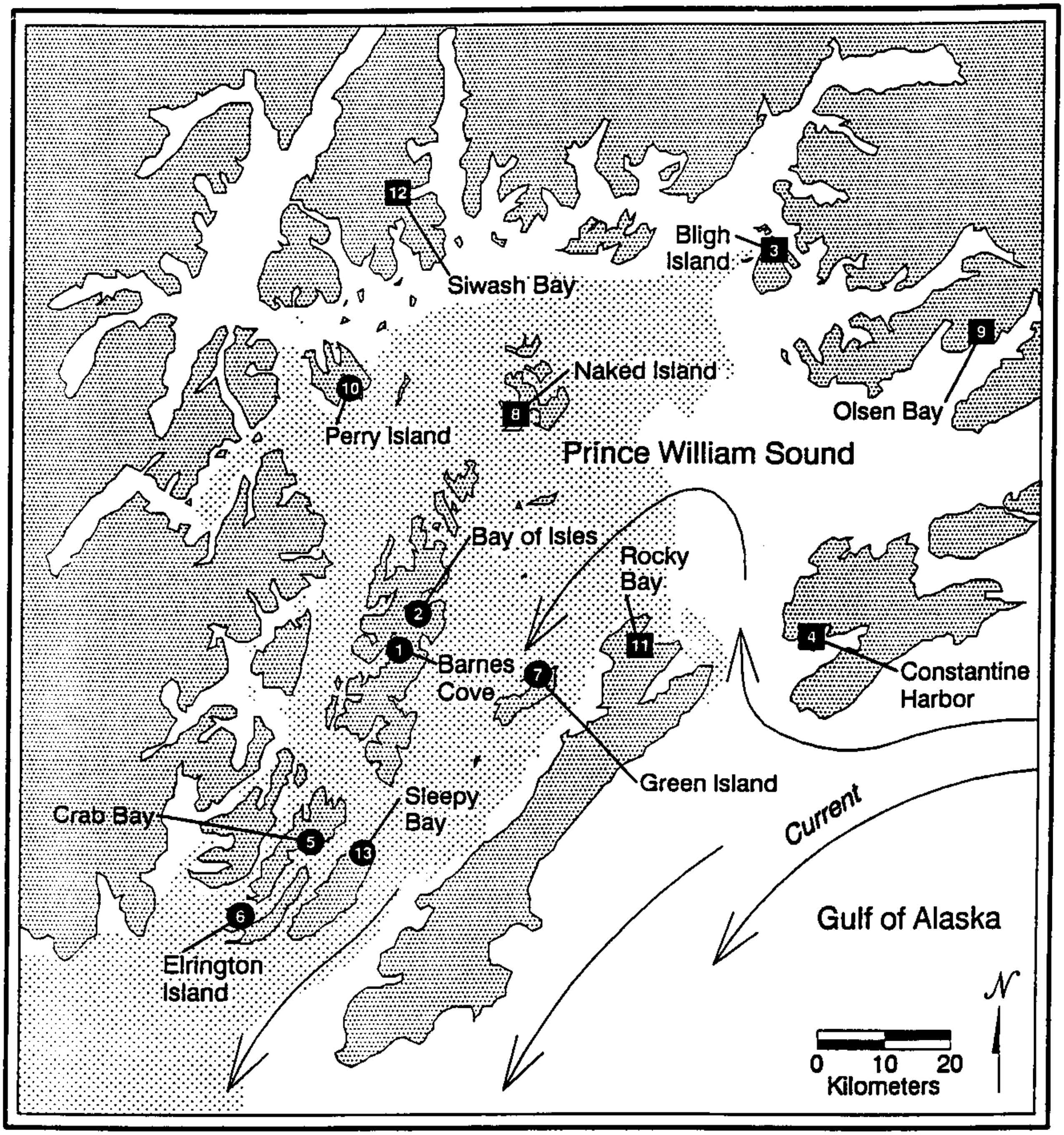

Figure 1.--Station locations in PWS, Alaska, where mussels and sediments were sampled for this study. Station numbers correspond to the station numbers in Table 1 and in the hydrocarbon data tables in Appendix II. Arrows indicate the direction of prevailing oceanic currents through the Sound (Galt et al. 1991). Shaded area indicates the path of surface oil through the Sound. ■ indicates stations established in 1977 described by Karinen et al. (1993).

Table 1.--Station locations, station numbers, and latitude and longitude where mussel and sediments samples were collected from PWS and the Gulf of Alaska for this study. Station numbers correspond with those of Figures 1 and 2 in the text, and with those in Appendix II. Italicized station names indicate stations established in 1977 as described by Karinen et al. (1993). The symbol "x" indicates collection of both sediment and mussel samples at the indicated station and date; the symbols "s" and "m" respectively indicate collection of sediment or mussels only.

				1989						1990			1991
Station	Station Number	Latitude	Longitude	Mar	Apr	May	Jun	Jul	Aug	Apr	Jun	Aug	Apr/May
PWS													
Barnes Cove	1	60°18'31"	147°45'43"	x	x	x	m		x	x	x	x	x
Bay of Isles	2	60°21'48"	147°41'30"	x	x	x	m		x	x	x	x	x
Bligh Island	3	60°52'02"	146°45'16"	x		x	m		x	x	x	x	x
Constantine Harbor	4	60°20'56"	146°39'45"	s		s	m		s	x	x	s	
Crab Bay	5	60°04'20"	147°59'50"		x	x	m		x	x	x	x	x
Elrington Island	6	59°58'13"	148°08'35"			x	x		x	x	x	x	x
Green Island	7	60°17'42"	147°22'30"		m								
Naked Island	8	60°39'07"	147°26'15"	x	x	x	x		x	x	x	x	x
Olsen Bay	9	60°44'22"	146°11'53"		x	x	m		x	x	x	x	x
Perry Island	10	60°40'32"	147°54'54"			m			x	x	x	x	x
Rocky Bay	11	60°20'12"	147°07'28"	x		x	m		x	x	x	x	x
Siwash Bay	12	60°57'15"	146°39'45"	x		x			x	x	x	x	x
Sleepy Bay	13	60°04'00"	147°50'02"			x			x	x	x	x	x
GULF OF ALASKA													
Anton Larson Bay	14	57°52'00"	152°37'42"					x					
Buskin River	15	57°45'26"	152°29'06"					x					
Foul Bay	16	58°20'00"	152°52'00"					x					
Harris Bay	17	59°44'12"	149°53'30"		x					x	x		
McDonald's Lagoon	18	58°09'18"	152°19'36"		s			x					
Monashka Bay	19	58°49'03"	152°25'18"					x					
Paul's Bay	20	58°23'24"	152°21'12"		x			x					
Petrof Point	21	59°22'25"	151°00'00"			x	m						
Quicksand Cove	22	59°47'10"	149°47'12"		x				x	m	m		
Tetrakof Point	23	58°30'54"	152°23'36"		x			x					
Verdant Cove	24	59°41'48"	149°44'20"		x				x	m	m		
Woman's Bay	25	57°42'30"	152°33'14"					m					

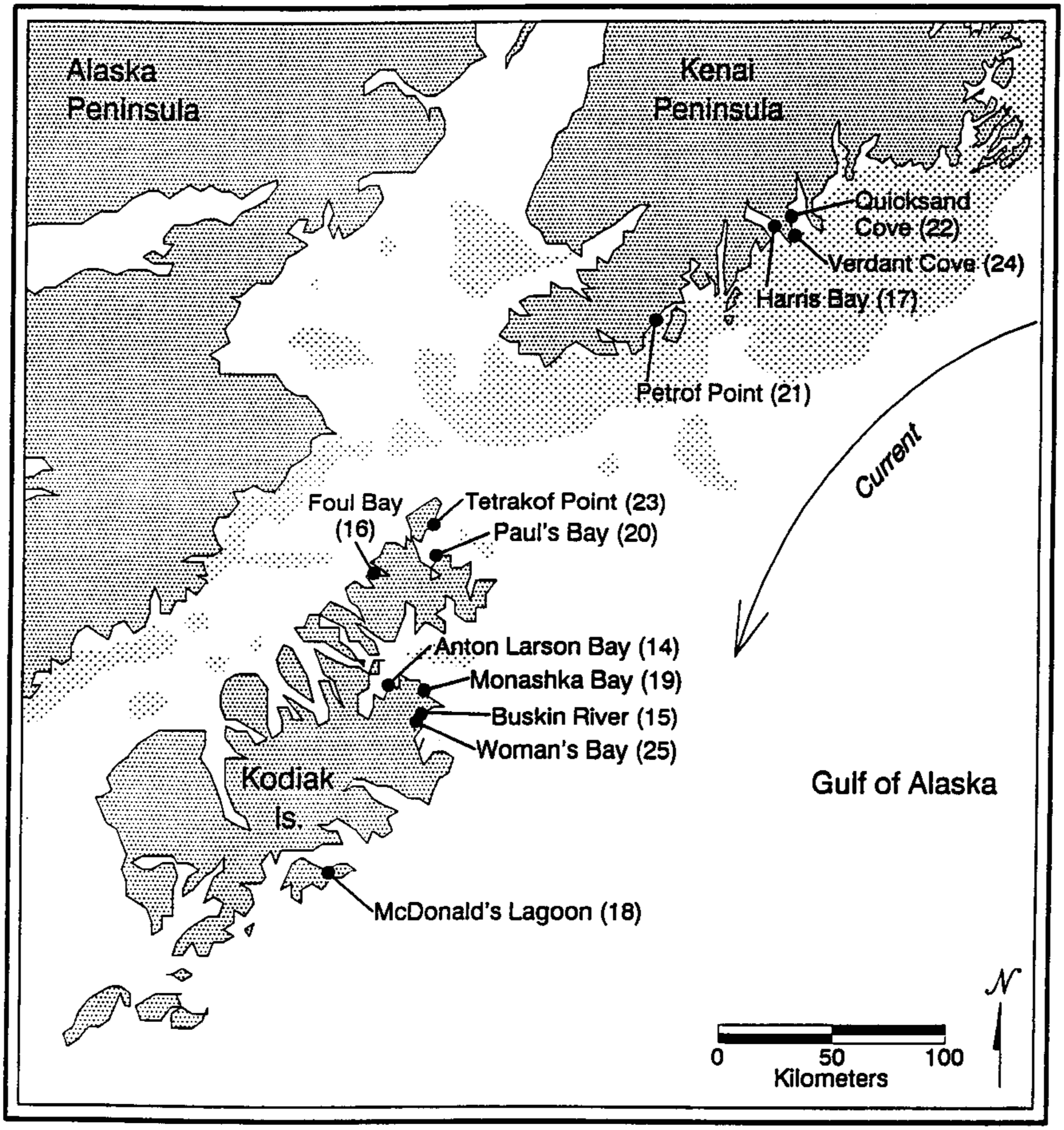

Figure 2.--Station locations in the Gulf of Alaska where mussels and sediments were sampled for this study. Station numbers correspond with station numbers in Table 1 and in the hydrocarbon data tables in Appendix II. Arrow indicates the direction of prevailing oceanic currents in the northern gulf (Galt et al. 1991). Shaded areas indicates the path of surface oil in the northern gulf.

Sample Labeling and Chain of Custody

Sample labels included site name, type of sample, date of sampling, and unique identifying number. The record of each person who had custody of samples, the date, time, and location of custodial transfer; and signatures of transferring parties are on file at the Auke Bay Laboratory. Shipping containers were crosswrapped with custody tape signed and dated by the person shipping the containers.

Dry Weight Determination

Ratios of sample wet and dry weights were measured by dehydrating ca. 1 g of homogenized sample for 24 h at 60°C and weighing the mass remaining.

Chemical Analysis

Mussels and sediments were prepared and analyzed following procedures presented in detail by Larsen et al. (1992) and Short et al. (in press). Briefly, ca. 10 g (wet weight) homogenized mussel tissue, or 10-20 g wet sediment, was added to 70 g anhydrous sodium sulfate for dehydration, and spiked with 500 μL hexane solution containing five alkane and six aromatic deuterated surrogate hydrocarbon standards (listed in Table I-1, Appendix I).

Hydrocarbons were extracted from mussels by maceration with dichloromethane. The mixture of homogenate, sodium sulfate, and surrogate standards was macerated mechanically for 1 min with each of three successive 50 mL aliquots of dichloromethane, with the dichloromethane separated by filtration through an additional 10 g sodium sulfate on a combusted glass fiber filter after each maceration. The filters and filtered solids were macerated together after the first filtration. The combined dichloromethane extracts were reduced in volume over steam and exchanged with hexane to a final volume of ca. 1 mL.

Hydrocarbons were extracted from sediments by prolonged room temperature agitation with dichloromethane following a procedure developed by Brown et al. (1980). The mixture of sediment, sodium sulfate, and surrogate standards was agitated mechanically for three successive periods of 16 h, 6 h, and 16 h with each of three successive 100 mL aliquot of dichloromethane, with the dichloromethane separated by filtration after each agitation period. The combined dichloromethane extracts (ca. 300 mL) were reduced in volume over steam and exchanged with hexane to a final volume of ca. 1 mL.

Extracted alkane and aromatic hydrocarbons were separated by silica gel-alumina column chromatography. The chromatographic columns consisted of 20 g silica gel (deactivated with 5% water) above 10 g alumina in a 20 mm i.d. glass column filled with pentane. The alkane hydrocarbons eluted with 50 mL pentane, followed by the aromatic hydrocarbons that eluted with 250 mL 1:1 pentane:dichloromethane (by volume). The pentane solutions containing the alkane hydrocarbons from the samples were each reduced in volume over steam and exchanged with hexane to a final volume of ca. 1 mL spiked with 50 μL hexane internal standard containing 42 ng/μL dodecylcyclohexane (DCH) for estimating recoveries of the deuterated alkane hydrocarbon surrogate standards added initially, and stored for analysis by gas chromatography. The pentane:dichloromethane solutions containing the aromatic hydrocarbons were reduced in volume over steam to a final volume of ca. 0.5 mL, and stored for further purification before analysis by gas chromatography/mass spectrometry (GC/MS).

Aromatic hydrocarbons from the sample extracts were further purified by gel-permeation high performance liquid chromatography. The injection volume was 0.5 mL into dichloromethane flowing at 7 mL/min through 2 size-exclusion gel columns (Phenomenex, phenogel, 22.5 mm x 250 mm, 100 Å pore size) connected sequentially. The initial 110 mL elute was discarded, and the following 53 mL was concentrated over steam and exchanged with hexane to a final volume of ca. 1 mL, then spiked with 25 μL hexane containing 80 ng/μL hexamethylbenzene (HMB) as an internal standard for estimating recoveries of the deuterated aromatic hydrocarbon surrogate standards added initially.

Polynuclear Aromatic Hydrocarbon Analysis

Instrumental Method - PAHs in samples and in standards were separated and analyzed using a Hewlett Packard 5890 series II gas chromatograph equipped with a 5970B mass selective detector (MSD)[1]. The injection volume was 2 μL into a split less injection port at 300°C. The initial oven temperature was 60°C, increasing at 10°C per min immediately following injection to a final temperature of 300°C which was maintained for 25 min. The chromatographic column was a 25 m fused silica capillary (0.20 mm i.d.) coated with a 0.33 μm thick film of 5% phenyl methyl silicone. The helium carrier gas was maintained at 70 kPa inlet pressure.

The chromatographic column eluted into the 70 kV electron impact MSD through a 300°C transfer line. The ionizer temperature and pressure were 240°C and 10^{-5} torr, respectively. The mass detector was operated in the selected ion monitoring (SIM) mode. The specific ions and retention time windows were chosen to detect all the calibrated aromatic hydrocarbons, the surrogate standards, and the 200 most prominent peaks found on the total ion chromatogram of an aliquot of crude oil from the hold of the T/V *Exxon Valdez* analyzed as a sample, with the MSD operating in the scan mode. The MSD was tuned using mass 69, 102, and 512 fragments of perfluorotributylamine prior to each batch of samples analyzed.

PAH Identification - Calibrated PAHs were identified on the basis of retention time and ratio of two mass fragment ions characteristic of each hydrocarbon. Calibrated PAHs are listed in Table I-2, Appendix I, and include dibenzothiophene and the aromatic hydrocarbons in Standard Reference Material (SRM) 1491 supplied by the National Institute of Standards and Technology (NIST). Also listed in Table I-2 are the mass of the quantification ion, the mass of the

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[1]Reference to trade name does not indicate endorsement by NOAA, National Marine Fisheries Service.

confirmation ion, and the mean ratio of these two ions in the calibration standards. Chromatographic peaks were identified as a calibrated aromatic hydrocarbon if both ions were codetected at retention times within ±0.15 min of the mean retention time of the hydrocarbon in the calibration standards, and if the ratio of the confirmation ion to the quantification ion was within ±30% of the expected ratio.

Uncalibrated aromatic hydrocarbons include the alkyl-substituted isomers of naphthalene, fluorene, dibenzothiophene, phenanthrene, fluoranthene, and chrysene listed in Table I-3, Appendix I. Uncalibrated aromatic hydrocarbons were identified by the presence, within a relatively wide retention time window, of a single mass fragment ion that is characteristic of the uncalibrated aromatic hydrocarbon sought. Table I-3 lists the mass of the fragment ions used for both identification and measurement, and the retention time windows used. Note that the retention time windows for uncalibrated aromatic hydrocarbons are much wider than those for calibrated aromatic hydrocarbons. Mass fragments of uncalibrated aromatic hydrocarbons that eluted outside the windows listed in Table I-3 would not have been detected.

Measurement of PAHs - Concentrations of calibrated PAHs in the sample extracts were estimated using a multiple internal standard method employing a 5-point calibration curve for each calibrated aromatic hydrocarbon. The deuterated surrogate standards that were initially spiked into each sample are treated as internal standards; each surrogate compound is associated with one or more calibrated PAH (see Tables I-1 and I-2, Appendix I). A calibration curve for each calibrated PAH and batch of samples analyzed is based on five different hexane dilutions of dibenzothiophene and NIST SRM 1491; 1 mL of each dilution contained the same amount of deuterated surrogate standard as was initially spiked into the samples. Each calibration curve is derived from linear regression of the ratio of MSD/SIM quantification ion response of the calibrated PAH and the associated deuterated surrogate standard as the ordinate, and the ratio of the amount of calibrated PAH and the amount of deuterated surrogate in 1 mL of each of five calibration standards as the abscissa. The highest calibration standard is 25 times more concentrated than the lowest standard. PAH concentrations in the lowest standard correspond with PAH concentrations in a 10 g sample of mussel tissue or sediment ranging from 3.6 to 8.3 μg/g (or 3 to 22 times the PAH concentrations that would have resulted from samples containing PAHs at the method detection limits (MDLs), see below).

The amount of a calibrated PAH in the dichloromethane extract of a sample was calculated as the product of the inverse of the calibration curve regression line slope, the ratio of MSD/SIM quantification ion response to the calibrated PAH and the associated deuterated surrogate standard for the sample extract, and the amount of the deuterated surrogate standard associated with the PAH. The concentration of a calibrated PAH in the sample was calculated as the ratio of the amount of the hydrocarbon in the dichloromethane extract and the measured wet weight of the homogenate aliquot analyzed (about 10 g). Note that this procedure compensates for losses of calibrated PAHs during sample preparation.

Concentrations of uncalibrated PAHs in the samples were determined using calibration curves and procedures for the most similar calibrated PAH. The MSD/SIM response to the quantification ion of each uncalibrated PAH identified with like molecular mass were summed; this sum was used in place of the most similar calibrated PAH response in the procedure described above for calculating concentrations of calibrated PAHs. For example, the fluorene calibration curve and procedure was used for all the alkyl-substituted fluorenes identified, but the 1-methylphenanthrene calibration curve and procedure was used for all the alkyl-substituted phenanthrenes.

Detection Limits - MDLs were estimated for each calibrated PAH analyte following the procedure described in Appendix B, Chapter 40 Code of Federal Regulations, Part 136. These estimates of detection limit concentrations are indicated for each calibrated PAH analyte in sediment and in mussel tissue in Table I-5, Appendix I. Detection limits for each sample were determined as the ratio of the experimentally estimated MDL expressed as a mass, and the sample dry weight.

MDLs for uncalibrated PAHs were not experimentally determined. Consequently, detection limits for these analytes are arbitrarily assumed as the MDL of the most closely related calibrated PAH analyte.

Quality Assurance - Samples were analyzed in batches consisting of 12 samples, which together with 5 calibration curve standards, and 6 quality control samples arranged in a specific sequence, are denoted as strings. Replicated samples were analyzed in different strings. The 6 quality control samples included 2 mid-level calibration standards, 2 reference samples, and 2 method blanks, one of which was spiked with hydrocarbon standards (denoted as spiked blank). One each of the mid-level calibration standards and of the reference samples, and the method blank were analyzed in the middle of each string, and the remaining three quality control samples were analyzed at the end of each string.

The mid-level calibration standards were analyzed to assess calibration accuracy and to verify instrument stability during analysis of the string; the results are summarized in Table III-1, Appendix III. Note that this assessment of accuracy is directly related to NIST standards for all calibrated PAHs except dibenzothiophene.

Reference samples for mussels were prepared as 10 g aliquot of NIST SRM 1974 enriched with a solution of selected PAH analytes prepared by NIST (denoted as QC-TEST-1) to tissue concentrations ranging from 19 to 205 ng PAH/g, and were analyzed to assess analytical precision within and among strings for the selected PAH analytes. The results of the mussel reference sample analyses are summarized in Table III-2, Appendix III. The sediment reference samples were 1 g aliquot of a material prepared by NIST (denoted as QC-SED-1), and were analyzed to assess analytical precision within and among strings for calibrated PAH analytes. The results of the sediment reference sample analyses are summarized in Table III-3, Appendix III.

Method blanks were analyzed to assess contaminants introduced during processing and analysis. Mussel tissue or sediments and method blank samples were processed and analyzed identically, except the method blanks contained no matrix material. Also, method blanks spiked with an amount of NIST SRM 1491 and dibenzothiophene equivalent to amounts that would be present from sample concentrations of 50 to 100 ng PAH/g, were analyzed to assess overall method accuracy. The results of the spiked method blank sample analyses are summarized in Table III-4, Appendix III.

Calibration curve linearity, expressed as the square of the correlation coefficient of regression (r^2), was greater than 0.99 for more than 95% of the PAH calibration curves. Recoveries of the deuterated surrogate standards, that were added to each sample, were estimated by comparing the ratio of deuterated surrogate response and the HMB internal standard of a sample with the mean of the same ratio derived from the calibration standards of the sample string (1 mL of each calibration standard contains the same amounts of these standards as was added to each sample, and each sample was concentrated to about 1 mL for instrumental analysis). PAHs that are associated with deuterated surrogate standard recoveries of less than 30%, or more than 150%, are treated as missing, affecting 2.7% of the mussel PAH data and 0.4% of the sediment PAH data. The remaining PAH data for these samples are listed in Table II-9, Appendix II, and these data were excluded from further consideration in this report.

The precision of the analytical procedure for selected PAH analytes, expressed as the coefficient of variation (CV, i.e., the ratio of the standard deviation and the mean of the calibrated PAHs found in the reference samples, expressed as percent) calculated from the results of the 36 mussel and 37 sediment strings analyzed, ranged from 13% to 28% for mussels (median 20%; Table III-2, Appendix III), and from 5% to 50% for sediments (median 18%; Table III-3, Appendix III). Mean accuracy, determined as the ratio (expressed as percent) of the mean amount of calibrated PAH found in the NIST calibration check samples of the 73 mussel and sediment strings analyzed for this study and the amount added, ranged from 94% to 101% (median 99%); corresponding CVs ranged from 2% to 11% (median 4%; Table III-1, Appendix III). Mean accuracy based on the spiked blank samples ranged from 91% to 117% (median 101%); corresponding CVs ranged from 5% to 15% (median 9%; Table III-4, Appendix III).

Calibrated PAHs were detected above respective MDLs only once in the analysis of 25 calibrated PAHs in each of 73 method blanks. Uncalibrated PAHs were detected above estimated MDLs 13 times in the analysis of 18 uncalibrated PAHs in each of the 73 method blanks.

Alkane Hydrocarbon Analysis

Instrumental Method - Alkanes in samples and in standards were separated and analyzed using a Hewlett Packard 5890 series II gas chromatograph equipped with a flame ionization detector (FID). The injection volume was 1 μL into a splitless injection port at 300°C. The initial oven temperature of 60°C was maintained for 1 min then increased at 6°C per min to a final temperature of 300°C which was maintained for 26 min. The chromatographic column was a 25 m fused silica capillary (0.20 mm ID) coated with a 0.33 μm thick film of 5% phenyl methyl silicone. The helium carrier gas flow rate was 0.80 mL per min, and the column effluent was combined with 34 mL per min nitrogen make-up gas before entering the FID. The FID was operated using hydrogen and air flowing at 33 and 410 mL per min, respectively.

Alkane hydrocarbons were identified on the basis of their retention times. Any peak detected above the integrator threshold within ±0.25% of the mean retention time of an alkane in the calibration standards was identified and quantified as that alkane. The calibration standards were prepared at our Laboratory, and contained the normal alkanes from decane through triacontane, dotriacontane, tetratriacontane, and 2,6,10,14-tetramethylpentadecane (pristane).

Alkane Hydrocarbon Measurement - Concentrations of calibrated alkanes in samples were estimated using an internal standard method employing a 5-point calibration curve for each calibrated alkane hydrocarbon. The deuterated surrogate standards that were initially spiked into each sample are treated as internal standards, where each surrogate compound is associated with one or more calibrated alkane (see Tables I-1 and I-4, Appendix I). A calibration curve for each calibrated alkane and batch of samples analyzed is based on five different hexane dilutions of the concentrated alkane standard prepared at our Laboratory, where 1 mL of each dilution contained the same amount of deuterated surrogate standard as was initially spiked into the samples. Each calibration curve is derived from linear regression of the ratio of FID response of the calibrated alkane and the associated deuterated surrogate standard as the ordinate, and the ratio of the amount of calibrated alkane and the amount of deuterated surrogate in 1 mL of each of five calibration standards as the abscissa. The highest calibration standard is 50 times more concentrated than the lowest standard, and alkane concentrations in the lowest standard correspond with alkane concentrations in a 10 g sample of mussel tissue or sediment ranging from 41 to 128 μg/g.

Concentrations of 2,6,10,14-tetramethylhexadecane (phytane) were also estimated as the mean of results derived from the calibrations curves for octadecane and nonadecane, because a suitable standard for this alkane was not available. The accuracy of this procedure was, however, evaluated using NIST-derived standards (see below).

Amounts of uncalibrated alkane hydrocarbons and the cumulative amount of hydrocarbons in the unresolved complex mixture (UCM) were calculated using respective detector responses and the calibration curve for hexadecane. FID response due to the UCM was determined as the difference of the total FID response and the response due to distinguishable peaks.

Detection Limits - MDLs were estimated for each calibrated alkane analyte following the procedure described in Appendix B, Chapter 40 Code of Federal Regulations Part 136. These estimates of detection limit concentrations are indicated for each calibrated alkane analyte in Table I-5, Appendix I.

Quality Assurance - Samples were analyzed in strings comprising 12 samples, 5 calibration curve standards, and 7 quality control samples arranged in a specific sequence. Replicated samples were analyzed in different strings. The 7 quality control samples included 2 mid-level calibration standards, 2 reference samples, a method blank, and a NIST-derived alkane standard. One each of the mid-level calibration standards and of the reference samples, and the method blank were analyzed in the middle of each string, and the remaining 4 quality control samples were analyzed at the end of each string.

The mid-level calibration standards were analyzed to verify instrument stability during analysis of the string; the results are summarized in Table III-5, Appendix III. The reference samples for mussels were prepared as 10 g aliquot of NIST SRM 1974 enriched with a solution of alkanes prepared at our Laboratory to tissue concentrations ranging from 490 to 1,300 ng alkane/g dry weight, and were analyzed to assess analytical precision within and among mussel strings for the alkane analytes; the results are summarized in Table III-6, Appendix III. The sediment reference samples were 1 g aliquot of a material prepared by NIST (denoted as QC-SED-1), and were analyzed to assess analytical precision within and among strings for the calibrated alkane analytes. The results of the reference sample analyses are summarized in Table III-7, Appendix III.

Method blanks were analyzed to assess contaminants introduced during processing and analysis. Mussel tissue or sediments and method blank samples were processed and analyzed identically, except the method blanks contained no matrix material. Method blanks spiked with an amount of Laboratory-prepared standards equivalent to amounts that would be present from sample concentrations of 4,000 to 13,000 ng alkane/g, were analyzed to assess overall method accuracy. The results of the spiked method blank sample analyses are summarized in Table III-8, Appendix III. Also, a NIST-derived alkane standard (denoted as QA-CH-2) was analyzed with each string to relate accuracy assessments of alkanes with NIST standards; results of these analyses are summarized in Table III-9, Appendix III.

Calibration curve linearity, expressed as the square of the correlation coefficient of regression (r^2), was greater than 0.99 for more than 95% of the alkane calibration curves. Recoveries of the deuterated surrogate standards, added to each sample, were estimated by comparing the ratio of deuterated surrogate response and the DCH internal standard of a sample with the mean of the same ratio derived from the calibration standards of the sample string (1 mL of each calibration standard contains the same amounts of these standards as was added to each sample, and each sample was concentrated to about 1 mL for instrumental analysis). Alkanes that are associated with deuterated surrogate standard recoveries of less than 30%, or more than 150%, are treated as missing, affecting 1.7% of the mussel alkane data and 0.9% of the sediment alkane data. The remaining alkane data for these samples are listed in Table II-10, Appendix II, and these data were excluded from further consideration in this report.

The precision of the analytical procedure is evaluated on the basis of the results of the two reference samples analyzed with each string. Alkane CVs in reference samples ranged from 12% to 16% (median 13%; Table III-6, Appendix III), and from 8% to 41% for sediments (median

18%; Table III-7, Appendix III). Mean accuracy, determined as the ratio (expressed as percent) of the mean amount of calibrated alkane found in the calibration check samples of the 73 strings analyzed for this study and the amount added, ranged from 95% to 103% (median 100%); corresponding CVs ranged from 0.7% to 17% (median 2.6%; Table III-5, Appendix III). Mean accuracy based on the spiked blank samples ranged from 91% to 108% (median 99.6%); corresponding CVs ranged from 3.6% to 15.2% (median 5.3%; Table III-8, Appendix III). Mean accuracy based on the NIST QA-CH-2 standards ranged from 86% to 128% (median 94.4%); corresponding CVs ranged from 3% to 65% (median 4.6%; Table III-9, Appendix III).

Calibrated alkanes were detected above respective MDLs only twice in the analysis of 25 calibrated alkanes in each of 73 method blanks.

Data Analysis

Summarized Hydrocarbon Results - Alkane and PAH results are presented in full in Appendix II, and are summarized below as mean total normal alkanes (TNAs) or total polynuclear aromatic hydrocarbons (TPAHs). TNA is the sum of all normal alkanes detected, and TPAH is the sum of all PAHs detected, excluding perylene, a naturally occurring PAH found in the marine sediments of the sound. Mean TNA or TPAH is the mean of the TNA or TPAH summed for replicated samples, and is presented together with ±1 SE. The number of replicated samples is three unless indicated otherwise. All units are presented as ng/g dry weight.

Carbon Preference Index - A carbon preference index (CPI) was calculated as:

$$CPI = 2*(C27 + C29)/(C26 + 2*C28 + C30)$$

This form of CPI was used because these five alkanes were simultaneously above MDLs most frequently.

Analysis of Variance - One-way ANOVA used to evaluate the significance of time variation of sediment TNA and TPAH means at Constantine Harbor and Rocky Bay. These data were not transformed.

Detection Limit Convention for Replicated Samples - In cases where hydrocarbon concentrations were replicated and were near detection limits, resulting in some of the replicated concentrations above the MDL for an analyte and some below, the analyte was reported as detected in the tables of Appendix II, if the concentration mean was above the MDL. If the concentration mean was below the MDL, the analyte was reported as below the MDL in these tables.

Excluded Samples - Hydrocarbon results from 25 sediment samples were excluded from consideration in this study because they appeared to have become contaminated after shipment to another laboratory where these samples were analyzed. Evidence for this conclusion is presented in Appendix IV, and the excluded hydrocarbon results are listed in Table IV-1 of the Appendix.

Identification of EVO - Identification of EVO is presumptively based on ratios of PAH homologue groups. Specifically, PAHs were considered as derived from the spilled oil if: (1) the ration of the sum of the alkyl-dibenzothiophenes and the sum of the alkyl-phenanthrenes exceeded 0.29; (2) the ratios of the sum of the alkyl-chrysenes and the sum of the alkyl-phenanthrenes exceeded 0.05; and (3) the sum of the alkyl-phenanthrenes exceeded 20 ng/g in sediments, or 50 ng/g in mussels (dry weight basis). Samples with a hydrocarbon signal judged so derived are denoted as EVO-PAH.

RESULTS

PWS

Mussel PAHs - Concentrations of PAHs derived from EVO were found in mussels at all stations within or near the path followed by spilled oil through PWS, and were highest during the first three months after the Spill, followed by a steady decline. Mean TPAH concentrations in mussels increased from less than 550 ng/g at any station sampled just prior to oil impact, to over 100,000 ng/g within six weeks at stations where beached oil was especially heavy (Fig. 3). The highest TPAH concentrations found in mussels were in samples collected during April through mid-June 1989 from Green Island (234,000 ± 32,400 ng/g, $n = 2$), Sleepy Bay (143,000 ± 13,900 ng/g), and Elrington Island (30,100 ± 5,060 ng/g), where heavy beach oiling was present on or near the mussel bed sampled. Mean TPAH concentrations at Sleepy Bay and Elrington Island declined to 38,600 ± 4,330 ng/g and 4,480 ± 1890 ng/g by August 1989 (Fig. 3).

The PAH composition of mussels sampled from oiled beaches is similar to that of weathered spilled oil. For example, the relative abundance of PAHs in mussels collected from Sleepy Bay in May 1989 is very similar to that of floating mousse oil collected near eastern Knight Island 11 days following the Spill (Figs. 4A and B).

The maximum TPAH concentrations were lower in mussels at stations where beach oiling was less readily apparent. At Bay of Isles, Naked Island, Perry Island, and Crab Bay, mean TPAH concentrations were consistently highest in April or May 1989, and ranged from 1,790 ± 13.4 ng/g ($n = 2$) at Crab Bay to 18,000 ± 1,540 ($n = 2$) at Bay of Isles (Figs. 3A and B). By August, these concentrations declined to 51.4 ± 26.0 at Crab Bay and 2,530 ($n = 1$) at Bay of Isles. Except at Crab Bay in August, the PAH composition in mussels from all these stations after March was similar to the composition of weathered EVO depicted in Fig. 4 (see Figs. 3A and B).

Contributions of EVO-PAHs oil to mussels at Barnes Cove and at Rocky Bay were relatively small. At Barnes Cove, PAHs were compositionally similar to weathered EVO only in mussels collected in May 1989; the mean TPAH concentration was 770 ± 11.5 ng/g (Fig. 3C). Mean TPAH concentrations in mussels collected from Barnes Cove during other sampling periods in 1989 ranged from 71.2 ± 13.4 ng/g (in August) to 230 ± 78.3 ng/g (in April), and consisted mainly of naphthalenes; the single most abundant PAH detected. At Rocky Bay, PAHs were

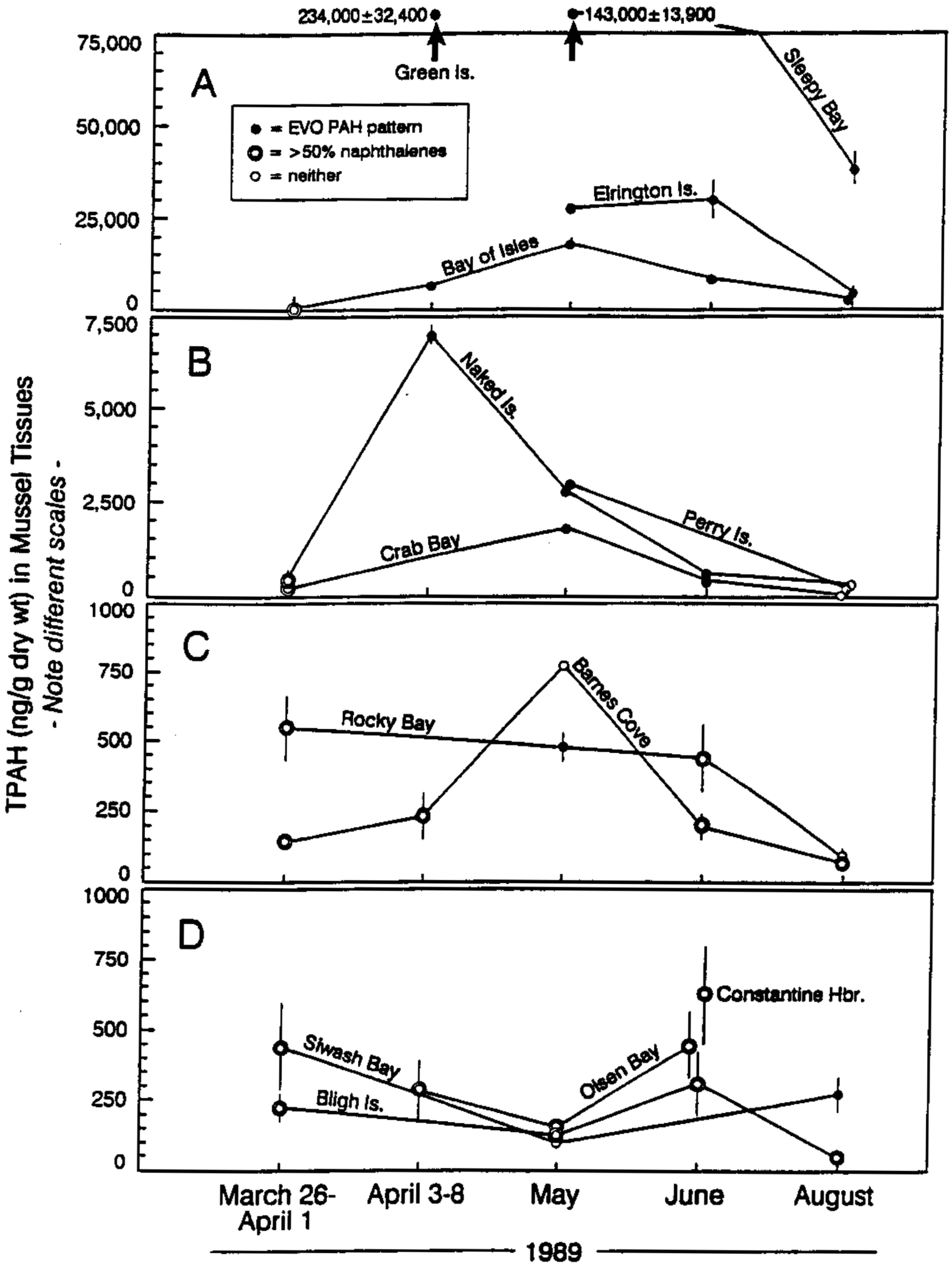

Figure 3.--Concentrations of TPAHs in mussels collected from PWS in spring and summer 1989. Filled symbols indicate PAH compositions similar to that depicted in Figure 4. Open concentric circle symbols indicate PAHs that consist mostly of naphthalenes. A. Bay of Isles, Elrington Island, Green Island, and Sleepy Bay stations. B. Crab Bay, Naked Island, and Perry Island stations. C. Barnes Cove and Rocky Bay stations. D. Bligh Island, Constantine Harbor, Olsen Bay, and Siwash Bay stations. Note the different scales on the y axes. Units are ng TPAH/g dry tissue weight.

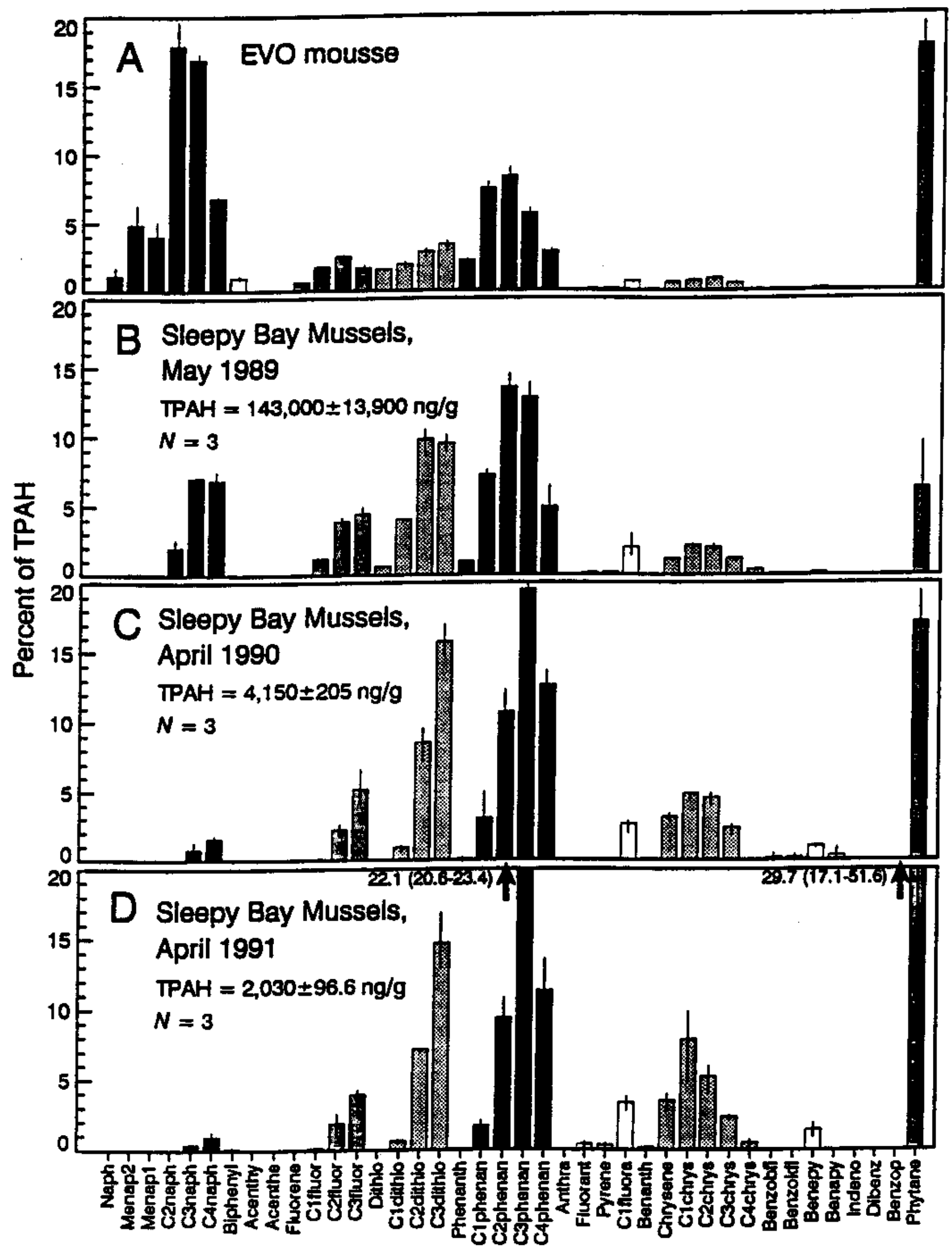

Figure 4.--Relative abundance of PAHs and phytane in: A. Mousse collected from sea surface of western Montague Strait 11 days following the EVOS; B. mussels from Sleepy Bay, May 1989; C. mussels from Sleepy Bay, April 1990; and D. mussels from Sleepy Bay, April 1991. Relative abundances for each sample are calculated as the ratio (expressed as percent) of the analyte to the sum of all the PAHs (excluding perylene) in the sample; thick vertical bars indicate the mean of these calculations for replicate samples, and thin vertical bars indicate the range. Also given are the mean TPAH concentrations of Sleepy Bay mussels ± SE, and *n* of replicate samples included. Units are ng PAH/g dry tissue weight.

compositionally similar to weathered EVO in mussels collected in May and in June 1989; mean TPAH concentrations were 474 ± 49.3 ng/g and 437 ± 178 ng/g. Although the mean TPAH concentration of mussels at Rocky Bay was higher in March 1989 at 544 ± 114 ng/g, the PAH composition consisted mainly of naphthalenes. By August 1989, the mean TPAH concentration in Rocky Bay mussels declined to 93.6 ± 32.2 ng/g (Fig. 3C).

Mean TPAH concentrations at the reference stations were usually less than 500 ng/g in 1989, and consisted mainly of naphthalenes. At Bligh Island, Constantine Harbor, and Olsen Bay, naphthalenes consistently accounted for more than half the TPAHs detected (Fig. 3D). Similarly, naphthalenes consistently accounted for more than half the TPAHs detected in all mussel samples collected in March prior to any oil spill impacts (compare Figs. 3A through D). However, at Siwash Bay, naphthalenes accounted for just less than half the TPAHs detected in May. The mean TPAH concentration was relatively low at 97.6 ± 5.83 ng/g; whereas, in August the PAH composition was similar to that of weathered EVO and the mean TPAH concentration was higher at 274 ± 61.4 ng/g ($n = 2$).

In 1990, mussel EVO-PAHs were consistently evident only in samples from Sleepy Bay. Mean mussel TPAH concentrations in Sleepy Bay samples were highest in August at 21,700 ± 1,510 ng/g; compared to 4,150 ± 205 ng/g in April and 1,830 ± 69.3 ng/g in June. The PAH composition of Sleepy Bay mussels was consistently similar to that of weathered EVO (Fig. 4C). Mean TPAH concentrations of mussels from Elrington Island and Bay of Isles were also relatively higher in samples collected later in 1990, but the PAH composition differed from that of weathered EVO. Mean TPAH concentrations in mussels increased from 90.5 ± 41.8 ng/g in April 1990 to 3,860 ± 167 ng/g in August at Elrington Island, and from 205 ± 43.7 ng/g ($n = 2$) in April to 489 ng/g ($n = 1$) in June at Bay of Isles. At both these stations, PAH compositions of mussels that contained relatively higher mean TPAH concentrations were similar to that of weathered EVO except for the chrysenes which were low or absent. This PAH composition pattern is consistent with that expected for diesel oil refined from North Slope crude oil.

Mean TPAH concentrations in mussels were low at the remaining stations sampled in PWS in 1990. Of all the remaining stations and times sampled, the median of the mean TPAH concentrations found was 19 ng/g, and 80% of these means were less than 100 ng/g. The highest mean TPAH observed was at Olsen Bay in August at 250 ± 245 ng/g ($n = 2$) due to a single sample that was not corroborated by the replicate.

PAHs from spilled oil persisted in mussels at Sleepy Bay to April 1991; the mean TPAH concentration was 2,030 ± 96.6 ng/g and the PAH composition was similar to weathered EVO (Fig. 4D). At the remaining stations sampled in April or May 1991, mean TPAH concentrations were less than 165 ng/g (median 80 ng/g).

In contrast with 1989, naphthalenes were generally relatively minor constituents of mussel samples collected in 1990 and in 1991, including samples that were low in TPAHs. Instead, the most abundant PAHs in these samples were usually alkyl-substituted PAHs sporadically detected near detection limits.

Results of replicate TPAH concentrations of mussels usually agreed to within ±50% of the replicate mean. In 75% of the 48 replicated mussel samples for which the replicate mean TPAH concentration exceeded 200 ng/g, the CV was less than 50%, and the median CV was 26.3%. This means that for replicates consisting of two or three samples, results agreed to within ±50% of the mean in 75% of samples where the mean TPAH concentration exceeded 200 ng/g.

Mussels Alkanes, including Phytane - Mussels in PWS that contained the highest TPAH concentrations also contained the highest concentrations of TNA including phytane. Mean TNA and phytane concentrations were highest in mussels sampled from April to June 1989 at Green Island, Sleepy Bay, Elrington Island, Bay of Isles, and Naked Island (Figs. 5A and B). Concentrations were highest at Green Island and Sleepy Bay at 282,000 ng/g ($n = 1$) and 96,700 ± 13,300 ng/g, and exceeded 9,000 ng/g at the other three named stations during this period. In contrast, mean TNA concentrations in mussels were consistently lower than 3,000 ng/g at all of the remaining stations sampled in 1989, as well as in mussels sampled from Elrington or Naked Islands in March prior to oil impacts (Fig. 5). Similarly, mean phytane concentrations were also highest at Green Island and Sleepy Bay at 15,900 ± 1,290 ng/g and 9,150 ± 2,430 ng/g respectively, and ranged from 2,530 ± 380 ng/g to 236 ng/g at Elrington Island, Bay of Isles, Naked Island, Perry Island, and Crab Bay in mussels sampled in April to June 1989. Phytane concentrations in mussels at these stations generally varied in concert with TNA concentrations. However, phytane concentrations in mussels were either near or below detection limits at the remaining stations sampled in 1989.

Alkane CPIs of mussels sampled after March 1989 were consistently lower than 1.75 at Green Island, Sleepy Bay, Elrington Island, Bay of Isles, and (except for August) at Naked Island (Fig. 5A). Alkane CPIs of mussels that contained higher concentrations of normal alkanes were consistently near one in 1989, indicating a petrogenic source for these alkanes. Normal alkanes of mussels sampled elsewhere, or sampled in March, consisted predominantly of the marine-derived alkanes C15, C17, and C19 (Fig. 5).

In 1990, concentrations of TNAs and phytane remained highest at the three stations where TPAHs were highest. At Sleepy Bay, TNA concentrations in mussels ranged from 4,890 ± 1,090 ng/g (in June) to 15,500 ± 1,550 ng/g (in August), and phytane concentrations ranged from 414 ± 69.3 ng/g to 2,380 ± 701 ng/g. At Elrington Island and Bay of Isles, TNA concentrations ranged from 1,950 ± 1,330 ng/g ($n = 2$) to 5,700 ± 1,270 ng/g ($n = 2$), and phytane concentrations ranged from near detection limits to 1,910 ± 265 ng/g. At the remaining stations, TNA concentrations ranged from below detection limits to 5,660 ng/g (except for one sample from Olsen Bay that contained 58,300 ng/g of C21), and phytane concentrations ranged from below detection limits to 394 ± 31.9 ng/g (at Crab Bay in August).

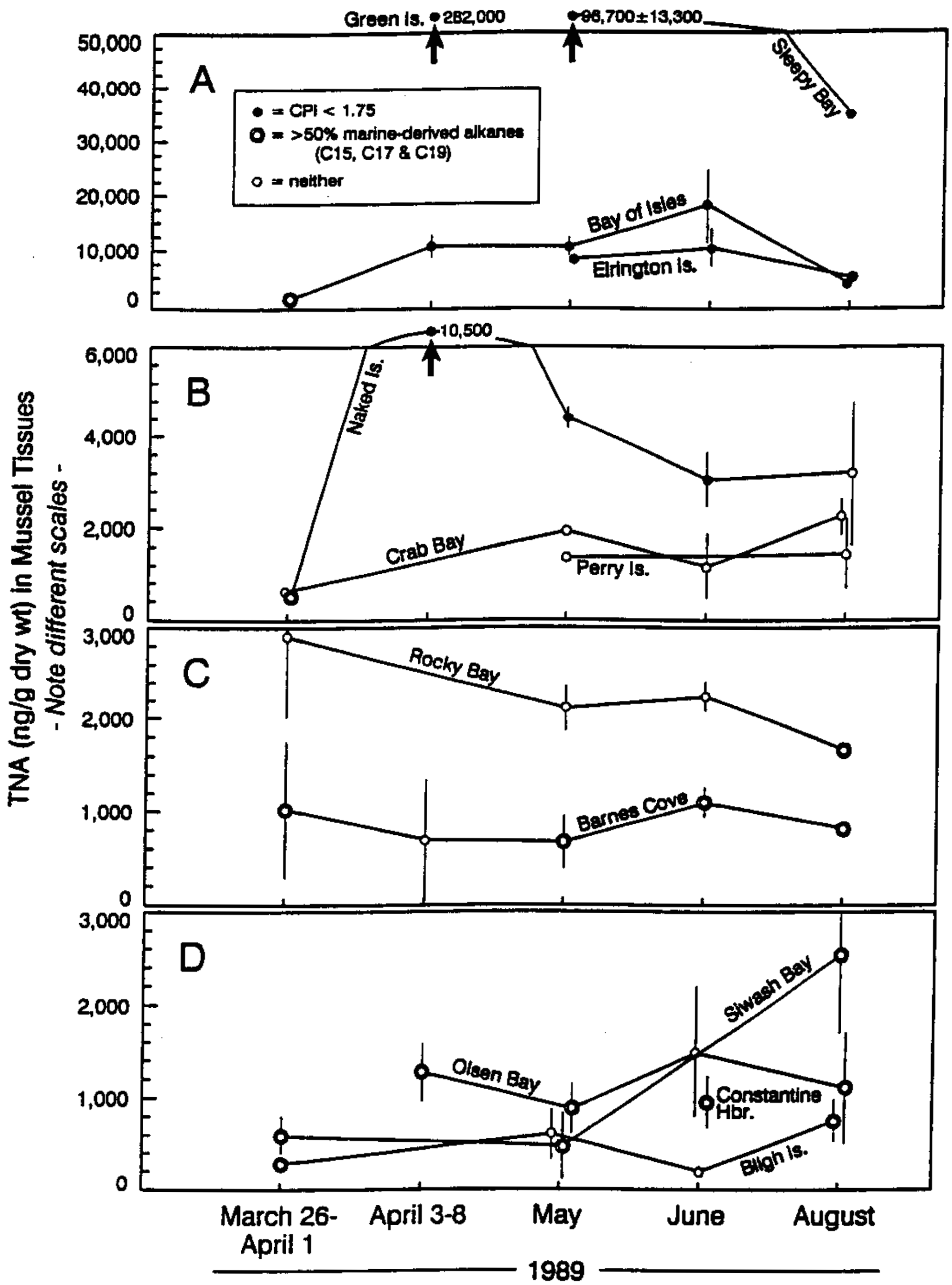

Figure 5.--Concentrations of TNAs in mussels collected from PWS in 1989. Filled symbols indicate CPIs (see methods section for definition) less than 1.75. Open concentric circle symbols indicate more than 50% of the TNAs consists of marine-derived alkanes C15, C17, and C19. A. Bay of Isles, Elrington Island, Green Island, and Sleepy Bay stations. B. Crab Bay, Naked Island, and Perry Island stations. C. Barnes Cove and Rocky Bay stations. D. Bligh Island, Constantine Harbor, Olsen Bay, and Siwash Bay stations. Note the different scales for the y axes for A - D. Units are ng TNA/g dry tissue weight.

Alkane CPIs could be meaningfully determined for mussel samples from only Sleepy Bay in 1990. At Sleepy Bay, alkane CPIs ranged from 0.77 to 1.25. Concentrations of normal alkanes in the range C25 to C30 were too frequently below detection limits in most of the remaining mussel samples collected from PWS stations in 1990 for the CPI calculation to be meaningful. Normal alkanes of mussels sampled at these stations consisted predominantly of the marine-derived alkanes C15, C17, and C19.

In 1991, concentrations of TNAs and of phytane were highest in mussels from Sleepy Bay. TNA concentrations in Sleepy Bay mussels were 2,880 ± 733 ng/g, compared with TNA concentrations that ranged from below detection limits to 936 ± 794 ng/g elsewhere. Similarly, phytane concentrations were 926 ± 251 ng/g at Sleepy Bay compared with concentrations elsewhere that were usually below detection limits (exceptions included Crab Bay and Naked Island where phytane concentrations were 411 ± 233 ng/g and 154 ± 154 ng/g). As in 1990, concentrations of normal alkanes in the range C25 to C30 were too frequently below detection limits in most of the mussel samples collected from PWS stations in 1991 for the CPI calculation to be meaningful (except at Sleepy Bay, where the CPI was 1.55). Normal alkanes of mussels sampled at these stations consisted predominantly of the marine-derived alkanes C15, C17, and C19.

Results of replicate TNA concentrations of mussels were more variable than results for TPAHs. In 52% of the 64 replicated mussel samples for which the replicate mean TNA concentration exceeded 1,000 ng/g, the CV was less than 50%, and the median CV was 42.9%. This means that for replicates consisting of two or three samples, results agreed to within ± 50% of the mean in 52% of samples where the mean TNA concentration exceeded 1,000 ng/g.

Pristane concentrations in mussels at reference stations varied substantially with season. Pristane concentrations were highest at reference stations in mussel samples collected during the spring. In 1989, pristane concentrations in mussels at reference stations increased from below detection limits to concentrations that ranged to 4,560 ± 711 ng/g during April through June, but these concentrations declined to near or below detection limits by August. Similar variations were evident at all stations in 1990. Mean pristane concentrations in mussels sampled in spring 1990 often exceeded 5,000 ng/g, then declined by factors of 10 or more by August at stations where petrogenic hydrocarbons were not evident.

Sediment PAHs - Aromatic hydrocarbons derived from the spilled oil were most consistently evident at Sleepy Bay. Mean TPAH concentrations were highest in sediments collected during the first sampling period in May 1989 at Sleepy Bay at 924 ± 407 ng/g. Mean TPAH concentrations declined slightly by August, and substantially by 1990 (Fig. 6) when they were below 200 ng/g. Mean TPAH concentration declined further by April 1991 to 33.1 ± 5.43 ng/g. These generally declining concentrations in sediments at Sleepy Bay are consistent with a similar pattern of decline in mussels (Fig. 6).

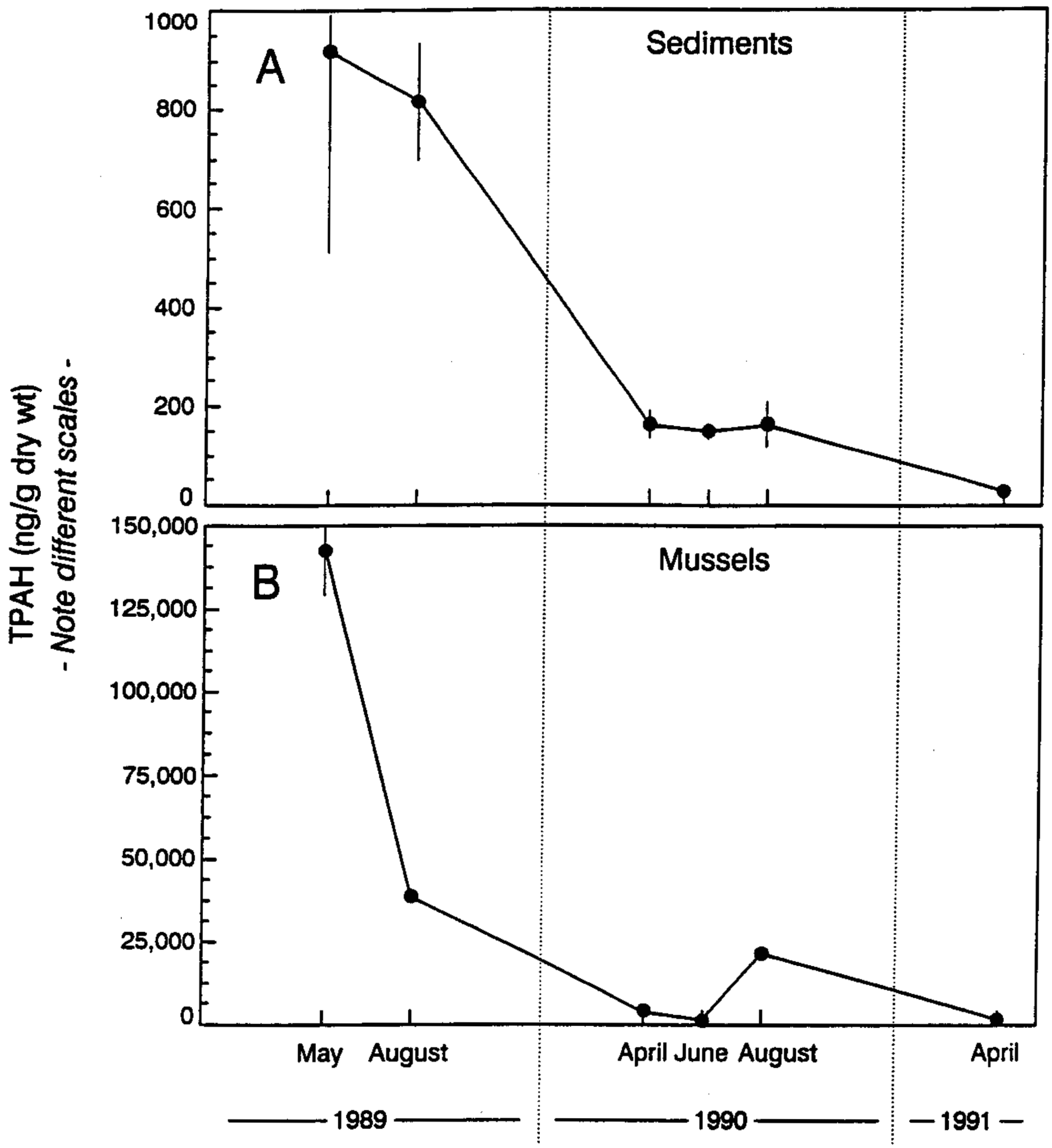

Figure 6.--Comparison of TPAHs in mussels (left-hand scale) and in sediments) at Sleepy Bay from spring 1989 to spring 1991. Samples were collected simultaneously but are offset for clarity. Vertical bars represent standard error; $n = 2$ or 3. Units are ng TPAH/g dry tissue or sediment weight.

The PAH composition of sediments sampled from Sleepy Bay is similar to that of weathered EVO. The relative abundance of PAHs in sediments at Sleepy Bay is similar to that of mussels there that were sampled concurrently (compare Figs. 4 and 7). In both sediments and mussels at Sleepy Bay, PAHs of lower molecular weight, or with lower alkyl substitution, are preferentially lost with time, compared with the relative PAH abundances of the benchmark mousse oil sampled 11 days following the Spill.

PAHs derived from the spilled oil were more sporadically detected at Elrington Island. In May 1989, mean TPAH concentrations in sediment samples collected from the lower intertidal area near the mussel sampling site contained 117 ± 35.7 ng/g compared with 11,600 ± 2,740 ng/g in visibly oiled sediments collected from the upper intertidal. At the lower intertidal site, mean TPAH concentrations were consistently lower than 50 ng/g for the remainder of 1989, but increased to 163 ± 89.9 ng/g ($n = 2$) in April 1990. After April 1990, mean TPAH concentrations in sediments at the lower intertidal site were consistently less than 10 ng/g. The PAH composition of sediments collected in May 1989 and April 1990 were similar to that of the weathered mousse sample. However, PAH concentrations in the remaining sediments collected from this station were too frequently below detection limits to indicate possible PAH sources.

PAHs derived from the spilled oil were also sporadically detected in sediments from Barnes Cove, Bay of Isles, Crab Bay, and Perry Island. In 1989, mean TPAH concentrations at these stations ranged to 427 ± 217 ng/g at Barnes Cove, and the highest mean TPAH concentrations in sediments from Bay of Isles, Crab Bay, and Perry Island were 155 ± 75.7 ng/g, 238 ± 86.8 ng/g, and 43.1 ± 31.0 ng/g, respectively. The relative abundance of PAHs of samples that contained the highest TPAH concentrations from each of these stations consistently matched that of weathered EVO in 1989. However, the pattern of PAH abundance characteristic of the weathered mousse was less evident in samples that contained lower TPAH concentrations from these stations, especially where mean TPAH concentrations were below 50 ng/g.

In 1990, PAH abundance patterns indicative of weathered spilled oil were consistently evident at Bay of Isles; mean TPAH concentrations ranged from 76.4 ± 7.81 ng/g ($n = 2$) to 197 ± 14.9 ng/g ($n = 2$). At Barnes Cove and Crab Bay, mean TPAH concentrations ranged from 55.0 ± 13.6 ng/g to 111 ± 18.8 ng/g ($n = 2$), and often contained relatively low proportions of dibenzothiophenes or chrysenes compared with phenanthrenes; this suggests petrogenic sources other than EVO. At Perry Island, mean TPAH concentrations ranged from 3.44 ± 0.10 ng/g ($n = 2$) to 19.0 ± 7.04 ng/g ($n = 2$) which are too low to indicate possible sources. Mean TPAH concentrations were similarly low at these stations in 1991, except at Barnes Cove, where the mean concentration was 236 ± 65.0 ng/g, and the relative PAH abundances were most similar to those of sediments at Constantine Harbor and Rocky Bay.

At Rocky Bay and Constantine Harbor, mean TPAH concentrations in sediments were very consistent and relatively high from 1989 through 1991, and the relative PAH abundances differed markedly from that of weathered spilled oil. The mean TPAH concentration of all sediment samples from Rocky Bay was 300 ± 27.8 ng/g (n=18), and from Constantine Harbor

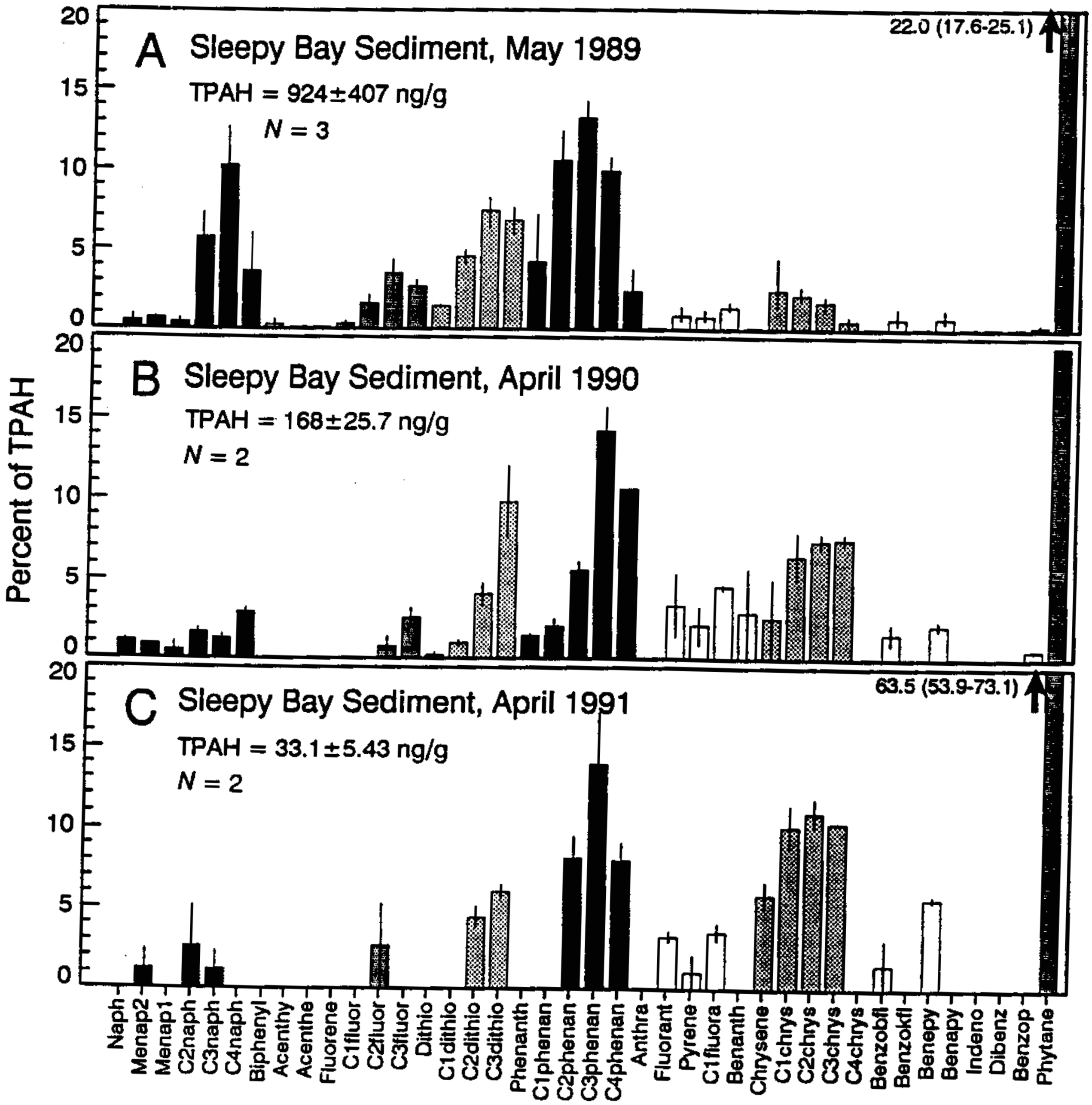

Figure 7.--Relative abundance of PAHs and phytane in sediments collected from Sleepy Bay in: A. May 1989, B. April 1990, and C. April 1991. Relative abundances for each sample are calculated as the ratio (expressed as percent) of the analyte to the sum of all the PAHs (excluding perylene) in the sample; thick vertical bars indicate the mean of replicate samples, and thin vertical bars indicate the range. Also given are the mean TPAH concentrations ± SE and *n* of replicate samples included. Units are ng TPAH/g dry sediment weight.

was 561 ± 15.2 ng/g (n = 15). Mean TPAH concentrations did not vary significantly with the date of sampling at either station (Rocky Bay P>0.14, Constantine Harbor P>0.23; Fig. 8). At both stations, sediments contained relatively low concentrations of dibenzothiophene PAHs compared with other PAHs, and substantial concentrations of alkyl-substituted PAHs compared with unsubstituted PAHs (Fig. 9). Although similar, the relative PAH abundances at Rocky Bay and Constantine Harbor are not identical; the relative abundances of unsubstituted PAHs compared with homologous alkyl-substituted PAHs is somewhat higher at Rocky Bay than Constantine Harbor (Fig. 9).

Mean TPAH concentrations were usually well below 100 ng/g at the remaining stations in PWS where sediments were sampled. Sediment TPAH concentrations were lowest at Bligh Island; they ranged from 2.71 ± 1.71 ng/g to 32.8 ± 13.6 ng/g. At Naked Island, Olsen Bay, and Siwash Bay, mean TPAH concentrations ranged to 113 ± 52.0 ng/g, but 68% of these means were below 50 ng/g. Consistent patterns of relative PAH abundances were not evident in these samples, although naphthalenes were often the most abundant PAHs present.

The variability of TPAHs in sediments is similar to the variability in mussels. In 71% of the 51 replicated sediment samples for which the replicate mean TPAH concentration exceeded 50 ng/g, the CV was less than 50%, and the median CV was 30.9%. This means that for replicates consisting of two or three samples, results agreed to within ± 50% of the mean in 71% of samples where the mean TPAH concentration exceeded 50 ng/g.

Concentrations of perylene in sediments varied widely among stations. At Elrington Island, Perry Island, and Sleepy Bay, perylene was almost never detected in sediments. In contrast, perylene concentrations ranged from at least 10.7 ± 4.21 ng/g (n = 2) to as high as 69.2 ± 16.9 ng/g (n = 2) at Constantine Harbor, Barnes Cove, Bay of Isles, and Rocky Bay, and did not vary with sampling date in any consistent manner. Perylene concentrations in sediments at remaining stations were intermediate, and usually ranged from 2.40 ± 1.23 ng/g to 11.9 ± 1.91 ng/g (n = 2), except at Naked Island, where concentrations ranged from 4.93 ± 0.29 ng/g to 25.0 ± 1.67 ng/g (n = 2).

Sediment Alkanes - Except at Elrington Island and Sleepy Bay, the alkanes found in sediments of PWS derived primarily from indigenous sources. At the Elrington Island site that was visibly oiled in May 1989, the sediment TNA concentration was 10,700 ng/g (n = 1), and the CPI was 0.89. However, mean TNA concentrations in sediment samples collected from the lower intertidal near the mussel sampling site were consistently less than 300 ng/g. At Sleepy Bay, mean TNA concentrations of sediments declined from 3,280 ± 1,200 ng/g in May 1989 to 2,720 ± 330 ng/g in August, and declined further to less than 650 ng/g in 1990 and 1991. The CPIs of Sleepy Bay sediments were consistently less than 1.75, and phytane was consistently detected, which corroborates a petrogenic source.

In contrast, the normal alkanes in sediments of the remaining stations in PWS mainly comprised those of odd-numbered carbon atoms with molecular weights equivalent to C15 or

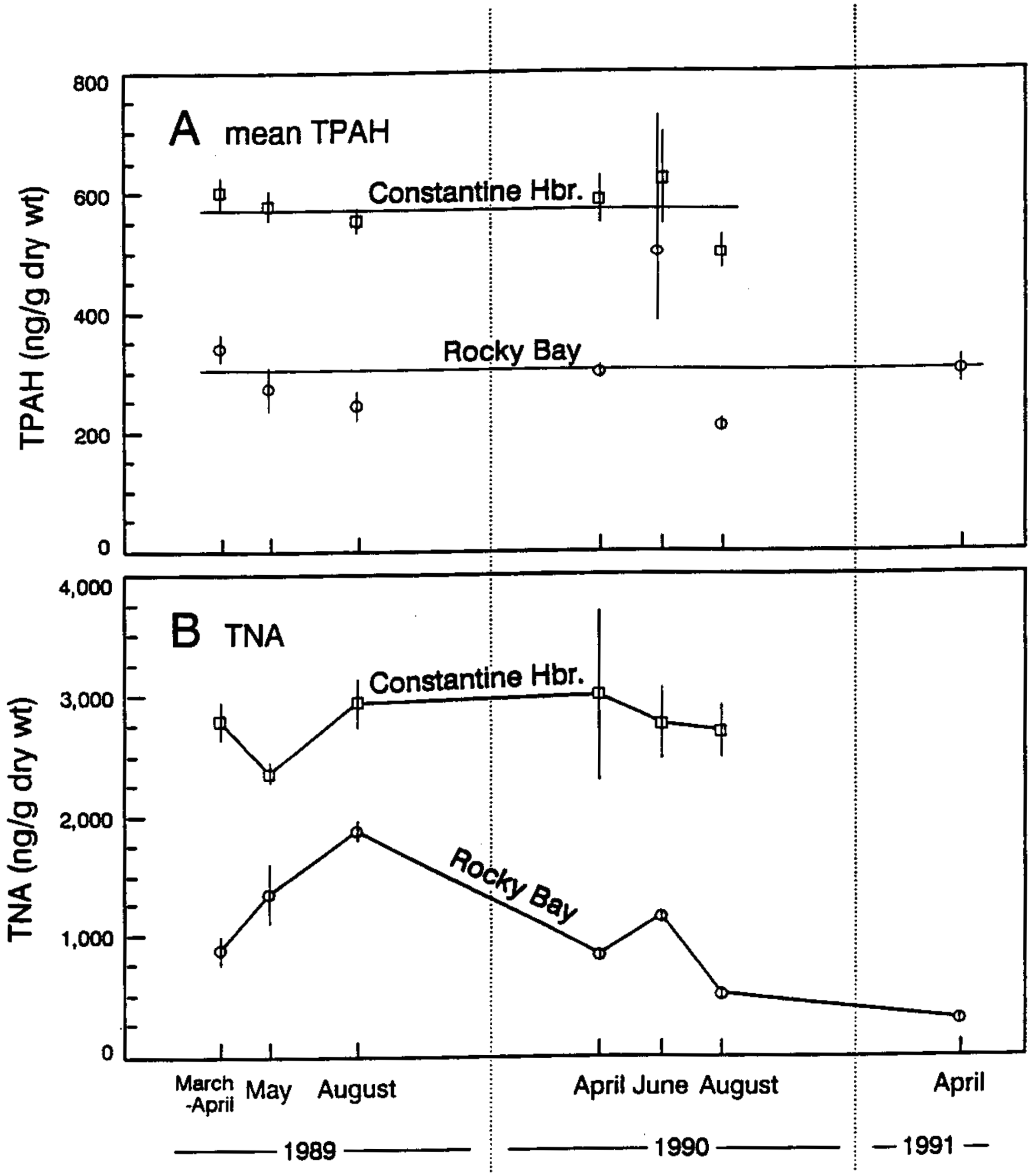

Figure 8.--Comparison of: A. TPAHs and B. TNAs in sediments at Constantine Harbor and Rocky Bay during the period from spring 1989 to spring 1991. Vertical bars indicate standard errors, and horizontal lines indicate means over all sampling periods when these were not significantly different (ANOVA P>0.05).

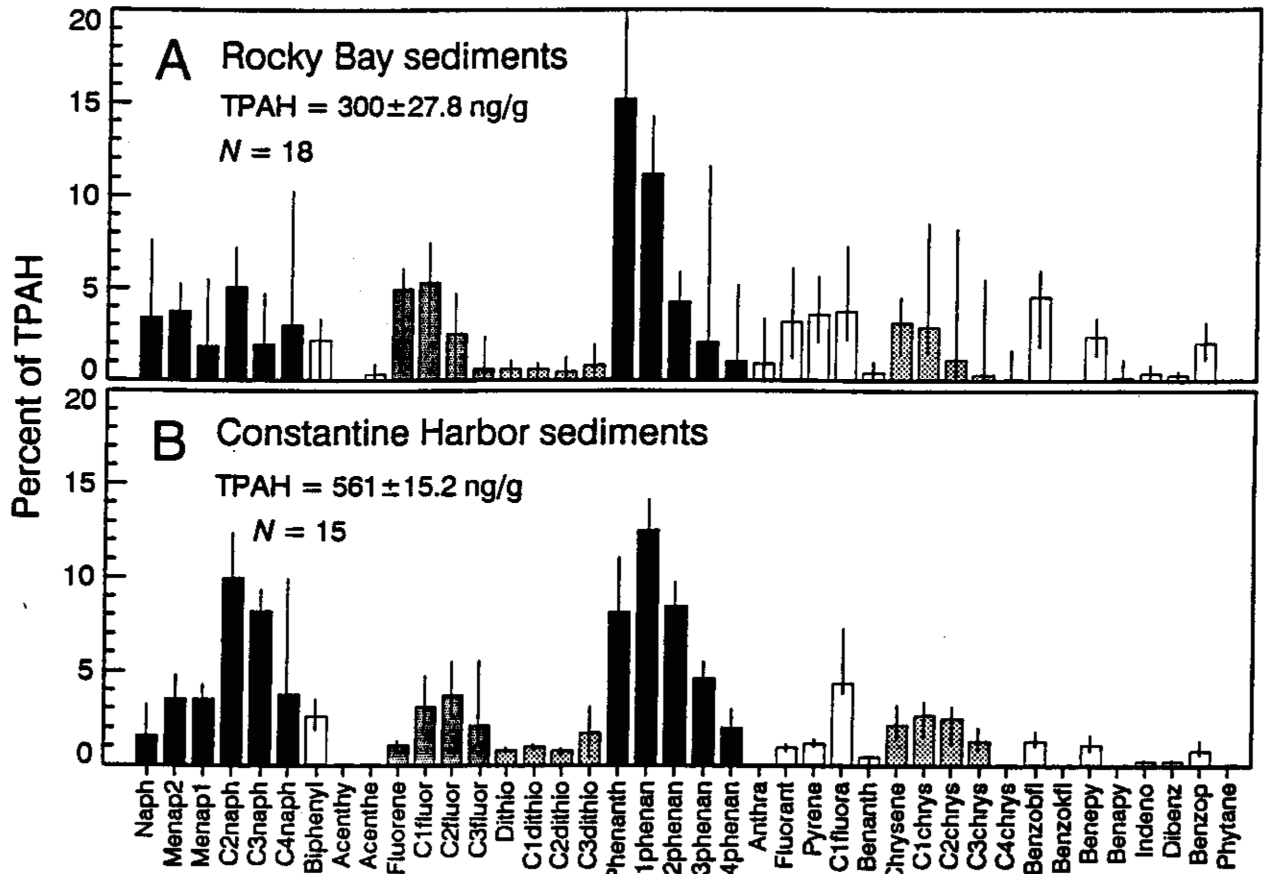

Figure 9.--Relative abundance of PAHs and phytane in sediments collected from: A. Rocky Bay and B. Constantine Harbor. Included are all sediment samples collected from these stations during this study. Relative abundances for each sample are calculated as the ratio (expressed as percent) of the analyte to the sum of all the PAHs (excluding perylene) in the sample; thick vertical bars indicate the mean and thin vertical bars indicate the range. Also given are the mean TPAH concentrations ± SE and *n* of samples included. The TPAH units are ng TPAH/g dry sediment weight.

greater, had CPIs that were usually substantially greater than two, and phytane concentrations that were usually below detection limits.

Mean concentrations of TNAs and of perylene in sediments of PWS generally varied similarly among stations where EVO was not indicated. At stations where perylene concentrations in sediments were lowest, i.e. Elrington Island, Perry Island, and Sleepy Bay, mean TNA concentrations were less than about 600 ng/g except for samples where the spilled oil was indicated. At stations where perylene concentrations in sediments were highest, i.e. Barnes Cove, Bay of Isles, Constantine Harbor, and Rocky Bay, mean TNA concentrations usually exceeded 1,000 ng/g, often ranged above 2,000 ng/g (except at Rocky Bay), and were highest at Barnes Cove at 5,650 ± 948 ng/g (n = 2). At the remaining stations where perylene concentrations were intermediate, mean TNA concentrations were intermediate also, and ranged from 326 ± 73.1 ng/g (n = 2) to 2,100 ± 69.1 ng/g.

Mean TNA concentrations were especially consistent over time in sediments at Constantine Harbor, and similar to mean TPAH concentrations there. The mean TNA concentration was 2,780 ± 102 ng/g (n = 16), and did not vary significantly during the two years of this study ($P>0.5$; Fig. 8A). The alkanes in Constantine Harbor sediments consisted primarily (i.e. more than 50%) of odd carbon-numbered normal alkanes with molecular weights equivalent to C21 or greater. CPIs that ranged from 3.82 to 6.63 indicating a terrestrial origin for these alkanes. In contrast, mean TNA concentrations at Rocky Bay were quite variable, despite the mean TPAH concentrations that did not significantly vary. Mean TNA concentrations in sediments at Rocky Bay ranged from 323 ± 53.9 ng/g to 1,900 ± 80.4 ng/g, and consisted of primarily (i.e. 50% to 90%) of C15, C17, and C19; C17 the most abundant normal alkane present. However, despite the higher TNA and TPAH concentrations in Constantine Harbor and Rocky Bay sediments, phytane was consistently below detection limits.

Results of replicate TNA concentrations of sediments were substantially less variable than results for mussels. In 93% of the 82 replicated sediment samples for which the replicate mean TNA concentration exceeded 200 ng/g, the CV was less than 50%, and the median CV was 18.9%. This means that for replicates consisting of two or three samples, results agreed to within 50% of the mean in 93% of samples where the mean TPAH concentration exceeded 200 ng/g.

Gulf of Alaska

<u>Mussel PAHs</u> - Concentrations of PAHs derived from EVO were found in mussels at three stations along the Kenai Peninsula, and at one station on Kodiak Island in 1989. Of these four stations, mean TPAH concentrations in mussels were highest at Tetrakof Point on Kodiak Island, at 15,100 ng/g (n=1) in April, declining to 1,440 ± 133 ng/g in July. Of the stations on the Kenai peninsula, mean TPAH concentrations were highest at Petrov Point at 5,780 ± 1,160 ng/g (n = 2) in May 1989 and 7,500 ng/g (n = 1) in June. At Verdant Cove, mean TPAH concentrations declined from 4,120 ± 594 (n = 2) in April 1989 to 511 ± 55.9 in August. At Harris Bay, the TPAH concentration in mussels was 900 ng/g in April; the only time mussels were

sampled there in 1989. At all these locations, the PAH composition of the mussels sampled in 1989 is similar to that of weathered EVO (e.g. Fig. 4).

Relatively high TPAH concentrations were found in mussels sampled from other Gulf of Alaska stations in 1989, but had PAH compositions that differed markedly from that of spilled oil. At Quicksand Cove on the Kenai Peninsula, the mean TPAH concentrations in mussels sampled in April was 1,050 ± 88.1 ng/g, but 70% of this comprised naphthalene, C1-fluorene, and C2-fluorene, and by August the mean TPAH concentration decreased to 78.0 ± 54.3 ng/g (n=2). At Buskin River and Womans Bay on Kodiak Island, mean TPAH concentrations in mussels were 3,800 ± 3,300 ng/g (n=2) and 5,250 ng/g (n=1) respectively, but the PAH composition was similar to that of diesel oil as indicated by the relatively low proportions of chrysenes present. At Anton Larson Bay, Kodiak Island, and at Foul Bay, Afognak Island, mean TPAH concentrations were 349 ± 97.9 ng/g and 486 ± 81.5 ng/g in July 1989 respectively, but consisted primarily (> 60%) of naphthalenes. Mean TPAH concentrations at the remaining Gulf of Alaska stations sampled for mussels in 1989 were less than 65 ng/g.

Mean TPAH concentrations were generally below detection limits in mussels collected from the three Gulf of Alaska stations sampled in 1990. These three stations were all on the Kenai peninsula, and PAHs were only detected in mussels from Quicksand Cove in April 1990 at a TPAH concentration of 39.7 ng/g (n = 1), and consisted entirely of naphthalenes.

Mussel Alkanes - TNA concentrations were highest in mussels at most of the Gulf of Alaska stations where TPAH concentrations were also highest. At the four stations in the Gulf of Alaska where PAHs derived from EVO were indicated, correspondingly high TNA concentrations were also initially present then subsequently declined. At Tetrakof Point, mean TNA concentrations were highest at 19,300 ± 13,500 ng/g (n = 2) in April 1989, and declined to 4,440 ± 857 ng/g in July. Mean TNA concentrations were second highest at Verdant Cove, at 14,100 ± 1770 ng/g in April, and declined to 2,610 ± 279 ng/g in August. At Petrov Point, mean TNA concentrations were 7,320 ± 2,350 ng/g (n = 2) in May, and 13,300 ng/g (n = 1) in June. Finally, at Harris Bay, where PAHs derived from the spilled oil were lowest, mean TNAs were also relatively low at 2,680 ng/g (n=1) in April. Phytane was consistently detected in mussels from all four of these stations collected during the spring of 1989; mean concentrations ranged from 197 ng/g (at Harris Bay) to over 800 ng/g at the other three stations. Also, the CPIs of these alkanes ranged from 0.76 to 1.28 in the spring of 1989; except at Harris Bay, where the CPI was 4.27. These phytane concentrations and CPIs confirm the petrogenic source of the hydrocarbons found in these mussels.

Mean TNA concentrations were also relatively high in mussels from Buskin River; high PAH concentrations from sources other than EVO were indicated. In July 1989, the mean TNA concentration of mussels was 12,200 ± 879 ng/g, the phytane concentration was 4,010 ± 92.7 ng/g, and the CPI was 0.63. Mean TNA concentrations in mussels from the remaining Gulf of Alaska stations sampled in 1989 ranged from 533 ± 334 ng/g (n=2) to 3,440 ng/g (n=1), with C15, C17, and C19 the most abundant alkanes present. Phytane was not detected in these mussels, and CPIs could not be calculated because higher molecular weight alkanes were too often below detection limits.

In 1990, TNA concentrations were relatively low at the three stations sampled. Mean TNA concentrations ranged from 1,470 ng/g (n=1) to 2,970 ng/g (n=1) in mussels from Harris Bay, Quicksand Cove, and Verdant Cove collected in April, the only time mussels were collected from these stations in 1990.

Pristane concentrations in mussels collected from the Kenai Peninsula stations varied seasonally, similar to variations found in mussels from PWS. Pristane concentrations ranged to over 20,000 ng/g at these stations in the spring of 1989, and declined nearly twenty-fold by August. These high pristane concentrations were not due to petrogenic sources because phytane concentrations were at least ten-fold lower than corresponding pristane concentrations.

Seasonal variation of pristane in mussels was much less marked in mussels collected from Kodiak Island stations compared with Kenai peninsula or PWS stations. Concentrations of pristane exceeded 1,000 ng/g in mussels from Kodiak Island stations only when petrogenic sources were indicated by correspondingly high phytane and PAH concentrations.

Sediment PAHs - Sediment samples collected from Gulf of Alaska stations contained generally low TPAH concentrations, and none contained EVO-PAHs. Mean TPAH concentrations were below 50 ng/g in 60% of the sediment samples collected in 1989. At the three stations were mean TPAH concentrations in sediments exceeded 100 ng/g, the PAH composition was similar to that of diesel oil as indicated by the relatively low proportions of chrysenes present. The highest mean TPAH concentration was 658 ± 324 ng/g at Tetrakof Point in July 1989, followed by mean concentrations of 144 ± 13.1 ng/g and 124 ± 5.28 ng/g at Paul's Bay and McDonald Lagoon in July. In 1990, the only Gulf of Alaska station where sediments were collected was Harris Bay; mean TPAH concentrations were less than 40 ng/g.

Perylene was below detection limits in most Gulf of Alaska sediments collected. However, it was detected sporadically at Anton Larson Bay, McDonald Lagoon, and Tetrakof Point; single sample perylene concentrations ranged to 36.7 ng/g, but were not corroborated by replicate samples.

Sediment Alkane Hydrocarbons - Mean TNA concentrations were generally below 800 ng/g in Gulf of Alaska sediments, except at Anton Larson Bay. At this station, the mean TNA concentration was 17,100 ± 1,190 ng/g, of which more than half was C27, and most of the remainder was odd carbon-numbered alkanes of molecular weights equivalent to C21 or greater. Odd carbon-numbered alkanes accounted for most of the TNAs in the three other Gulf of Alaska sediments collected in 1989 or 1990 where the mean TNA concentration exceeded 300 ng/g.

DISCUSSION

Mussels in PWS

Crude oil spilled from the T/V *Exxon Valdez* clearly contaminated mussels at all of the sampling stations near the trajectory of the spilled oil through PWS in 1989. Contamination by EVO is indicated by: (1) the consistent pattern of relative PAH abundances, exemplified in Fig. 4, found in these mussels and in EVO-PAHs in spring and summer 1989, (2) the simultaneous appearance of this pattern in mussels after, but never before, the spilled oil had moved through the Sound (Fig. 3), (3) increases of phytane and of TNAs with CPIs near one concurrent with the PAH increases (Fig. 5), and (4) the general absence of these relative hydrocarbon abundance patterns, and the general low TPAH concentrations in mussels at stations remote from the Spill trajectory.

Mussels accumulated spilled oil primarily as whole, particulate oil rather than by absorption of hydrocarbons dissolved in seawater. Accumulation of whole, particulate oil is indicated by the concurrently high TNA and phytane concentrations in mussels that contained high EVO-PAHs. The solubility of these alkanes in seawater is much lower than the solubilities of the PAHs, but the relative concentrations of these hydrocarbons in the mussels contaminated by the spilled oil is similar to the relative concentrations in weathered EVO itself (e.g. Fig. 4). This obviates intermediary partitioning of hydrocarbons into seawater prior to accumulation by the mussels, and suggests direct accumulation of whole particulate oil by the mussels.

The amount of EVO-PAHs accumulated by mussels in 1989 is strongly associated with proximity to oiled beaches. As depicted in Figures 3 and 6, mussels on heavily oiled beaches contained the highest concentrations of EVO; this indicates that proximal oil sources contribute substantially the oil burden in these mussels. However, mussels at stations distant from oiled beaches (e.g Rocky Bay and Barnes Cove) still accumulated detectable EVO-PAH burdens, indicating a longer range water-borne transport mechanism.

The dispersed, particulate EVO accumulated by the mussels was obviously biologically available, and this implies that this oil may also have been available to other fauna that feed on microplankton-sized prey such as larval fish. The oil ingested by the mussels may have been either discrete small oil droplets dispersed in the water column, or adsorbed on planktonic prey. In either case, larval fish may have ingested oil that was adsorbed on prey, or by mistaking oil droplets for prey.

Mussels contaminated by EVO are a vector for transmission of oil to mussel predators through ingestion. The widespread distribution of oil-contaminated mussels in 1989 suggests a similarly widespread availability of oil to mussel predators, such as marine snails, marine mammals, and birds. However, the effects of ingested crude oil on these predators is generally not well known.

Widespread contamination of PWS mussels by EVO did not persist at these stations into 1990. The absence of oil contaminated mussels (except at Sleepy Bay) indicates that particulate oil dispersed into the seawater column was more limited in 1990 to stations near heavily oiled beaches such as Sleepy Bay. However, the increasing EVO-PAH concentrations in mussels at Sleepy Bay from April to August 1990 may have been due to cleanup activities. Cleanup efforts mobilized the spilled oil into adjacent seawaters, and this oil may have accumulated to progressively higher concentrations in mussels through the summer of 1990 at Sleepy Bay where beach cleaning activities were substantial. The persistence of EVO-PAHs in Sleepy Bay mussels to April 1991 indicates that residual oil after the cleanup ended remained a significant contamination source for mussels (and thus for mussel predators) at least at locations where substantial oil was left.

The increases of TPAHs observed at Elrington Island and Bay of Isles during 1990 may have been indirect effects of cleanup efforts. The relative PAH abundances of mussels at these stations was consistent with diesel oil in August when TPAH concentrations were highest. At Elrington Island, these TPAH concentrations were very reproducible in August. This reproducibility suggests that the diesel oil was not the result of contamination during sampling, although it does not eliminate that possibility. Alternatively, the high August TPAH concentrations at Elrington Island and at Bay of Isles may have been the result of small, local diesel oil spills that often attend high marine vessel traffic, such as was present near heavily oiled beaches in PWS during the summer of 1990. However, the general absence of diesel-derived PAHs at most stations in PWS in 1990 indicates that the magnitude of diesel oil contamination of marine waters was small compared with the EVOS.

Mussels in the Gulf of Alaska

Hydrocarbon results for mussels at Gulf of Alaska stations generally corroborate results for PWS stations. The four Gulf of Alaska stations where mussel PAHs were consistent with EVO in spring 1989 were all near beaches that had been moderately to heavily oiled (Alaska Department of Environmental Conservation 1990a, 1990b, and 1990c). Conversely, EVO was not indicated as the PAH source for mussels collected at stations more distant from oiled beaches, nor in any of the Gulf of Alaska stations sampled in 1990. These results indicate that contamination of mussels by EVO in the Gulf of Alaska was limited to locations near oiled beaches in 1989, as was generally the case in PWS.

Naphthalenes in Mussels

The source of the naphthalenes, that was so consistently prevalent in mussels collected during the spring of 1989, in PWS is not clear. One possibility is contamination introduced during sampling or subsequently during sample storage or analysis. Alternatively, mussels in PWS may have accumulated these naphthalenes from an unknown source which made naphthalenes available to mussels in 1989, but less so in succeeding years.

Pristane in Mussels

The relatively high pristane concentrations found in samples of mussels collected during the spring is probably related to the annual zooplankton bloom in PWS and the northern Gulf of Alaska. Strong seasonal variation of pristane concentrations in mussels of PWS was first reported by Karinen et al. (1993), who related the high spring concentrations of pristane they found in mussels to simultaneously high abundances of *Calanus spp.* and *Neocalanus spp.* copepods there. Closely related species of these copepods in the Atlantic ocean biosynthesize pristane (Avigan and Blumer 1968) and retain it at concentrations approaching 1% dry weight (Blumer et al. 1964). Karinen et al. (1993) proposed ingestion of detrital material derived from carcasses of these copepods as a mechanism of pristane incorporation into mussels. The high concentrations of pristane found in mussels during spring at, e.g. Petrov Point and Verdant Cove, extends the geographic range of this phenomenon to the Kenai peninsula. Conversely, the absence of high spring-time concentrations of pristane in mussels from Kodiak suggests that the geographic range of this phenomenon may not include Kodiak Island.

Comparison with Historical Data

Except for naphthalenes, concentrations of unsubstituted PAHs and selected methyl-substituted PAHs in PWS mussels collected from stations that were not impacted by the spilled oil were generally below detection limits, consistent with results for comparable samples collected during the period 1977 through 1980 (Karinen et al. 1993). During the period 1977 through 1980, naphthalene and 1-methylnaphthalene were detected sporadically in mussels at concentrations near detection limits, and most of the remaining PAHs considered in the Karinen et al. (1993) study were consistently below detection limits. Results are similar for the corresponding PAH analytes in this study; except naphthalene and methylnaphthalene concentrations were substantially greater and more consistently detected in mussels collected during spring 1989. The results of Karinen et al. (1993) together with those of this study affirm that the seawater in PWS was generally free of petrogenic hydrocarbons just before the Spill, remained so at stations distant from the path of the spilled oil through the Sound, and returned to a comparable state by 1991. In particular, the results of these studies together place strong constraints on the magnitude of other sources of anthropogenic PAHs in mussels (and hence in seawater) compared with EVO, such as spilled diesel oil associated with beach cleanup efforts, commercial fishing, or recreational marine vessel traffic.

Sediments

Results of this study imply that contamination of lower intertidal sediments by the spilled oil was relatively slight compared with the heavy oiling that frequently impacted upper intertidal sediments. Results from Natural Resoureces Damage Assessment studies Air/Water Study Number 2 (O'Clair et al., 1996) and Subtidal Study Number 3B (Sale et al., 1995) indicate that transport of oil from the upper intertidal to the lower intertidal and subtidal sediments was mediated primarily by wave (or cleanup) mobilization and dispersion of oiled sediments in the upper intertidal to sediments a lower depths, with PAH concentrations in sediments that decrease rapidly with distance from the local oil source. In this scenario, contamination of lower intertidal sediments would be transient as oil available for mobilization is depleted and as contaminated sediments at lower depths continue to be dispersed. The EVO-PAH concentrations found in this study at Sleepy Bay, that generally decrease with time (Fig. 6), are consistent with this scenario, as are the low PAH concentrations found in lower intertidal sediments at Elrington Island where sediment transport fluxes are high due to strong marine and tidal currents. Similarly, the relatively lower concentrations of PAHs derived from EVO found in lower intertidal sediments at more protected stations (i.e. Barnes Cove, Bay of Isles, and Crab Bay) are probably due to the relatively lower wave energy available to mobilize oil contaminated sediments at these stations, or else to the distance from the nearest heavily oiled sediments.

Sampling stations where sediment transport fluxes are high are indicated by low sediment perylene concentrations. Perylene is produced diagenetically in PWS sediments (Karinen et al. 1993, Venkatesan and Kaplan 1982), and this diagenesis has been associated with terrigenous alkanes (especially C27 and C29) in these sediments. Thus, relatively high perylene concentrations indicate relatively stable sediments, because stability is prerequisite for diagenesis. High perylene concentrations therefore indicate depositional environments. Conversely, the generally low hydrocarbon concentrations at the lower intertidal stations of Sleepy Bay, Elrington Island, and Perry Island, and the ephemeral appearance of EVO-derived hydrocarbons at these stations, is because the stations are not depositional environments as indicated by the absence of perylene.

The foregoing discussion indicates two factors that primarily determine the persistence of spill-derived hydrocarbons in lower intertidal sediments. These two factors are (1) proximity to a persistent environmental reservoir of spilled oil, and (2) the depositional environment of the sampling station. These two factors do not simultaneously favor hydrocarbon persistence in sediments at any of the stations sampled in this study. Of the three stations where the spilled oil persisted to 1990, two were non-depositional as indicated by the absence of perylene (Sleepy Bay and Elrington Island), and the other was a highly depositional environment (Bay of Isles) but was more distant from heavily oiled beaches than the stations at Sleepy Bay or Elrington Island. The relatively brief appearances of EVO in lower intertidal sediments at Barnes Cove, Crab Bay, and Perry Island are probably due to the combined influence of distance from oil reservoirs and the specific depositional environment at these stations. However, other lower intertidal sites in PWS that are near reservoirs of beached oil and are depositional environments may be expected to contain relatively high and persistent concentrations of spilled oil.

The relatively high PAH concentrations consistently found at Constantine Harbor and at Rocky Bay are clearly not derived from EVO. Karinen et al. (1993) attributed PAHs at these stations to local anthropogenic sources associated with marine vessels, based on their analysis of mainly unsubstituted PAHs. However, the additional analysis of the alkyl-substituted PAHs herein indicates that these PAHs are probably derived primarily from geologic sources external to PWS. The relatively low proportions of dibenzothiophenes in these sediments clearly indicates a source other than the spilled oil. The pattern of relative PAH abundances we found in intertidal sediments at Constantine Harbor is consistent with the pattern that has been identified with petroleum seepage oil near Katalla that is swept into PWS through Hinchinbrook Entrance along with Copper River sediments by the Alaska coastal current (Page et al. 1995). Although our results generally confirm the source identification (at least insofar as a geologic source external to PWS) and transport mechanism described by Page et al. (1995); our results also suggest that the exact PAH source may be other than petrogenic.

A geologic PAH source external to PWS is consistent with the invariance of PAH concentrations and with the relatively high perylene concentrations at Constantine Harbor and Rocky Bay. Mean TPAH concentrations were constant during the two years of this study at both stations. Furthermore, intertidal sediment PAH concentrations measured in common in this study and during the period 1977 through 1980 by Karinen et al. (1993) are nearly the same at these stations (Table 2), indicating that these PAH concentrations have been almost constant over a period of nearly 15 years. Both stations are stable depositional environments, as indicated by the relatively high perylene concentrations at them. The remarkable invariance of PAH concentrations in these sediments suggests a general absence of anthropogenic PAHs during this 15 year period, at least in comparison with the magnitude of the geologic PAH source.

The temporal invariance suggests that the PAHs in the intertidal sediments at Constantine Harbor and Rocky Bay are not subject to weathering processes that generally characterize petroleum degradation in the marine environment (e.g. Fig. 4). The high and persistent relative abundance of unsubstituted PAHs in these sediments further contraindicates weathering influences. In addition, the absence of phytane in these sediments, and the absence of the PAHs in the mussels at these stations, suggests that these PAHs are associated with a relatively refractory matrix. This matrix could be clay particles that have strongly adsorbed PAHs derived from petroleum seeps near Katalla, or alternatively, the matrix could be a form of coal in the Copper River drainage that has a pattern of relative PAH abundances that is low in dibenzothiophenes. In either case, the PAHs from this source are evidently not bioavailable, as indicated by the absence of these PAHs in the mussels at these two stations.

At stations along the Spill path, the relatively low concentrations of PAHs derived from the geologic PAH source external to PWS suggests substantial depletion of these PAHs from the upper seawater column soon after seawater enters PWS through Hinchinbrook Entrance. PAHs from this source were generally less than 100 ng/g in intertidal sediments at stations along the Spill path, including the highly depositional stations at Barnes Cove and at Bay of Isles; therefore, this source is probably not significant in intertidal sediments within the path of the spilled oil through PWS, although this source may contribute more substantially to subtidal sediments, especially deeper subtidal sediments.

Table 2.--Comparison of TPAHs in sediments at Constantine Harbor and at Rocky Bay during the periods 1977 to 1980 (Karinen et al., 1993), and 1989 to 1991 (this study). Included are all PAHs measured in common to both sets of data. *N* = number of samples; SE = standard error. Units are ng PAH/g dry sediment weight.

	Constantine Harbor						Rocky Bay					
	1977-1980			1989-1991			1977-1980			1989-1991		
PAH[a]	*N*	Mean	SE	*N*	Mean	SE	*N*	Mean	SE	*N*	Mean	SE
Naph	11	4.67	0.47	16	5.30	0.57	8	4.50	0.66	19	6.47	0.82
Menap2	13	14.55	1.80	16	12.03	0.49	10	7.74	1.32	19	7.14	0.43
Menap1	13	11.65	1.71	17	11.91	0.43	10	2.29	0.52	19	3.34	0.64
Dimeth	13	9.17	1.50	16	8.03	0.29	10	4.68	0.65	19	4.17	0.18
Trimeth	13	6.81	0.84	16	5.58	0.13	10	0.00	--	19	0.55	0.10
Biphenyl	13	8.85	0.78	16	8.81	0.35	10	3.62	0.63	19	4.22	0.43
Fluorene	13	3.43	0.44	16	3.57	0.11	10	10.72	1.54	19	9.64	0.38
Dithio	13	2.51	0.69	16	2.48	0.08	10	1.78	0.68	19	1.16	0.10
Phenanth	13	32.62	3.84	16	27.91	1.02	10	37.89	5.92	19	29.32	1.24
Mephen1	12	6.62	1.41	16	9.78	0.41	9	2.41	0.81	19	2.55	0.40
Anthra	13	0.09	0.07	16	0.00	--	10	1.80	0.47	19	1.60	0.37
Fluorant	13	4.03	1.48	16	3.10	0.10	10	9.74	1.50	19	5.97	0.54
Pyrene	12	7.27	2.58	16	3.76	0.09	8	12.61	2.19	19	6.90	0.51
Benanth	13	2.07	0.85	16	1.32	0.10	10	1.31	0.49	18	1.08	0.32
Chrysene	13	8.16	1.89	16	7.17	0.34	10	13.03	2.72	18	6.48	0.79
Benepy	13	5.29	1.47	16	3.57	0.17	10	8.90	1.67	19	4.70	0.43
Benapy	13	0.40	0.33	16	0.00	--	10	0.85	0.73	19	0.42	0.25
Perylene	13	80.46	15.41	16	17.97	0.74	10	33.30	5.34	19	13.79	0.87

[a]PAH abbreviations are given in Table I-2, Appendix I.

Weathering

Comparison of the relative abundances of EVO-PAHs in sediments and in mussels at Sleepy Bay suggests that the composition of the spilled oil changed little after May 1989. Losses of less alkyl-substituted PAH homologues and of lower molecular weight PAHs (especially naphthalenes) were striking in the oil of Sleepy Bay sediments and mussels between early April and early May, but were progressively less so over the following two years. Consequently, the relative PAH abundance patterns depicted in Figures 4 and 7 should be reliable indicators of the spilled oil in sediments, mussels, and in other matrices where active biochemical catabolism or differential physical partitioning are not factors.

Moreover, the comparatively small changes in the relative PAH abundance patterns between 1990 and 1991 suggests that the 1991 pattern may undergo subsequent alteration only very slowly so that substantially similar patterns may be evident in contaminated sediments of PWS for several additional years.

Data Variability

Most of the variability among TPAH and TNA concentrations of replicate sediment or mussel samples is probably due to real analyte concentration differences rather than to errors introduced during sampling or in the analytical laboratory. CVs were very low, usually less than 15%, for these analytes in sediments collected from Constantine Harbor or Rocky Bay. Concentrations of these analytes varied little at these two stations temporally, which suggests a distribution of the analytes that is relatively homogenous in the immediate vicinity of these stations. If replicate variability were due primarily to sampling or subsequent analysis, then analyte variability consistent with other stations would be expected at Constantine Harbor and Rocky Bay. However, since the variability of these analytes is lowest at the two stations where these analytes are most homogeneously distributed spatially, the higher variability at the other stations is probably the result of more patchily distributed analytes at them.

Conversely, CVs of TNAs in mussels were higher than in sediments, and were higher than TPAHs in mussels or sediments. This is probably due to dietary and nutritional differences among sampled mussels. Most of the alkanes in mussels, that did not contain the spilled oil, were derived from marine algal or terrigenous detrital sources that were probably ingested as food.

Restoration Criteria

Results from this study for stations that were not impacted by the Spill may be used to determine quantitative restoration criteria for beaches that were oiled by the Spill. In general, the hydrocarbon results of this study for stations outside the path of the spilled oil, and for stations sampled prior to spill impacts, confirm the conclusions of Karinen et al. (1993) that the intertidal area of PWS was nearly pristine (with the minor exception of depositional sites influenced by seep oils) with respect to petrogenic hydrocarbon contamination prior to the Spill. This conclusion derives from the sporadic occurrence of PAHs in intertidal sediment and mussels at concentrations near detection limits observed by Karinen et al. (1993), and herein at stations in western PWS that were not impacted by the Spill. The magnitude and composition of PAHs observed at these unimpacted stations may therefore be used as a standard for determining the restoration of oiled beaches. Specifically, oiled beaches should be considered as fully restored when the dry weight TPAH concentration of (1) intertidal sediments is less than 100 ng/g, and (2) mussels is less than about 200 to 400 ng/g, with the higher mussel concentrations due mainly to naphthalenes.

CONCLUSIONS

1. Mussels within or near the path followed by the spilled EVO incorporated whole, particulate oil during the spring and summer of 1989. Oil contamination of mussels was highest during the two months immediately following the Spill at stations closest to heavily oiled beaches, and declined thereafter below detection limits by 1990 except at the most heavily oiled beaches.

2. Contamination of lower intertidal sediments by EVO was relatively slight, even at beaches that were heavily oiled in the upper intertidal areas. EVO was often not evident in these sediments, and when present, did not exceed 1,000 ng/g TPAH. Also, TPAH derived from EVO declined by a factor of about ten annually in lower intertidal sediments where EVO was detected in 1989.

3. Intertidal sediments at stations near Hinchinbrook Entrance contain 300-600 ng/g TPAH apparently derived from geological sources external to PWS, but PAHs from this source were not evident in intertidal sediments at stations within the path of spilled EVO. The general absence of PAHs in PWS mussels from sources other than EVO indicates a general absence of anthropogenic contamination of seawater in PWS apart from the Spill.

4. Results for pristane in this study confirm an earlier observation of substantial increases of this alkane in mussels during spring which subside by late summer.

5. Results from this study for stations that were not impacted by the Spill may be used to determine quantitative restoration criteria for beaches that were oiled by the Spill. Specifically, oiled beaches should be considered as fully restored when the dry weight TPAH concentration of (1) intertidal sediments is less than 100 ng/g, and (2) mussels is less than about 200 to 400 ng/g, with the higher mussel concentrations due mainly to naphthalenes.

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APPENDIX I

Table I-1.--Deuterated surrogate hydrocarbon standards used for determination of alkanes and PAHs in sediment and mussels. The deuterated surrogate hydrocarbon standards, each identified by a number in the left-hand column, are listed below, together with the quantification ion mass of the PAHs, and the concentration in hexane of each of the standards in the sample spiking solution. A 500 μL aliquot of this solution was spiked into each environmental or quality control sample analyzed. The numbers in the left-hand column are used to relate the calibrated hydrocarbon analytes listed in Tables I-2 and I-4 with the deuterated standards listed here.

I.D. number	Name	Quantification ion mass	Concentration in spike solution (ng/mL)
1	Naphthalene - d_{12}	136	2.50
2	Acenaphthene - d_{10}	164	2.50
3	Phenanthrene - d_{10}	188	2.00
4	Chrysene - d_{12}	240	2.00
5	Benzo[a]pyrene - d_{12}	264	2.50
6	Perylene - d_{12}	264	2.50
7	n-Dodecane - d_{26}	N/A	10.50
8	n-Hexadecane - d_{34}	N/A	9.79
9	n-Eicosane - d_{42}	N/A	10.40
10	n-Tetracosane - d_{50}	N/A	9.89
11	n-Triacontane - d_{62}	N/A	10.00

Table I-2.--Calibrated PAHs determined in sediments and mussels. The calibrated aromatic hydrocarbons, and standardized abbreviations for them, are listed below, together with the number of the associated surrogate standard (see Table I-1 above), quantification ion mass, confirmation ion mass, and the mean ratio of these two ions in the calibration standards, of which the latter three are used for identification.

PAH	Abbreviation	Quantification ion mass	Confirmation ion mass	Expected ion ratio	I.D. number of surrogate standard used
Naphthalene	Naph	128	127	15	1
2-Methylnaphthalene	Menap2	142	141	88	1
1-Methylnaphthalene	Menap1	142	141	88	1
2,6 Dimethylnaphthalene	Dimeth	156	141	67	2
2,3,5 Trimethylnaphthalene	Trimeth	170	155	90	2
Biphenyl	Biphenyl	154	152	28	1
Acenaphthylene	Acenthy	152	153	13	2
Acenaphthene	Acenthe	154	153	99	2
Fluorene	Fluorene	166	165	92	2
Dibenzothiophene	Dithio	184	152	15	3
Phenanthrene	Phenanth	178	176	19	3
Anthracene	Anthra	178	176	18	3
1-Methylphenanthrene	Mephen1	192	191	57	3
Fluoranthrene	Fluorant	202	101	15	3
Pyrene	Pyrene	202	101	19	3
Chrysene	Chrysene	228	226	25	4
Benz-a-anthracene	Benanth	228	226	28	4
Benzo-b-fluoranthene	Benzobfl	252	253	22	5
Benzo-k-fluoranthene	Benzokfl	252	253	22	5
Benzo-e-pyrene	Benepy	252	253	23	5
Benzo-a-pyrene	Benapy	252	253	24	5
Perylene	Perylene	252	253	25	6
Indeno-1,2,3 cd-pyrene	Indeno	276	277	24	5
Dibenzo-a,h-anthracene	Dibenz	278	279	22	5
Benzo-g,h,i-perylene	Benzop	276	277	23	5

Table I-3.--Uncalibrated PAHs determined in sediments and mussels. The uncalibrated aromatic hydrocarbons, and standardized abbreviations for them, are listed below, together with the quantification ion mass and retention time windows used for identification.

Name	Abbreviation	Quantification ion mass	Retention time window (min)
C2 - Naphthalenes	C2naph	156	11.0 - 14.5
C3 - Naphthalenes	C3naph	170	12.5 - 16.5
C4 - Naphthalenes	C4naph	184	14.0 - 18.5
C1 - Fluorenes	C1fluor	180	15.0 - 18.0
C2 - Fluorenes	C2fluor	194	16.5 - 20.0
C3 - Fluorenes	C3fluor	208	18.0 - 21.5
C1 - Dibenzothiophenes	C1dithio	198	17.0 - 21.0
C2 - Dibenzothiophenes	C2dithio	212	18.0 - 23.0
C3 - Dibenzothiophenes	C3dithio	226	19.5 - 26.0
C1 - Phenanthrenes/Anthracenes	C1phenan	192	17.5 - 20.5
C2 - Phenanthrenes/Anthracenes	C2phenan	206	19.0 - 22.5
C3 - Phenanthrenes/Anthracenes	C3phenan	220	20.0 - 23.5
C4 - Phenanthrenes/Anthracenes	C4phenan	234	21.0 - 25.0
C1 - Fluoranthenes/Pyrenes	C1fluora	216	20.0 - 28.0
C1 - Chrysenes	C1chrys	242	24.5 - 27.5
C2 - Chrysenes	C2chrys	256	26.0 - 29.0
C3 - Chrysenes	C3chrys	270	27.0 - 31.0
C4 - Chrysenes	C4chrys	284	28.0 - 33.0

Table I-4.--Calibrated alkane hydrocarbons determined in sediments and mussels. The calibrated alkane hydrocarbons, and standardized abbreviations for them, are listed below, together with the number of the associated surrogate standard (see Table II-1).

Name	Abbreviation	I.D. of Surrogate Standard
n-Decane	C-10	7
n-Undecane	C-11	7
n-Dodecane	C-12	7
n-Tridecane	C-13	7
n-Tetradecane	C-14	8
n-Pentadecane	C-15	8
n-Hexadecane	C-16	8
n-Heptadecane	C-17	8
Pristane	Pris	8
n-Octadecane	C-18	9
n-Nonadecane	C-19	9
n-Eicosane	C-20	9
n-Heneicosane	C-21	9
n-Docosane	C-22	10
n-Tricosane	C-23	10
n-Tetracosane	C-24	10
n-Pentacosane	C-25	10
n-Hexacosane	C-26	10
n-Heptacosane	C-27	11
n-Octacosane	C-28	11
n-Nonacosane	C-29	11
n-Triacontane	C-30	11
n-Dotriacontane	C-32	11
n-Tetratriacontane	C-34	11

Table I-5.--MDLs of calibrated PAHs and alkane analytes in sediment and in mussel tissue. These MDLs are given as absolute masses in ng; MDLs for these analytes in specific samples were calculated as the ratio of these absolute masses and the sample dry weight.

Alkane	Sediment	Mussel
C10	61.8	134.0
C11	44.8	78.4
C12	67.0	51.0
C13	57.6	103.0
C14	45.0	196.0
C15	202.0	181.0
C16	88.4	284.0
C17	113.6	379.0
Pristane	210.0	204.0
C18	242.0	147.0
Phytane	242.0	147.0
C19	55.0	173.0
C20	108.4	197.0
C21	94.2	145.0
C22	62.6	54.1
C23	222.0	107.0
C24	350.0	124.0
C25	75.4	73.0
C26	212.0	74.6
C27	170.2	141.0
C28	140.8	129.0
C29	152.4	239.0
C30	186.0	158.0
C31	186.0	158.0
C32	242.0	110.0
C33	242.0	110.0
C34	144.6	64.4

Table I-5.--(Con't).

Aromatic	Sediment	Mussel
Naph	10.14	22.01
Menap2	9.44	9.94
Menap1	20.60	13.06
C1naph	30.04	23.00
Dimeth	19.50	7.03
C2naph	19.50	7.03
Trimeth	9.46	4.23
C3naph	9.46	4.23
C4naph	9.46	4.23
Biphenyl	43.00	7.52
Acenthy	25.00	5.73
Acenthe	12.14	5.40
Fluorene	18.26	4.97
C1fluor	18.26	4.97
C2fluor	18.26	4.97
C3fluor	18.26	4.97
Dithio	9.64	3.54
C1dithio	9.64	3.54
C2dithio	9.64	3.54
C3dithio	9.64	3.54
Phenanth	13.34	8.29
Mephen1	27.20	5.57
C1phenan	27.20	5.57
C2phenan	27.20	5.57
C3phenan	27.20	5.57
C4phenan	27.20	5.57
Anthra	33.20	6.50
Fluorant	9.12	11.79
Pyrene	10.44	9.75
C1fluoranth	9.12	11.79
Benanth	3.34	4.28
Chrysene	26.36	5.54
C1chrys	26.36	5.54
C2chrys	26.36	5.54
C3chrys	26.36	5.54
C4chrys	26.36	5.54
Benzobfl	12.22	6.01
Benzokfl	7.96	7.75
Benepy	12.08	8.21
Benapy	32.20	6.54
Perylene	11.68	9.41
Indeno	6.80	4.43
Dibenz	4.94	3.76
Benzop	9.34	5.53

APPENDIX II

Table II-1.--Concentrations of PAH in MUSSELS collected from PWS, Alaska, for this study. Tables I-2 and I-3 contain keys for the PAH abbreviations used here. Tables 1 and 2 list the station names, numbers, locations, and collection dates that correspond with those listed here. Stations established in 1977 described by Karinen et al. (1993) are italicized. Concentrations are means of *n* replicated determinations reported as ng PAH/g dry tissue weight; the mean sample wet and dry weights are also given. Total aromatics (i.e. TPAH) is the sum of the listed mean PAH concentrations with perylene excluded, followed by the standard error of the sum. Hyphens indicate concentrations below MDLs adjusted for the sample weight. Only samples that had surrogate standard recoveries greater than 30% and less than 150% are included in this table; samples that were excluded on this basis are listed in Table II-9.

Prince William Sound mussel samples

Station	Barnes	Barnes	Barnes	Barnes	Barnes	Barnes	Barnes	Barnes	Barnes
Name (#)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)
Date collected	31-Mar-89	07-Apr-89	06-May-89	24-Jun-89	17-Aug-89	25-Apr-90	22-Jun-90	06-Aug-90	20-Apr-91
Mean wet wt. (g)	9.91	10.3	10.8	9.43	9.56	9.09	8.13	9.80	8.70
Mean dry wt. (g)	0.92	0.86	0.83	0.78	0.60	1.06	0.78	0.88	0.61
N	3	3	3	3	3	3	2	1	3
PAH's(ng/g)									
Naph	54.7	94.0	24.3	120	14.5	-	-	-	-
Menap2	5.23	6.23	-	-	-	-	-	-	-
Menap1	22.2	28.4	4.91	-	8.26	-	-	-	-
Dimeth	-	-	2.83	-	-	-	-	-	-
C2naph	20.2	17.5	29.6	-	-	-	-	-	-
Trimeth	-	-	10.5	-	-	-	-	-	-
C3naph	12.6	15.3	47.5	5.94	2.43	-	2.89	-	-
C4naph	4.77	-	16.8	-	14.1	-	-	-	-
Biphenyl	-	3.67	8.08	-	4.49	-	-	-	-
Acenthy	-	-	-	-	-	-	-	-	-
Acenthe	-	-	-	-	3.22	-	-	-	-
Fluorene	-	-	-	-	-	-	-	-	-
C1fluor	-	2.13	2.96	-	2.76	-	-	-	-
C2fluor	6.10	4.34	33.5	5.93	4.72	3.65	-	-	26.1
C3fluor	13.0	9.66	24.5	-	4.11	1.45	-	7.89	7.33
Dithio	-	-	12.3	-	-	-	-	-	-
C1dithio	-	7.74	41.8	5.57	-	-	-	-	-
C2dithio	-	8.48	87.6	7.48	-	-	-	-	-
C3dithio	4.67	-	59.6	1.37	-	-	-	-	-
Phenanth	-	-	20.4	-	-	-	-	-	-
Mephen1	-	-	26.3	8.23	-	-	-	-	-
C1phenan	-	17.2	91.2	18.1	4.00	-	-	-	6.67
C2phenan	-	10.8	144	16.4	-	-	-	-	-
C3phenan	-	-	107	13.5	-	-	-	-	-
C4phenan	-	-	-	-	5.16	-	-	-	-
Anthra	-	-	-	-	-	-	-	-	-
Fluorant	-	5.01	-	-	-	-	-	-	-
Pyrene	-	-	-	-	-	-	-	-	-
C1fluora	-	-	-	-	-	-	-	-	-
Benanth	-	-	-	-	-	-	-	-	-
Chrysene	-	-	6.48	-	-	-	-	-	-
C1chrys	-	-	4.95	-	3.39	-	-	-	-
C2chrys	-	-	2.50	-	-	2.26	-	-	-
C3chrys	-	-	-	-	-	-	-	-	-
C4chrys	-	-	-	-	-	-	-	-	-
Benzobfl	-	-	-	-	-	-	-	-	-
Benzokfl	-	-	-	-	-	-	-	-	-
Benepy	-	-	-	-	-	-	-	-	-
Benapy	-	-	-	-	-	-	-	-	-
Perylene	-	-	-	-	-	-	-	-	-
Indeno	-	-	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-	-	-
Benzop	-	-	-	-	-	-	-	-	-
Total Aromatics (w/o Perylene)	143±20.9	230±78.3	770±11.5	195±43.2	71.2±13.4	7.37±3.87	2.89±2.89	7.89	40.1±7.40

Prince William Sound mussel samples

Station	Bay of	Bay of	Bay of	Bay of	Bay of	Bay of	Bay of	Bay of
Name (#)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)
Date collected	30-Mar-89	08-Apr-89	06-May-89	24-Jun-89	16-Aug-89	25-Apr-90	22-Jun-90	19-Apr-91
Mean wet wt. (g)	10.4	9.50	10.4	10.1	9.42	7.62	5.06	8.58
Mean dry wt. (g)	0.66	0.74	0.73	0.84	0.56	0.78	0.68	0.55
N	3	3	2	3	1	2	1	3
PAH's(ng/g)								
Naph	71.6	111	22.2	108	-	-	-	11.9
Menap2	11.3	83.8	32.1	6.08	-	-	-	-
Menap1	12.2	101	44.5	4.70	-	-	-	26.3
Dimeth	4.35	87.2	66.2	13.3	-	-	-	-
C2naph	31.6	367	279	34.6	-	-	-	-
Trimeth	2.53	80.6	103	27.7	-	-	-	-
C3naph	27.5	497	688	186	-	-	-	-
C4naph	208	303	584	210	107	-	-	-
Biphenyl	4.78	33.2	21.4	-	15.0	11.9	-	-
Acenthy	-	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-	-
Fluorene	-	22.6	21.0	-	-	-	-	-
C1fluor	24.6	88.6	143	58.7	14.3	-	-	-
C2fluor	10.6	236	521	286	43.9	-	43.1	-
C3fluor	16.3	209	678	387	118	-	44.3	-
Dithio	-	89.0	105	29.0	-	-	-	-
C1dithio	1.62	253	648	237	33.4	-	-	-
C2dithio	-	586	2000	817	237	5.80	55.0	5.86
C3dithio	-	558	2080	835	366	13.3	58.7	8.75
Phenanth	-	141	200	66.2	19.0	-	-	-
Mephen1	-	120	303	140	20.2	-	-	-
C1phenan	3.68	525	1400	562	68.4	25.7	64.3	-
C2phenan	-	936	3120	1370	304	44.8	86.7	14.3
C3phenan	-	844	3040	1600	438	41.5	73.4	19.6
C4phenan	33.5	187	835	630	403	44.9	64.1	-
Anthra	-	-	-	-	-	-	-	-
Fluorant	-	-	24.2	34.9	-	-	-	-
Pyrene	-	-	21.8	30.7	-	-	-	-
C1fluora	-	79.5	267	168	43.5	-	-	-
Benanth	-	-	6.60	11.6	-	-	-	-
Chrysene	-	75.4	293	176	71.0	6.58	-	9.48
C1chrys	-	101	436	289	124	6.92	-	15.9
C2chrys	8.47	89.3	289	189	124	3.96	-	-
C3chrys	-	30.3	138	88.2	-	-	-	-
C4chrys	-	2.62	5.99	11.6	-	-	-	-
Benzobfl	-	-	25.3	26.2	-	-	-	-
Benzokfl	-	-	-	-	-	-	-	-
Benepy	-	-	50.6	38.3	-	-	-	-
Benapy	-	-	-	-	-	-	-	-
Perylene	-	-	-	-	-	-	-	-
Indeno	-	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-	-
Benzop	-	-	-	-	-	-	-	-
Total Aromatics (w/o Perylene)	466±212	6550±943	18000±1540	8500±579	2530	205±43.7	489	112±57.0

Prince William Sound mussel samples

Station	Bligh	Bligh	Bligh	Bligh	Bligh	Bligh	Bligh	Bligh
Name (#)	Island (3)	Island (3)	Island (3)	Island (3)	Island (3)	Island (3)	Island (3)	Island (3)
Date collected	28-Mar-89	02-May-89	18-Jun-89	15-Aug-89	28-Apr-90	21-Jun-90	05-Aug-90	17-Apr-91
Mean wet wt. (g)	9.59	10.2	10.3	9.74	8.77	8.89	11.0	9.16
Mean dry wt. (g)	0.77	0.99	0.96	0.59	0.82	0.83	0.82	0.69
N	3	3	3	3	3	3	2	2
PAH's(ng/g)								
Naph	98.7	52.1	253	-	-	-	-	-
Menap2	11.7	-	18.9	-	-	7.45	-	-
Menap1	16.8	-	11.9	-	-	-	-	-
Dimeth	-	-	-	-	-	-	-	-
C2naph	16.4	11.2	6.78	3.91	4.31	18.8	-	5.31
Trimeth	-	-	-	-	-	4.16	-	-
C3naph	3.96	5.33	-	-	-	16.3	-	-
C4naph	30.7	-	-	22.6	-	15.4	-	-
Biphenyl	-	-	-	4.56	-	14.7	5.17	-
Acenthy	-	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-	-
Fluorene	-	-	-	-	-	-	-	-
C1fluor	-	-	2.41	-	-	-	3.72	4.36
C2fluor	11.6	1.40	2.33	9.58	-	8.45	-	-
C3fluor	13.0	4.32	4.30	-	-	10.4	-	-
Dithio	1.83	1.42	-	-	-	-	-	-
C1dithio	-	4.11	-	-	-	-	-	-
C2dithio	-	8.25	-	-	-	-	-	-
C3dithio	-	0.97	-	-	-	-	-	-
Phenanth	-	9.05	-	6.39	-	-	-	-
Mephen1	-	-	-	-	-	-	-	-
C1phenan	4.75	12.6	2.00	-	-	4.29	-	-
C2phenan	-	12.5	2.63	-	-	-	-	-
C3phenan	6.54	1.98	-	-	-	-	-	-
C4phenan	5.21	-	-	-	-	-	-	-
Anthra	-	-	-	-	-	-	-	-
Fluorant	-	-	-	-	-	-	-	-
Pyrene	-	-	-	-	-	-	-	-
C1fluora	-	-	-	-	-	-	-	-
Benanth	-	-	-	-	-	-	-	-
Chrysene	-	-	-	-	-	-	-	-
C1chrys	3.46	-	7.21	-	-	-	-	-
C2chrys	-	-	-	-	-	-	-	-
C3chrys	-	-	-	-	-	-	-	-
C4chrys	-	-	-	-	-	24.5	-	-
Benzobfl	-	-	-	-	-	-	-	-
Benzokfl	-	-	-	-	-	-	-	-
Benepy	-	-	-	-	-	-	-	-
Benapy	-	-	-	-	-	-	-	-
Perylene	-	-	-	-	-	-	-	-
Indeno	-	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-	-
Benzop	-	-	-	-	-	-	-	-
Total Aromatics (w/o Perylene)	225±51.2	125±4.60	312±111	47.1±33 3	4.31±4.31	120±113	8.89±1.45	9.67±0.95

Prince William Sound mussel samples

Station	Constantine	Constantine	Constantine
Name (#)	Harbor (4)	Harbor (4)	Harbor (4)
Date collected	21-Jun-89	25-Apr-90	22-Jun-90
Mean wet wt. (g)	8.57	5.03	8.31
Mean dry wt. (g)	0.77	0.66	0.83
N	2	1	3
PAH's(ng/g)			
Naph	468	-	-
Menap2	53.9	-	-
Menap1	31.1	-	-
Dimeth	-	-	-
C2naph	12.2	-	3.24
Trimeth	-	-	-
C3naph	2.65	-	-
C4naph	-	-	-
Biphenyl	6.93	-	-
Acenthy	-	-	-
Acenthe	5.31	-	-
Fluorene	-	-	-
C1fluor	3.56	-	-
C2fluor	28.7	-	14.9
C3fluor	17.3	-	5.67
Dithio	-	-	-
C1dithio	-	-	-
C2dithio	-	-	-
C3dithio	-	-	-
Phenanth	-	-	-
Mephen1	-	-	-
C1phenan	9.67	-	-
C2phenan	-	-	-
C3phenan	-	-	-
C4phenan	-	-	-
Anthra	-	-	-
Fluorant	-	-	-
Pyrene	-	-	-
C1fluora	-	-	-
Benanth	-	-	-
Chrysene	-	-	-
C1chrys	-	-	-
C2chrys	-	-	-
C3chrys	-	-	-
C4chrys	-	-	-
Benzobfl	-	-	-
Benzokfl	-	-	-
Benepy	-	-	-
Benapy	-	-	-
Perylene	-	-	-
Indeno	-	-	-
Dibenz	-	-	-
Benzop	-	-	-
Total Aromatics (w/o Perylene)	640±187	-	23.8±16.7

Prince William Sound mussel samples

Station	Crab	Crab	Crab	Crab	Crab	Crab	Crab	Crab
Name (#)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)
Date collected	01-Apr-89	07-May-89	19-Jun-89	17-Aug-89	26-Apr-90	23-Jun-90	07-Aug-90	20-Apr-91
Mean wet wt. (g)	10.3	10.6	9.98	10.1	8.32	8.10	10.2	8.40
Mean dry wt. (g)	0.99	0.79	0.76	0.75	0.81	0.95	0.88	0.72
N	3	2	3	3	3	2	3	2
PAH's(ng/g)								
Naph	113	52.7	58.2	-	-	-	12.7	-
Menap2	5.30	6.15	-	-	-	-	-	-
Menap1	9.19	25.9	9.23	-	-	-	16.3	-
Dimeth	-	5.84	-	-	-	-	-	-
C2naph	19.8	34.3	14.2	-	-	-	12.2	-
Trimeth	-	14.4	2.07	-	-	-	-	-
C3naph	8.24	82.1	22.5	7.31	-	-	23.9	-
C4naph	-	211	13.8	5.09	-	-	24.0	-
Biphenyl	10.4	5.96	-	-	-	-	-	-
Acenthy	-	-	-	-	-	-	-	-
Acenthe	-	-	2.92	-	-	-	-	-
Fluorene	-	3.08	-	-	-	-	-	-
C1fluor	-	19.6	9.77	-	-	-	2.37	8.23
C2fluor	-	36.9	23.3	5.46	-	-	11.7	17.9
C3fluor	5.49	27.4	8.67	-	-	-	5.30	19.6
Dithio	-	15.3	1.83	-	-	-	-	-
C1dithio	-	61.3	13.3	-	-	-	8.15	-
C2dithio	1.39	172	25.7	5.02	-	-	15.4	-
C3dithio	5.19	152	23.8	3.48	-	-	9.99	-
Phenanth	-	29.4	10.3	-	-	7.92	-	-
Mephen1	-	38.6	6.47	3.77	-	-	6.24	-
C1phenan	1.88	152	37.6	7.03	-	-	18.9	28.2
C2phenan	-	295	54.3	10.7	-	-	25.3	-
C3phenan	-	224	42.4	7.35	-	-	17.2	4.56
C4phenan	-	20.6	10.3	-	-	-	-	-
Anthra	-	-	-	-	-	-	-	-
Fluorant	-	7.97	-	-	-	4.94	-	-
Pyrene	-	-	-	-	-	-	-	-
C1fluora	-	-	-	-	-	-	-	-
Benanth	-	-	-	-	-	-	-	-
Chrysene	-	31.4	6.50	-	-	-	-	-
C1chrys	-	57.7	8.73	-	3.78	5.40	3.60	-
C2chrys	13.7	57.9	3.20	-	-	-	-	-
C3chrys	-	-	-	-	-	-	-	-
C4chrys	-	-	-	-	-	-	-	-
Benzobfl	-	-	-	-	-	-	-	-
Benzokfl	-	-	-	-	-	-	-	-
Benepy	-	5.40	-	-	-	-	-	-
Benapy	-	-	-	-	-	-	-	-
Perylene	-	-	-	-	-	-	-	-
Indeno	-	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-	-
Benzop	-	-	-	-	-	-	-	-
Total Aromatics (w/o Perylene)	193±19.6	1790±13.4	400±207	51.4±26.0	3.78±3.78	18.3±7.45	207±13.9	78.5±10.9

Prince William Sound mussel samples

Station	Elrington	Elrington	Elrington	Elrington	Elrington	Elrington	Elrington	Green
Name (#)	Island (6)	Island (6)	Island (6)	Island (6)	Island (6)	Island (6)	Island (6)	Island (7)
Date collected	10-May-89	19-Jun-89	17-Aug-89	26-Apr-90	23-Jun-90	07-Aug-90	19-Apr-91	03-Apr-89
Mean wet wt. (g)	10.6	10.0	10.1	7.95	8.68	11.1	8.98	8.79
Mean dry wt. (g)	0.84	0.77	0.80	0.89	1.10	1.25	0.81	0.82
N	3	3	2	3	3	3	3	2
PAH's(ng/g)								
Naph	-	58.1	-	14.0	-	-	23.3	954
Menap2	16.0	-	-	-	4.36	-	-	7420
Menap1	16.6	14.7	-	-	-	-	35.5	5960
Dimeth	48.5	-	-	-	5.44	28.7	-	6810
C2naph	247	16.0	-	-	21.7	146	-	8220
Trimeth	87.0	29.0	4.51	-	2.37	79.1	-	6540
C3naph	674	244	27.3	-	18.2	556	-	38700
C4naph	1150	510	154	-	22.4	583	-	21900
Biphenyl	6.71	-	-	2.70	14.0	-	-	1240
Acenthy	-	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-	-
Fluorene	10.3	-	-	-	-	6.49	-	1340
C1fluor	172	104	15.0	-	3.64	80.3	-	5540
C2fluor	825	781	218	5.37	20.8	290	-	10100
C3fluor	1410	1470	250	-	12.2	226	2.30	7160
Dithio	65.3	27.6	-	1.85	-	25.4	-	4480
C1dithio	781	578	56.7	-	2.98	183	-	12800
C2dithio	2610	3300	340	2.00	8.01	328	-	17800
C3dithio	3890	4120	624	7.45	12.8	241	5.22	10300
Phenanth	113	68.0	10.6	-	-	49.6	-	6440
Mephen1	311	239	15.5	-	2.20	99.3	-	4900
C1phenan	1380	1270	84.2	2.22	10.2	286	-	22000
C2phenan	3640	4620	413	11.4	19.7	450	3.44	23600
C3phenan	4160	6490	766	11.2	24.5	314	9.59	17000
C4phenan	2590	2080	681	4.19	4.24	70.7	2.48	1790
Anthra	-	2.97	-	-	-	4.36	-	-
Fluorant	43.5	71.7	-	-	-	-	-	282
Pyrene	47.1	99.9	-	-	-	-	-	436
C1fluora	1300	604	196	-	-	7.73	-	2090
Benanth	19.5	30.3	4.87	-	-	-	-	53.4
Chrysene	357	692	85.0	11.9	7.22	-	7.81	1240
C1chrys	728	1280	215	7.71	5.61	6.56	7.48	1870
C2chrys	669	884	196	6.59	1.91	4.15	5.67	734
C3chrys	317	422	107	1.97	1.81	-	-	1230
C4chrys	72.4	66.2	9.81	-	24.3	-	-	378
Benzobfl	50.2	73.3	8.20	-	-	-	-	182
Benzokfl	-	-	-	-	-	-	-	-
Benepy	94.3	127	19.7	-	-	-	-	329
Benapy	-	5.84	-	-	-	-	-	83.6
Perylene	-	-	-	-	-	-	-	39.3
Indeno	-	-	-	-	-	-	-	17.0
Dibenz	-	-	-	-	-	-	-	15.5
Benzop	6.79	12.6	-	-	-	-	-	61.0
Total Aromatics (w/o Perylene)	27500±1120	30100±5060	4480±1890	90.5±41.8	241±123	3860±167	103±22.1	234000±32400

Prince William Sound mussel samples

Station	Naked	Naked	Naked	Naked	Naked	Naked	Naked	Naked	Naked
Name (#)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)
Date collected	28-Mar-89	08-Apr-89	08-May-89	18-Jun-89	15-Aug-89	24-Apr-90	21-Jun-90	05-Aug-90	15-Apr-91
Mean wet wt. (g)	9.51	9.93	9.99	10.7	10.0	8.83	8.21	10.4	9.37
Mean dry wt. (g)	0.67	0.79	1.10	1.21	0.73	0.97	1.04	1.08	0.88
N	3	3	3	3	3	3	2	2	3
PAH's(ng/g)									
Naph	298	137	73.2	124	40.4	10.2	-	-	17.1
Menap2	38.3	95.6	-	8.22	-	-	-	-	-
Menap1	15.7	90.8	-	11.7	-	-	-	7.88	-
Dimeth	-	80.1	1.92	-	-	-	-	-	-
C2naph	13.1	374	21.5	9.33	-	-	-	-	2.67
Trimeth	-	86.6	5.44	-	-	-	-	-	-
C3naph	2.20	598	56.6	10.8	4.97	-	-	-	-
C4naph	72.5	425	127	13.9	2.33	-	-	-	-
Biphenyl	-	26.4	11.6	-	4.66	-	-	10.6	-
Acenthy	-	-	-	-	-	-	-	-	-
Acenthe	-	-	-	-	3.32	-	-	-	2.23
Fluorene	-	17.1	-	-	-	-	-	-	-
C1fluor	22.1	125	10.2	5.45	-	-	-	-	2.41
C2fluor	8.88	344	78.1	14.8	52.1	-	-	-	2.15
C3fluor	15.8	303	120	18.3	12.7	-	4.68	-	2.67
Dithio	-	53.7	3.43	-	-	-	-	-	2.48
C1dithio	3.73	277	62.3	8.63	3.91	-	-	-	-
C2dithio	2.96	629	273	32.6	15.1	-	-	-	2.45
C3dithio	1.86	551	340	44.2	15.7	-	-	-	5.34
Phenanth	-	111	24.7	2.59	5.14	5.83	-	-	-
Mephen1	-	135	31.5	3.76	-	-	-	-	-
C1phenan	3.09	570	136	25.0	11.1	-	-	-	-
C2phenan	-	990	471	61.8	30.4	-	-	-	3.56
C3phenan	5.24	735	542	93.1	43.2	-	-	-	7.00
C4phenan	-	212	212	38.5	8.73	-	-	-	6.48
Anthra	-	-	-	-	-	-	-	-	-
Fluorant	-	-	4.01	-	-	-	-	-	-
Pyrene	-	-	3.51	3.03	-	-	-	-	-
C1fluora	-	64.7	38.1	7.93	-	-	-	-	-
Benanth	-	-	-	-	-	-	-	-	-
Chrysene	-	66.9	46.5	12.2	3.13	-	-	-	6.82
C1chrys	4.95	73.7	77.6	12.8	7.56	-	-	-	6.63
C2chrys	10.2	73.9	47.5	13.3	-	-	-	-	5.08
C3chrys	8.01	36.4	9.39	6.56	-	-	-	-	-
C4chrys	-	2.37	-	1.70	-	-	-	-	-
Benzobfl	-	-	-	-	-	-	-	-	4.74
Benzokfl	-	-	-	-	-	-	-	-	-
Benepy	-	-	-	-	-	-	-	-	-
Benapy	-	-	-	-	-	-	-	-	2.67
Perylene	-	-	-	-	-	-	-	-	5.37
Indeno	-	-	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-	-	-
Benzop	-	-	-	-	-	-	-	-	-
Total Aromatics (w/o Perylene)	526±150	6980±245	2790±66.3	580±92.5	264±1.64	16.1±7.31	4.68±4.68	18.5±5.77	82.5±32.8

Prince William Sound mussel samples

Station	Olsen	Olsen	Olsen	Olsen	Olsen	Olsen	Olsen
Name (#)	Bay (9)	Bay (9)	Bay (9)	Bay (9)	Bay (9)	Bay (9)	Bay (9)
Date collected	06-Apr-89	01-May-89	18-Jun-89	28-Apr-90	25-Jun-90	09-Aug-90	15-Apr-91
Mean wet wt. (g)	9.99	10.1	9.90	8.52	9.68	10.9	9.62
Mean dry wt. (g)	1.03	0.91	0.72	0.84	0.99	0.82	0.91
N	3	3	3	3	3	2	2
PAH's(ng/g)							
Naph	177	47.6	347	-	-	-	-
Menap2	12.2	3.47	31.3	-	3.46	-	-
Menap1	13.1	-	46.3	-	10.1	-	-
Dimeth	-	-	-	-	2.40	-	-
C2naph	10.6	3.10	4.46	-	11.3	7.99	-
Trimeth	-	-	-	-	3.58	3.42	-
C3naph	-	-	-	-	10.4	17.9	-
C4naph	-	40.0	-	-	17.1	14.7	-
Biphenyl	6.53	4.04	5.09	3.14	8.70	-	3.95
Acenthy	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-
Fluorene	-	-	-	-	-	-	-
C1fluor	1.77	6.85	1.97	-	1.62	9.51	-
C2fluor	21.1	15.5	5.46	4.89	9.76	8.92	-
C3fluor	13.0	10.9	3.54	2.79	4.38	7.06	-
Dithio	-	-	-	-	-	2.78	-
C1dithio	-	-	-	-	1.33	8.56	-
C2dithio	-	-	-	-	1.18	19.0	-
C3dithio	-	-	-	-	-	23.9	-
Phenanth	-	5.11	-	-	-	-	-
Mephen1	-	-	-	-	-	4.21	-
C1phenan	11.5	2.13	2.26	-	-	16.3	-
C2phenan	3.57	-	-	-	-	29.5	-
C3phenan	9.27	6.04	-	6.98	23.3	43.3	-
C4phenan	-	4.48	-	-	-	11.6	-
Anthra	-	-	-	-	-	-	-
Fluorant	-	-	-	-	-	-	-
Pyrene	-	-	-	-	-	-	-
C1fluora	-	-	-	-	-	-	-
Benanth	-	-	-	-	1.36	-	-
Chrysene	-	-	-	-	-	10.1	-
C1chrys	1.83	-	-	-	-	11.5	-
C2chrys	-	5.75	-	-	-	7.70	-
C3chrys	-	-	-	-	-	-	-
C4chrys	-	-	-	-	-	-	-
Benzobfl	-	-	-	-	-	-	-
Benzokfl	-	-	-	-	-	-	-
Benepy	-	-	-	-	-	-	-
Benapy	-	-	-	-	-	-	-
Perylene	-	-	-	-	-	-	-
Indeno	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-
Benzop	-	-	-	-	-	-	-
Total Aromatics (w/o Perylene)	281±109	155±5.31	447±119	17.8±11.2	104±60.5	250±245	3.95±3.95

Prince William Sound mussel samples

Station	Perry	Perry	Perry	Perry	Perry	Perry
Name (#)	Island (10)	Island (10)	Island (10)	Island (10)	Island (10)	Island (10)
Date collected	08-May-89	16-Aug-89	24-Apr-90	21-Jun-90	05-Aug-90	18-Apr-91
Mean wet wt. (g)	9.28	9.90	5.05	6.79	8.35	8.86
Mean dry wt. (g)	0.93	0.66	0.73	0.61	0.65	1.06
N	1	2	1	3	1	1
PAH's(ng/g)						
Naph	-	-	-	-	-	-
Menap2	-	-	-	-	-	-
Menap1	-	-	-	-	-	-
Dimeth	10.2	-	-	-	-	-
C2naph	12.9	7.40	-	-	-	-
Trimeth	13.8	-	-	-	-	-
C3naph	79.7	14.0	-	-	-	-
C4naph	87.4	19.2	-	-	-	-
Biphenyl	-	-	-	-	-	-
Acenthy	-	-	-	-	-	-
Acenthe	-	-	-	4.92	-	-
Fluorene	-	-	-	-	-	-
C1fluor	27.7	-	-	-	-	-
C2fluor	113	19.7	-	7.48	-	-
C3fluor	148	9.59	-	3.84	8.16	-
Dithio	14.7	-	-	-	-	-
C1dithio	96.8	6.76	-	-	-	-
C2dithio	338	20.3	-	-	-	-
C3dithio	312	23.5	-	1.99	-	-
Phenanth	33.1	-	-	-	-	-
Mephen1	53.8	-	-	-	-	-
C1phenan	192	14.0	-	6.96	-	-
C2phenan	513	34.8	-	3.37	-	-
C3phenan	578	44.8	-	-	-	-
C4phenan	91.5	18.3	-	-	-	-
Anthra	-	-	-	-	-	-
Fluorant	18.8	-	-	-	-	-
Pyrene	-	-	-	-	-	-
C1fluora	31.1	-	-	-	-	-
Benanth	-	-	-	-	-	-
Chrysene	41.1	5.28	-	-	-	-
C1chrys	65.3	-	-	-	-	5.35
C2chrys	20.5	-	-	-	-	-
C3chrys	8.40	-	-	-	-	-
C4chrys	-	-	-	-	-	-
Benzobfl	-	-	-	-	-	-
Benzokfl	-	-	-	-	-	-
Benepy	-	-	-	-	-	-
Benapy	-	-	-	-	-	-
Perylene	-	-	-	-	-	-
Indeno	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-
Benzop	-	-	-	-	-	-
Total Aromatics (w/o Perylene)	2820	238±1.13	-	28.6±14.4	8.16	5.35

Prince William Sound mussel samples

Station	Rocky	Rocky	Rocky	Rocky	Rocky	Rocky	Rocky	Rocky
Name (#)	Bay (11)	Bay (11)	Bay (11)	Bay (11)	Bay (11)	Bay (11)	Bay (11)	Bay (11)
Date collected	26-Mar-89	04-May-89	21-Jun-89	20-Aug-89	25-Apr-90	22-Jun-90	08-Aug-90	02-May-91
Mean wet wt. (g)	10.2	10.3	9.90	9.84	8.83	8.86	11.1	8.64
Mean dry wt. (g)	1.02	1.25	1.23	0.85	0.99	1.02	1.04	0.71
N	3	3	3	3	3	3	3	3
PAH's(ng/g)								
Naph	335	9.56	246	-	-	-	-	-
Menap2	32.5	-	24.7	-	-	-	3.77	-
Menap1	11.8	-	20.1	-	-	-	12.0	-
Dimeth	-	1.48	-	-	-	-	3.17	-
C2naph	12.4	17.7	5.62	-	3.37	-	12.7	-
Trimeth	-	3.41	-	-	-	-	2.37	-
C3naph	8.04	23.6	6.56	1.63	3.95	-	8.87	13.9
C4naph	44.0	23.6	1.54	28.0	-	-	3.87	87.7
Biphenyl	-	2.86	3.20	3.46	4.50	-	14.3	-
Acenthy	-	-	-	-	-	-	-	-
Acenthe	2.88	-	2.90	-	-	-	-	-
Fluorene	-	-	-	-	-	-	-	-
C1fluor	5.45	1.61	1.00	2.54	-	-	-	-
C2fluor	32.5	28.4	13.6	9.70	-	1.79	16.4	2.71
C3fluor	23.5	20.3	6.85	5.01	-	-	11.7	-
Dithio	-	1.32	-	-	-	-	-	-
C1dithio	2.55	15.2	4.29	-	-	-	-	1.92
C2dithio	-	36.3	11.4	1.52	-	-	-	5.21
C3dithio	3.10	34.7	13.3	2.82	-	-	-	-
Phenanth	-	14.3	-	5.12	5.83	-	-	10.6
Mephen1	-	14.7	-	-	-	-	-	-
C1phenan	9.44	39.3	14.4	3.08	2.27	-	5.98	10.6
C2phenan	6.51	88.7	23.7	2.67	2.46	-	6.82	-
C3phenan	4.64	71.4	25.4	23.1	-	-	9.84	24.5
C4phenan	2.50	16.7	7.27	2.33	-	-	-	-
Anthra	-	-	-	-	-	-	-	-
Fluorant	-	-	-	-	-	-	-	6.33
Pyrene	-	-	-	-	-	-	-	-
C1fluora	-	-	-	-	-	-	-	-
Benanth	-	-	3.17	-	-	-	-	-
Chrysene	-	10.2	-	-	-	-	-	-
C1chrys	-	8.15	-	2.58	-	-	-	-
C2chrys	7.66	7.82	1.77	-	-	-	-	-
C3chrys	-	-	-	-	-	-	-	-
C4chrys	-	2.00	-	-	-	-	1.67	-
Benzobfl	-	-	-	-	-	-	-	-
Benzokfl	-	-	-	-	-	-	-	-
Benepy	-	-	-	-	-	-	-	-
Benapy	-	-	-	-	-	-	-	-
Perylene	-	-	-	-	-	-	-	8.92
Indeno	-	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-	-
Benzop	-	-	-	-	-	-	-	-
Total Aromatics (w/o Perylene)	544±114	474±49.3	437±178	93.6±32.2	22.4±11.2	1.79±1.79	108±43.9	163±22.1

Prince William Sound mussel samples

Station	Siwash	Siwash	Siwash	Siwash	Siwash	Siwash	Siwash
Name (#)	Bay (12)	Bay (12)	Bay (12)	Bay (12)	Bay (12)	Bay (12)	Bay (12)
Date collected	29-Mar-89	03-May-89	16-Aug-89	24-Apr-90	25-Jun-90	09-Aug-90	18-Apr-91
Mean wet wt. (g)	10.1	10.4	10.5	8.21	9.29	11.0	8.50
Mean dry wt. (g)	0.88	0.80	0.89	0.79	1.41	1.22	0.72
N	3	3	2	3	3	3	2
PAH's(ng/g)							
Naph	216	-	-	-	4.62	-	16.7
Menap2	23.0	-	-	-	-	7.41	-
Menap1	10.0	16.3	-	-	-	-	11.1
Dimeth	3.08	-	-	-	1.41	6.04	-
C2naph	13.9	3.67	-	3.96	2.47	18.0	7.56
Trimeth	-	-	-	-	1.18	4.29	-
C3naph	5.66	3.53	2.94	-	3.46	13.9	-
C4naph	68.4	16.7	57.0	-	7.76	1.25	-
Biphenyl	-	-	5.72	-	9.17	12.3	6.56
Acenthy	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	4.12
Fluorene	-	-	-	-	-	-	-
C1fluor	26.0	2.03	4.64	-	-	-	-
C2fluor	14.5	21.7	82.4	9.37	11.7	5.72	20.9
C3fluor	17.4	12.0	17.2	14.3	3.99	7.42	11.2
Dithio	-	-	-	-	-	-	2.50
C1dithio	3.77	-	9.85	-	-	-	-
C2dithio	3.37	-	18.4	-	-	-	-
C3dithio	3.00	-	7.36	1.57	-	-	-
Phenanth	-	-	6.00	-	-	-	-
Mephen1	-	-	-	-	-	-	-
C1phenan	3.33	5.23	17.3	3.00	1.55	-	5.56
C2phenan	2.70	-	18.9	-	1.38	-	-
C3phenan	5.37	2.74	7.41	-	8.66	-	5.44
C4phenan	3.17	-	6.00	-	-	-	-
Anthra	-	-	-	-	5.64	-	-
Fluorant	-	-	-	-	-	-	-
Pyrene	-	-	-	-	-	-	-
C1fluora	-	-	-	-	-	-	-
Benanth	-	-	-	-	-	-	-
Chrysene	-	-	-	-	-	-	-
C1chrys	1.93	-	8.58	-	-	2.04	-
C2chrys	13.2	13.7	4.51	-	-	-	-
C3chrys	5.43	-	-	-	-	-	-
C4chrys	-	-	-	-	-	-	-
Benzobfl	-	-	-	-	-	-	-
Benzokfl	-	-	-	-	-	-	-
Benepy	-	-	-	-	-	-	-
Benapy	-	-	-	-	-	-	-
Perylene	-	-	-	-	3.23	-	-
Indeno	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-
Benzop	-	-	-	-	-	-	-
Total Aromatics (w/o Perylene)	440±153	97.6±5.83	274±61.4	32 2±16 6	60.4±23.6	68.1±36.0	91.6±36.0

Prince William Sound mussel samples

Station	Sleepy	Sleepy	Sleepy	Sleepy	Sleepy	Sleepy
Name (#)	Bay (13)	Bay (13)	Bay (13)	Bay (13)	Bay (13)	Bay (13)
Date collected	07-May-89	17-Aug-89	26-Apr-90	23-Jun-90	07-Aug-90	19-Apr-91
Mean wet wt. (g)	9.80	10.2	7.85	8.99	9.25	9.16
Mean dry wt. (g)	0.98	0.69	0.93	1.25	0.86	1.13
N	3	3	3	3	3	3
PAH's(ng/g)						
Naph	7.04	29.3	-	6.20	24.5	-
Menap2	238	-	-	-	-	-
Menap1	243	-	-	5.11	-	-
Dimeth	755	11.5	-	3.82	16.2	-
C2naph	3010	45.7	-	46.2	56.9	-
Trimeth	1530	60.0	-	4.88	69.0	-
C3naph	10200	476	33.0	43.1	523	7.89
C4naph	10100	931	66.1	59.5	933	15.6
Biphenyl	93.7	-	-	8.68	-	2.19
Acenthy	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-
Fluorene	173	-	-	-	-	-
C1fluor	1800	159	3.10	8.51	109	1.45
C2fluor	5650	1130	88.5	60.5	697	28.1
C3fluor	6510	2090	216	89.9	1110	76.4
Dithio	967	24.2	-	1.78	20.8	-
C1dithio	5790	686	37.5	26.0	455	13.1
C2dithio	14000	3900	355	130	2110	147
C3dithio	13700	5780	652	194	2950	278
Phenanth	1450	42.8	4.59	5.29	46.1	-
Mephen1	2140	180	11.2	6.46	240	13.5
C1phenan	10300	1120	128	90.6	803	31.5
C2phenan	19300	4950	443	185	2980	181
C3phenan	18200	7230	806	304	4270	464
C4phenan	7340	3370	523	144	1700	209
Anthra	97.9	8.71	-	-	13.8	-
Fluorant	269	68.5	-	3.58	42.8	11.9
Pyrene	324	82.0	-	-	62.3	10.1
C1fluora	3020	742	105	62.0	440	73.5
Benanth	-	37.2	3.20	-	8.57	5.49
Chrysene	1700	729	128	53.3	315	79.9
C1chrys	3090	1780	198	116	677	175
C2chrys	2900	1510	189	101	688	119
C3chrys	1710	983	94.8	39.5	397	44.9
C4chrys	628	297	2.13	13.4	56.8	11.9
Benzobfl	170	134	7.76	6.35	64.8	6.77
Benzokfl	-	-	7.87	-	-	-
Benepy	327	225	41.6	22.5	114	34.7
Benapy	43.4	27.8	14.6	-	4.27	-
Perylene	-	-	-	-	-	-
Indeno	7.26	6.90	-	-	-	-
Dibenz	10.4	7.74	-	-	1.27	-
Benzop	45.2	41 2	-	3.10	9.86	-
Total Aromatics (w/o Perylene)	143000±13900	38600±4330	4150±205	1830±69.3	21700±1510	2030±96.6

Table II-2.--Concentrations of alkanes in MUSSELS collected from PWS, Alaska, for this study. Table I-4 contains a key for the alkane abbreviations used here. Tables 1 and 2 list the station names, numbers, locations, and collection dates that correspond with those listed here. Stations established in 1977 described by Karinen et al. (1993) are italicized. Concentrations are means of *n* replicated determinations reported as ng alkane/g dry tissue weight; the mean sample wet and dry weights are also given. "ALKANES" indicates the mean of the sum of all alkanes detected, and "UCM" indicates the unresolved complex mixture. "Total NAlkanes" is the sum of the listed mean normal alkane concentrations (i.e., pristane and phytane excluded), followed by the standard error of the sum. Hyphens indicate concentrations below MDLs adjusted for the sample weight. Only samples that had surrogate standard recoveries greater than 30% and less than 150% are included in this table; samples that were excluded on this basis are listed in Table II-10.

Prince William Sound mussel samples

Station Name (#)	Barnes Cove (1)	Barnes Cove (1)	Barnes Cove (1)	Barnes Cove (1)	Barnes Cove (1)	Barnes Cove (1)	Barnes Cove (1)	Barnes Cove (1)	Barnes Cove (1)
Date collected	31-Mar-89	07-Apr-89	06-May-89	24-Jun-89	17-Aug-89	25-Apr-90	22-Jun-90	06-Aug-90	20-Apr-91
Mean wet wt. (g)	9.91	10.3	10.8	9.46	9.71	9.09	7.93	10.5	8.70
Mean dry wt. (g)	0.92	0.86	0.83	0.80	0.58	1.06	0.82	0.94	0.61
N	3	3	3	2	1	3	2	3	3
Alkanes (ng/g)									
C10alk	-	-	-	196	-	114	304	63.6	-
C11alk	-	-	-	-	-	25.5	47.3	-	-
C12alk	19.5	-	53.0	-	-	36.0	73.2	-	-
C13alk	-	47.7	54.7	73.8	260	-	-	-	-
C14alk	90.5	106	97.1	-	-	59.5	128	-	-
C15alk	423	112	260	342	524	287	1310	670	568
C16alk	280	-	169	-	-	83.1	580	-	-
C17alk	138	-	-	-	-	124	1190	-	-
Pristane	281	255	631	1150	-	4350	1320	-	400
C18alk	-	-	-	94.5	-	47.1	29.1	-	-
Phytane	-	-	-	151	-	46.0	-	-	-
C19alk	-	-	-	-	-	70.0	36.8	-	-
C20alk	-	-	-	-	-	57.0	-	-	-
C21alk	-	-	-	-	-	42.8	-	-	-
C22alk	43.2	-	-	-	-	34.1	-	62.7	-
C23alk	-	-	-	-	-	40.6	15.8	-	-
C24alk	-	-	-	-	-	46.1	-	-	-
C25alk	-	65.6	-	47.8	-	44.1	-	108	-
C26alk	-	-	-	-	-	31.8	-	61.5	-
C27alk	-	79.5	-	141	-	57.1	37.4	-	-
C28alk	-	72.0	-	-	-	33.3	-	-	-
C29alk	-	178	-	180	-	45.3	-	-	-
C30alk	-	-	-	-	-	29.6	-	-	-
C31alk	-	-	-	-	-	62.6	42.0	-	-
C32alk	-	-	-	-	-	36.0	-	-	-
C33alk	-	-	-	-	-	35.7	-	-	-
C34alk	-	-	-	-	-	-	-	-	-
ALKANES	3760	3040	7050	8830	2810	8200	7870	220000	4810
UCM	40100	30000	14500	16600	-	32300	40300	39300	-
Total NAlkanes	994±739	661±661	634±286	1070±163	785	1440±1440	3800±705	965±118	568±292

Prince William Sound mussel samples

Station	Bay of	Bay of	Bay of	Bay of	Bay of	Bay of	Bay of	Bay of	Bay of
Name (#)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)
Date collected	30-Mar-89	08-Apr-89	06-May-89	24-Jun-89	16-Aug-89	25-Apr-90	22-Jun-90	06-Aug-90	19-Apr-91
Mean wet wt. (g)	10.4	9.50	10.3	10.1	9.67	7.62	8.28	9.85	8.11
Mean dry wt. (g)	0.66	0.74	0.72	0.84	0.58	0.78	0.80	0.74	0.51
N	3	3	3	3	3	2	2	2	1
Alkanes (ng/g)									
C10alk	-	-	291	-	-	334	267	-	-
C11alk	41.4	194	255	28.2	-	116	39.3	-	-
C12alk	33.5	312	303	116	93.1	63.9	116	71.1	-
C13alk	64.9	460	382	64.0	139	-	239	114	-
C14alk	-	575	117	-	124	107	332	-	-
C15alk	339	730	223	-	798	1050	1200	914	-
C16alk	-	510	201	-	-	164	396	-	-
C17alk	-	498	453	606	-	262	571	275	-
Pristane	164	1190	2130	1850	320	294	811	376	-
C18alk	-	379	506	633	-	209	242	215	-
Phytane	-	782	511	1410	522	125	452	228	-
C19alk	-	342	475	762	-	268	238	-	-
C20alk	-	410	440	1500	-	260	422	-	-
C21alk	-	470	476	846	96.1	200	173	133	-
C22alk	-	502	710	1280	143	185	238	235	-
C23alk	-	474	453	1240	-	89.5	127	-	-
C24alk	-	598	561	2220	304	91.1	48.6	-	-
C25alk	-	611	736	1570	514	152	195	154	-
C26alk	-	868	571	1990	280	56.1	145	56.8	-
C27alk	-	1180	784	1740	340	153	188	175	-
C28alk	-	589	529	1180	106	104	27.7	-	-
C29alk	-	174	294	779	-	112	203	-	-
C30alk	-	70.6	381	496	424	178	147	-	-
C31alk	-	-	-	-	-	165	108	-	-
C32alk	-	-	274	253	149	109	-	-	-
C33alk	-	-	-	-	-	117	42.7	-	-
C34alk	-	-	294	-	-	102	-	-	-
ALKANES	3420	26100	40100	75400	17700	13100	19600	151000	4430
UCM	36700	157000	225000	60700	137000	86000	35100	116000	-
Total NAlkanes	479±73.2	9950±2220	9710±1480	17300±6670	3510±629	4650±2310	5700±1270	2340±400	-

Prince William Sound mussel samples

Station Name (#)	Bligh Island (3)	Bligh Island (3)	Bligh Island (3)	Bligh Island (3)	Bligh Island (3)	Bligh Island (3)	Bligh Island (3)	Bligh Island (3)
Date collected	28-Mar-89	02-May-89	18-Jun-89	15-Aug-89	28-Apr-90	21-Jun-90	05-Aug-90	17-Apr-91
Mean wet wt. (g)	9.59	10.2	10.3	9.74	8.77	8.89	11.1	9.06
Mean dry wt. (g)	0.77	0.99	0.96	0.59	0.82	0.83	0.82	0.72
N	3	3	3	3	3	3	3	3
Alkanes (ng/g)								
C10alk	-	-	-	-	142	414	-	-
C11alk	-	-	-	-	43.3	169	-	-
C12alk	-	15.4	43.4	-	50.2	190	-	28.0
C13alk	-	-	45.2	192	39.4	159	-	-
C14alk	-	-	-	-	101	200	-	-
C15alk	219	199	-	578	448	752	-	102
C16alk	-	-	-	-	146	103	-	-
C17alk	-	-	-	-	179	829	-	-
Pristane	-	4560	732	326	2010	285	-	-
C18alk	-	-	-	-	-	19.5	-	-
Phytane	-	-	-	-	-	-	-	-
C19alk	-	-	-	-	13.1	21.6	-	-
C20alk	-	-	-	-	-	-	-	-
C21alk	-	-	-	-	-	-	-	-
C22alk	-	-	-	-	-	-	-	-
C23alk	-	-	-	-	14.6	16.2	-	-
C24alk	-	-	-	-	-	-	-	-
C25alk	39.5	59.5	-	-	-	-	-	-
C26alk	36.7	68.3	-	-	-	-	-	-
C27alk	-	85.4	128	-	31.8	42.5	-	-
C28alk	-	106	-	-	12.9	-	-	-
C29alk	-	88.1	-	-	26.3	35.4	-	-
C30alk	-	-	-	-	-	-	-	-
C31alk	-	-	-	-	27.3	32.0	-	-
C32alk	-	-	-	-	-	-	-	-
C33alk	-	-	-	-	-	-	-	-
C34alk	-	-	-	-	-	363	-	-
ALKANES	3240	9980	3720	5890	5970	8150	14600	2580
UCM	63200	9760	-	14000	56500	28800	3150	72300
Total NAlkanes	296±36.0	622±270	216±46.4	771±220	1280±1020	3350±1220	-	130±130

Prince William Sound mussel samples

Station	Constantine	Constantine	Constantine
Name (#)	Harbor (4)	Harbor (4)	Harbor (4)
Date collected	21-Jun-89	25-Apr-90	22-Jun-90
Mean wet wt. (g)	8.57	5.03	8.31
Mean dry wt. (g)	0.77	0.66	0.83
N	2	1	3
Alkanes (ng/g)			
C10alk	124	461	458
C11alk	129	154	43.1
C12alk	99.3	121	96.8
C13alk	-	-	30.0
C14alk	-	194	120
C15alk	616	1260	1030
C16alk	-	492	138
C17alk	-	543	206
Pristane	548	1130	103
C18alk	-	195	-
Phytane	-	168	-
C19alk	-	261	15.6
C20alk	-	203	-
C21alk	-	146	-
C22alk	-	106	-
C23alk	-	146	15.1
C24alk	-	169	24.7
C25alk	-	124	-
C26alk	-	106	-
C27alk	-	175	37.0
C28alk	-	101	-
C29alk	-	141	32.1
C30alk	-	98.9	-
C31alk	-	181	35.8
C32alk	-	159	-
C33alk	-	130	-
C34alk	-	-	-
ALKANES	16100	6960	5790
UCM	16600	-	4200
Total NAlkanes	969±276	5660	2280±1540

Prince William Sound mussel samples								
Station	Crab	Crab	Crab	Crab	Crab	Crab	Crab	Crab
Name (#)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)
Date collected	01-Apr-89	07-May-89	19-Jun-89	17-Aug-89	26-Apr-90	23-Jun-90	07-Aug-90	20-Apr-91
Mean wet wt. (g)	10.3	10.9	9.98	10.1	8.32	8.96	10.2	8.40
Mean dry wt. (g)	0.99	0.87	0.76	0.75	0.81	1.03	0.88	0.72
N	3	1	3	3	3	3	3	2
Alkanes (ng/g)								
C10alk	72.0	155	61.0	281	-	345	290	-
C11alk	43.5	112	236	44.4	-	19.1	116	-
C12alk	37.5	113	170	86.6	37.6	45.9	158	-
C13alk	35.9	120	150	181	106	23.5	205	-
C14alk	-	-	-	-	58.6	72.7	-	-
C15alk	-	358	-	563	280	577	89.2	596
C16alk	-	-	-	150	243	284	119	-
C17alk	-	-	148	149	336	979	-	-
Pristane	372	9560	2320	281	6100	2020	625	754
C18alk	-	-	-	-	16.7	17.1	-	-
Phytane	-	214	209	153	25.5	74.3	394	198
C19alk	-	-	-	-	20.3	227	-	-
C20alk	-	-	164	211	15.5	-	-	-
C21alk	295	-	-	-	13.9	-	-	-
C22alk	-	81.1	103	-	13.3	10.3	75.1	-
C23alk	-	-	40.2	-	19.1	19.9	-	-
C24alk	-	-	-	82.2	25.8	17.7	-	-
C25alk	157	134	40.3	161	17.2	51.9	185	-
C26alk	-	106	38.6	119	-	13.2	-	-
C27alk	-	179	-	115	19.3	97.4	75.8	-
C28alk	-	304	49.6	133	10.3	-	-	-
C29alk	-	-	-	-	23.0	24.8	-	-
C30alk	-	287	-	-	15.7	13.5	-	-
C31alk	-	-	-	-	30.5	31.2	-	-
C32alk	-	-	-	-	30.3	-	-	-
C33alk	-	-	-	-	22.1	-	-	-
C34alk	-	-	-	-	-	-	-	-
ALKANES	5250	24400	17000	8780	12600	10000	16500	10800
UCM	34300	72100	87800	89300	93300	84700	242000	88500
Total NAlkanes	640±97.8	1950	1200±702	2280±380	1350±732	2870±1010	1310±96.4	596±65.9

Prince William Sound mussel samples

Station Name (#)	Elrington Island (6)	Elrington Island (6)	Elrington Island (6)	Elrington Island (6)	Elrington Island (6)	Elrington Island (6)	Elrington Island (6)	Green Island (7)
Date collected	10-May-89	19-Jun-89	17-Aug-89	26-Apr-90	23-Jun-90	07-Aug-90	19-Apr-91	03-Apr-89
Mean wet wt. (g)	10.6	9.67	10.2	7.19	8.68	10.7	8.98	9.21
Mean dry wt. (g)	0.84	0.77	0.81	0.86	1.10	1.24	0.81	0.93
N	3	2	1	2	3	2	3	1
Alkanes (ng/g)								
C10alk	-	112	-	216	143	552	-	1380
C11alk	-	49.1	-	96.2	24.6	459	-	4190
C12alk	44.8	40.4	73.5	76.2	70.3	533	-	10700
C13alk	200	82.1	166	-	-	506	57.0	14900
C14alk	124	135	-	79.8	67.4	233	-	23600
C15alk	620	-	623	549	426	541	203	23300
C16alk	-	668	-	106	68.7	111	-	-
C17alk	-	1030	687	190	1000	348	-	-
Pristane	10200	9530	2070	7390	2930	2590	3720	17000
C18alk	425	130	480	-	105	379	-	24400
Phytane	1330	2190	921	161	456	1640	-	14100
C19alk	331	683	-	30.4	146	383	-	23500
C20alk	611	1170	-	-	-	457	-	23900
C21alk	433	854	318	-	-	270	-	21100
C22alk	440	1040	166	52.7	21.2	342	-	17500
C23alk	289	431	-	23.2	8.60	191	-	15600
C24alk	458	538	261	43.3	72.8	126	-	16000
C25alk	844	688	374	174	86.6	118	74.1	14600
C26alk	697	535	155	26.2	41.8	-	136	13300
C27alk	867	700	309	41.8	21.6	-	130	10600
C28alk	746	530	276	52.4	-	-	128	6550
C29alk	645	286	-	55.9	88.2	-	116	5230
C30alk	693	-	282	38.5	-	-	91.7	4390
C31alk	-	-	-	52.8	16.8	-	-	-
C32alk	370	-	-	42.5	-	-	-	3420
C33alk	-	-	-	-	-	-	-	-
C34alk	573	-	-	-	-	-	-	4030
ALKANES	55600	83200	40900	12600	15300	48900	7510	745000
UCM	246000	261000	110000	39300	8030	166000	38900	2640000
Total NAlkanes	9410±613	9700±3490	4170	1950±1330	2410±393	5550±810	936±794	282000

Prince William Sound mussel samples

Station	Naked	Naked	Naked	Naked	Naked	Naked	Naked	Naked	Naked
Name (#)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)
Date collected	28-Mar-89	08-Apr-89	08-May-89	18-Jun-89	15-Aug-89	24-Apr-90	21-Jun-90	05-Aug-90	15-Apr-91
Mean wet wt. (g)	9.51	8.99	9.99	10.6	10.0	8.83	9.04	10.5	9.37
Mean dry wt. (g)	0.67	0.72	1.10	1.22	0.70	0.97	1.12	1.12	0.88
N	3	1	3	2	2	3	3	3	3
Alkanes (ng/g)									
C10alk	-	-	291	-	-	154	374	-	-
C11alk	129	267	223	111	-	47.1	36.6	-	-
C12alk	32.0	473	321	162	94.2	39.1	93.7	36.5	36.3
C13alk	91.2	625	224	163	-	32.9	21.4	35.6	43.8
C14alk	-	684	161	265	-	60.0	73.4	-	-
C15alk	280	832	747	223	623	581	531	319	346
C16alk	-	1410	174	-	192	71.4	86.9	-	-
C17alk	-	729	-	220	325	102	119	-	173
Pristane	-	1670	15300	2480	701	1710	1600	66.2	7170
C18alk	-	525	-	-	357	-	-	-	-
Phytane	-	855	253	269	582	-	-	-	154
C19alk	-	501	-	-	232	15.4	11.2	-	-
C20alk	-	625	-	413	381	-	-	-	-
C21alk	-	405	-	-	202	15.0	-	-	-
C22alk	-	361	120	240	284	14.8	-	23.6	-
C23alk	-	313	117	95.7	-	23.6	13.6	-	-
C24alk	-	369	177	-	-	28.1	-	-	-
C25alk	-	444	356	158	214	-	57.8	-	-
C26alk	-	826	354	150	107	16.3	-	-	-
C27alk	-	787	319	287	217	39.1	38.0	-	-
C28alk	-	296	250	278	-	30.7	-	-	-
C29alk	-	-	263	318	-	23.1	29.9	-	-
C30alk	-	-	151	-	-	19.5	-	-	-
C31alk	-	-	-	-	-	28.5	27.6	-	-
C32alk	-	-	40.0	-	-	-	-	-	-
C33alk	-	-	-	-	-	-	-	-	-
C34alk	-	-	155	-	-	-	-	-	-
ALKANES	1450	33500	37200	14400	12400	4640	6110	10000	12300
UCM	60900	-	105000	89600	49800	65100	10800	-	136000
Total NAlkanes	533±61.4	10500	4440±240	3080±588	3230±1570	1340±1040	1510±833	415±107	600±110

Prince William Sound mussel samples

Station	Olsen	Olsen	Olsen	Olsen	Olsen	Olsen	Olsen	Olsen
Name (#)	Bay (9)	Bay (9)	Bay (9)	Bay (9)	Bay (9)	Bay (9)	Bay (9)	Bay (9)
Date collected	06-Apr-89	01-May-89	18-Jun-89	16-Aug-89	28-Apr-90	25-Jun-90	09-Aug-90	15-Apr-91
Mean wet wt. (g)	9.99	10.1	9.90	9.92	7.68	9.68	11.3	9.78
Mean dry wt. (g)	1.03	0.91	0.72	0.66	0.80	0.99	0.91	0.88
N	3	3	3	3	2	3	1	3
Alkanes (ng/g)								
C10alk	-	-	-	73.8	-	397	-	-
C11alk	81.6	38.9	118	-	-	141	-	-
C12alk	17.5	30.4	167	32.3	84.0	112	-	-
C13alk	86.4	34.2	264	55.8	-	41.5	-	-
C14alk	291	61.9	257	-	172	170	-	-
C15alk	473	423	254	615	460	799	-	205
C16alk	-	-	156	209	252	123	-	-
C17alk	279	303	-	-	397	434	-	312
Pristane	-	381	239	-	837	458	-	482
C18alk	-	-	-	-	-	24.4	-	-
Phytane	-	-	-	-	-	16.4	-	-
C19alk	-	-	-	137	26.4	26.4	-	-
C20alk	-	-	-	-	-	21.8	-	-
C21alk	-	-	-	-	-	25.4	58300	-
C22alk	-	-	-	-	-	25.4	-	-
C23alk	-	-	-	-	32.2	46.6	-	-
C24alk	-	-	-	-	25.0	40.8	-	-
C25alk	-	-	-	-	-	46.9	-	-
C26alk	-	-	-	-	24.5	30.5	-	-
C27alk	53.5	-	79.9	-	62.0	56.0	-	-
C28alk	-	-	-	-	27.4	29.4	-	-
C29alk	-	-	191	-	50.3	43.8	-	-
C30alk	-	-	-	-	-	19.4	-	-
C31alk	-	-	-	-	51.8	39.8	-	-
C32alk	-	-	-	-	-	-	-	-
C33alk	-	-	-	-	-	-	-	-
C34alk	-	-	-	-	-	-	-	-
ALKANES	5420	4780	8260	5030	3380	5410	99000	5190
UCM	54000	18700	64400	15900	32800	5330	-	114000
Total NAlkanes	1280±308	892±264	1490±699	1120±598	1660±1660	2690±2030	58300	518±136

Prince William Sound mussel samples

Station	Perry	Perry	Perry	Perry	Perry	Perry
Name (#)	Island (10)	Island (10)	Island (10)	Island (10)	Island (10)	Island (10)
Date collected	08-May-89	16-Aug-89	24-Apr-90	21-Jun-90	05-Aug-90	18-Apr-91
Mean wet wt. (g)	9.28	9.95	5.05	6.79	8.35	9.00
Mean dry wt. (g)	0.93	0.70	0.73	0.61	0.65	1.03
N	1	2	1	3	1	2
Alkanes (ng/g)						
C10alk	-	-	517	258	-	-
C11alk	-	57.2	379	71.1	-	-
C12alk	-	41.6	125	62.8	-	-
C13alk	-	-	-	62.9	-	-
C14alk	-	-	-	90.9	-	-
C15alk	412	400	1030	431	428	233
C16alk	-	-	216	93.4	-	-
C17alk	-	-	358	615	-	-
Pristane	5470	337	7690	465	-	506
C18alk	-	-	210	-	-	-
Phytane	236	-	201	-	-	-
C19alk	-	-	271	22.0	-	-
C20alk	-	-	205	-	-	-
C21alk	-	-	152	-	735	-
C22alk	127	44.7	111	-	-	-
C23alk	-	82.5	124	15.8	-	-
C24alk	-	107	164	-	-	-
C25alk	207	255	146	-	122	-
C26alk	291	198	113	-	327	-
C27alk	365	167	148	70.5	274	-
C28alk	-	118	148	-	-	89.4
C29alk	-	-	139	-	-	-
C30alk	-	-	124	-	-	-
C31alk	-	-	180	51.0	-	-
C32alk	-	-	175	-	-	-
C33alk	-	-	145	-	-	-
C34alk	-	-	134	-	-	-
ALKANES	14100	5950	13200	4290	46900	3890
UCM	88900	34400	-	34800	-	-
Total NAlkanes	1400	1470±745	5320	1840±1220	1890	322±46.0

Prince William Sound mussel samples

Station	Rocky	Rocky	Rocky	Rocky	Rocky	Rocky	Rocky	Rocky
Name (#)	Bay (11)	Bay (11)	Bay (11)	Bay (11)	Bay (11)	Bay (11)	Bay (11)	Bay (11)
Date collected	26-Mar-89	04-May-89	21-Jun-89	20-Aug-89	25-Apr-90	22-Jun-90	08-Aug-90	02-May-91
Mean wet wt. (g)	10.2	10.3	9.90	9.84	8.83	8.86	11.3	8.84
Mean dry wt. (g)	1.02	1.25	1.23	0.85	0.99	1.02	1.12	0.71
N	3	3	3	3	3	3	2	3
Alkanes (ng/g)								
C10alk	-	-	-	-	145	279	-	147
C11alk	98.1	30.0	163	-	46.6	57.6	-	-
C12alk	45.9	28.1	132	19.9	40.4	85.0	36.9	-
C13alk	-	44.9	241	52.2	-	22.7	47.2	-
C14alk	-	-	248	76.3	58.4	90.5	-	-
C15alk	415	197	359	635	719	535	549	-
C16alk	-	-	-	-	61.9	114	155	-
C17alk	1540	1680	876	767	297	631	178	-
Pristane	-	3030	2250	-	1740	462	-	1040
C18alk	-	-	-	-	18.6	-	-	-
Phytane	-	-	61.5	-	-	-	-	-
C19alk	67.7	-	-	-	22.3	25.5	-	-
C20alk	-	-	-	-	27.1	-	-	-
C21alk	-	-	-	74.9	33.4	66.1	-	-
C22alk	22.0	-	-	25.4	60.8	-	-	-
C23alk	-	-	-	-	48.3	9.10	-	-
C24alk	44.7	-	-	-	48.3	-	-	-
C25alk	134	92.1	54.3	-	47.1	201	-	-
C26alk	99.7	34.3	-	-	35.5	-	-	-
C27alk	91.9	-	107	-	67.3	71.7	-	-
C28alk	82.5	-	-	-	35.5	-	-	-
C29alk	118	-	64.9	-	35.5	-	-	-
C30alk	82.6	-	-	-	29.5	-	171	-
C31alk	-	-	-	-	21.8	15.6	-	-
C32alk	69.8	-	-	-	27.1	-	-	-
C33alk	-	-	-	-	-	-	-	-
C34alk	-	-	-	-	-	-	-	-
ALKANES	9240	8480	12400	7340	5060	7510	25000	3620
UCM	3260	4650	87300	-	117000	31300	-	27600
Total NAlkanes	2910±903	2100±254	2240±168	1650±65.2	1930±1190	2200±1090	1140±143	147±74.1

Prince William Sound mussel samples

Station	Siwash	Siwash	Siwash	Siwash	Siwash	Siwash	Siwash
Name (#)	Bay (12)	Bay (12)	Bay (12)	Bay (12)	Bay (12)	Bay (12)	Bay (12)
Date collected	29-Mar-89	03-May-89	16-Aug-89	24-Apr-90	25-Jun-90	09-Aug-90	18-Apr-91
Mean wet wt. (g)	10.1	10.4	10.0	8.21	9.29	11.0	8.50
Mean dry wt. (g)	0.88	0.80	0.83	0.79	1.41	1.22	0.72
N	3	3	3	3	3	3	2
Alkanes (ng/g)							
C10alk	-	-	-	165	408	239	-
C11alk	63.3	-	-	77.1	76.1	-	-
C12alk	-	56.4	70.8	88.0	47.1	51.2	38.3
C13alk	-	90.6	103	-	-	37.2	73.0
C14alk	-	127	-	61.5	81.2	-	-
C15alk	325	212	1420	559	546	743	131
C16alk	-	-	-	83.7	77.2	90.7	-
C17alk	-	-	165	198	164	-	-
Pristane	-	114	-	565	926	180	269
C18alk	64.3	-	126	34.9	-	-	-
Phytane	-	-	106	33.2	-	-	-
C19alk	141	-	338	44.3	46.1	-	-
C20alk	-	-	98.0	36.9	10.4	-	-
C21alk	-	-	-	28.7	17.3	-	-
C22alk	-	-	45.5	67.9	12.6	-	-
C23alk	-	-	-	-	34.5	-	94.8
C24alk	-	-	-	59.2	27.0	-	-
C25alk	-	-	-	59.2	56.6	20.3	-
C26alk	-	-	-	24.0	89.8	-	-
C27alk	-	-	90.9	46.4	39.6	-	-
C28alk	-	-	84.9	21.2	-	-	-
C29alk	-	-	-	33.0	36.2	-	-
C30alk	-	-	-	-	-	-	-
C31alk	-	-	-	42.7	22.9	-	-
C32alk	-	-	-	-	-	-	-
C33alk	-	-	-	-	-	-	-
C34alk	-	-	-	-	-	-	-
ALKANES	5000	4370	11100	3540	4780	9740	4190
UCM	28100	-	3830	-	17200	12300	134000
Total NAlkanes	594±202	486±357	2540±828	1730±1320	1790±1460	1180±420	337±337

Prince William Sound mussel samples

Station	Sleepy	Sleepy	Sleepy	Sleepy	Sleepy	Sleepy
Name (#)	Bay (13)	Bay (13)	Bay (13)	Bay (13)	Bay (13)	Bay (13)
Date collected	07-May-89	17-Aug-89	26-Apr-90	23-Jun-90	07-Aug-90	19-Apr-91
Mean wet wt. (g)	9.80	9.93	6.99	8.99	9.25	9.16
Mean dry wt. (g)	0.98	0.83	0.92	1.25	0.86	1.13
N	3	1	2	3	3	3
Alkanes (ng/g)						
C10alk	127	383	130	304	170	-
C11alk	180	365	40.6	120	-	-
C12alk	754	389	80.2	98.9	271	-
C13alk	1940	863	58.0	236	629	-
C14alk	3290	696	513	163	812	-
C15alk	4190	1980	1980	638	1340	385
C16alk	5940	1110	1020	187	1220	386
C17alk	3250	1670	757	1130	1300	1010
Pristane	15600	7090	14500	2620	2470	1970
C18alk	6860	1360	263	122	790	495
Phytane	9150	4510	741	414	2380	926
C19alk	7300	1250	55.9	100	361	87.6
C20alk	7850	2200	213	-	485	-
C21alk	6400	1780	175	29.7	332	-
C22alk	5540	2380	229	196	521	84.1
C23alk	5370	1730	89.7	169	507	-
C24alk	6170	2370	149	238	799	-
C25alk	5990	2450	177	130	910	164
C26alk	5720	2440	183	104	1110	53.5
C27alk	4840	1750	313	257	1160	117
C28alk	4080	1020	272	210	984	93.7
C29alk	3540	1400	139	157	722	-
C30alk	3060	1790	82.2	138	523	-
C31alk	-	-	117	62.9	-	-
C32alk	1890	1080	79.2	70.5	356	-
C33alk	-	-	65.6	25.7	-	-
C34alk	2460	1790	-	-	165	-
ALKANES	1050000	151000	41100	21600	142000	31300
UCM	723000	1310000	206000	116000	301000	149000
Total NAlkanes	96700±13300	34300	7180±2790	4890±1090	15500±1550	2880±733

Table II-3.--Concentrations of PAH in SEDIMENTS collected from PWS, Alaska, for this study. Tables I-2 and I-3 contain keys for the PAH abbreviations used here. Tables 1 and 2 list the station names, numbers, locations, and collection dates that correspond with those listed here. Stations established in 1977 described by Karinen et al. (1993) are italicized. Concentrations are means of *n* replicated determinations reported as ng PAH/g dry tissue weight; the mean sample wet and dry weights are also given. Total aromatics (i.e. TPAH) is the sum of the listed mean PAH concentrations with perylene excluded, followed by the standard error of the sum. Hyphens indicate concentrations below MDLs adjusted for the sample weight. Only samples that had surrogate standard recoveries greater than 30% and less than 150% are included in this table; samples that were excluded on this basis are listed in Table II-9.

Prince William Sound sediment samples

Station	Barnes	Barnes	Barnes	Barnes	Barnes	Barnes	Barnes	Barnes	Barnes
Name (#)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)
Date collected	31-Mar-89	31-Mar-89	07-Apr-89	06-May-89	17-Aug-89	25-Apr-90	22-Jun-90	06-Aug-90	20-Apr-91
Mean wet wt. (g)	20.2	20.2	10.1	16.8	20.3	20.0	20.3	20.1	20.1
Mean dry wt. (g)	13.9	10.6	3.98	5.58	9.29	7.73	8.79	10.9	8.85
N	3	3	3	3	3	2	2	3	3
PAH's(ng/g)									
Naph	2.64	9.49	5.95	7.15	4.42	3.23	7.00	4.39	4.50
Menap2	0.71	2.79	1.62	2.77	2.29	2.12	2.64	1.07	1.50
Menap1	-	1.14	-	-	-	-	2.47	0.83	-
Dimeth	-	0.63	-	1.00	0.77	-	1.22	-	1.98
C2naph	2.64	5.69	-	10.5	7.04	6.03	8.05	3.91	6.93
Trimeth	0.93	1.30	-	1.64	0.83	0.97	1.66	0.33	1.10
C3naph	3.09	4.66	-	9.25	5.03	5.12	6.44	3.28	6.58
C4naph	0.51	-	15.4	12.8	2.19	6.62	1.99	2.27	1.33
Biphenyl	-	-	-	-	-	-	-	-	-
Acenthy	-	-	-	-	-	-	-	-	-
Acenthe	0.30	-	-	-	-	-	-	-	-
Fluorene	-	-	-	1.18	0.69	-	-	-	1.67
C1fluor	0.45	-	-	2.70	0.61	1.50	-	-	1.15
C2fluor	-	-	-	2.74	-	1.45	-	1.25	0.93
C3fluor	-	0.67	-	2.74	-	1.25	-	-	-
Dithio	-	-	1.19	1.50	0.38	-	0.58	-	0.65
C1dithio	-	-	-	2.77	0.92	-	-	-	0.81
C2dithio	-	-	-	3.05	-	-	-	0.35	0.86
C3dithio	-	0.32	-	9.97	-	2.12	1.97	1.26	-
Phenanth	3.73	1.48	-	14.9	5.55	1.92	7.33	3.02	10.3
Mephen1	-	-	-	2.62	1.53	-	-	-	4.43
C1phenan	3.39	3.04	6.05	21.4	8.63	3.69	9.25	4.55	12.7
C2phenan	0.99	2.65	2.87	18.4	4.82	5.55	7.38	2.90	9.50
C3phenan	-	1.86	7.53	11.8	-	2.53	4.40	0.94	4.85
C4phenan	-	-	-	6.63	-	-	-	-	-
Anthra	-	-	-	2.32	-	-	-	-	-
Fluorant	3.05	3.13	9.45	30.7	5.33	3.75	6.55	4.07	19.0
Pyrene	2.84	3.05	7.76	29.6	4.32	3.12	5.93	3.50	17.8
C1fluora	2.42	1.66	4.23	20.3	3.45	4.24	4.18	2.81	10.5
Benanth	0.91	1.51	4.52	21.9	3.45	2.05	3.75	2.27	8.94
Chrysene	0.97	1.06	3.44	25.8	4.71	-	4.52	2.18	12.0
C1chrys	0.86	-	-	19.5	3.59	-	4.78	0.87	7.55
C2chrys	-	-	-	10.8	-	-	-	-	2.49
C3chrys	-	-	-	-	-	-	-	-	-
C4chrys	-	-	-	-	-	-	-	-	-
Benzobfl	3.58	3.59	9.19	25.3	6.84	4.24	5.50	2.65	29.6
Benzokfl	-	-	-	18.0	-	-	1.83	0.94	-
Benepy	2.40	1.66	6.73	17.4	3.38	1.20	3.93	2.05	13.2
Benapy	-	-	4.53	24.9	2.08	-	3.19	1.08	19.4
Perylene	29.1	2.68	36.2	56.8	66.6	69.2	51.9	26.4	35.6
Indeno	-	0.56	-	14.4	1.58	1.50	2.43	0.88	12.2
Dibenz	-	-	-	5.24	-	0.46	0.88	-	4.78
Benzop	-	1.25	-	18.2	3.02	2.14	3.91	1.67	14.1
Total Aromatics (w/o Perylene)	35.5±4.87	51.3±8.47	90.5±9.85	427±217	84.3±15.0	65.9±7.38	111±18.8	55.0±13.6	236±65.0

Prince William Sound sediment samples

Station	Bay of	Bay of	Bay of	Bay of	Bay of	Bay of	Bay of	Bay of
Name (#)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)
Date collected	30-Mar-89	08-Apr-89	06-May-89	16-Aug-89	25-Apr-90	22-Jun-90	06-Aug-90	19-Apr-91
Mean wet wt. (g)	13.9	13.8	16.9	16.9	20.2	20.3	20.3	20.1
Mean dry wt. (g)	7.24	6.91	7.95	11.1	9.48	12.5	9.48	12.7
N	3	3	3	3	2	2	3	3
PAH's(ng/g)								
Naph	1.64	2.97	2.53	1.16	0.98	1.57	0.55	-
Menap2	-	1.92	1.62	0.24	0.52	-	1.10	-
Menap1	-	1.22	-	-	-	-	-	-
Dimeth	-	0.99	0.77	-	-	-	-	-
C2naph	-	1.24	7.30	1.33	4.22	0.77	2.97	-
Trimeth	-	-	1.82	-	0.47	-	0.39	-
C3naph	1.04	2.17	10.9	1.24	3.31	1.33	2.98	-
C4naph	-	1.69	12.0	5.10	22.3	3.74	2.61	2.68
Biphenyl	-	-	-	-	-	-	-	-
Acenthy	-	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-	-
Fluorene	-	-	0.75	-	-	-	-	-
C1fluor	-	-	2.59	-	3.18	0.94	-	-
C2fluor	-	1.22	3.92	-	4.17	1.13	0.88	-
C3fluor	-	-	2.80	-	6.03	5.46	2.15	-
Dithio	-	0.57	2.50	-	0.48	-	0.43	-
C1dithio	-	0.46	7.14	0.45	2.55	1.23	1.41	-
C2dithio	-	0.60	11.4	1.05	12.0	5.58	7.59	1.34
C3dithio	-	0.52	9.34	1.22	21.1	10.8	13.2	2.87
Phenanth	-	1.18	7.01	0.73	4.02	-	3.56	-
Mephen1	-	-	3.85	-	-	-	-	-
C1phenan	-	1.57	14.2	2.23	7.94	3.28	5.79	-
C2phenan	-	1.29	16.6	2.21	18.7	7.97	11.9	1.69
C3phenan	-	-	14.2	3.00	24.7	11.0	12.4	9.86
C4phenan	-	-	3.59	0.71	18.3	7.69	6.50	-
Anthra	-	-	-	-	-	-	-	-
Fluorant	0.42	1.69	2.54	1.78	1.98	0.54	3.48	-
Pyrene	-	0.99	2.04	1.11	1.93	-	2.11	-
C1fluora	1.19	-	4.13	0.57	5.97	2.79	3.07	-
Benanth	-	-	0.84	0.97	-	-	0.45	-
Chrysene	-	-	4.77	1.81	7.08	1.14	5.39	1.21
C1chrys	-	-	2.94	1.08	6.83	0.96	6.04	1.89
C2chrys	-	-	1.46	-	7.32	3.83	6.70	-
C3chrys	-	-	-	-	4.65	1.89	3.66	-
C4chrys	-	-	-	-	-	-	-	-
Benzobfl	-	0.65	2.57	0.68	2.70	1.49	2.14	0.82
Benzokfl	-	-	-	-	-	-	-	-
Benepy	-	0.70	1.90	0.72	2.94	0.79	2.21	0.64
Benapy	-	-	-	-	-	-	-	-
Perylene	56.6	24.2	22.5	23.5	16.9	10.7	15.0	17.4
Indeno	-	-	0.38	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-	-
Benzop	-	-	0.83	-	0.83	0.51	0.37	0.30
Total Aromatics (w/o Perylene)	4.29±4.29	22.7±15.7	155±75.7	29.4±3.12	197±14.9	76.4±7.81	112±48.0	23.3±10.3

Prince William Sound sediment samples

Station	Bligh	Bligh	Bligh	Bligh	Bligh	Bligh	Bligh
Name (#)	Island (3)	Island (3)	Island (3)	Island (3)	Island (3)	Island (3)	Island (3)
Date collected	28-Mar-89	02-May-89	15-Aug-89	28-Apr-90	21-Jun-90	05-Aug-90	17-Apr-91
Mean wet wt. (g)	20.2	16.8	13.6	20.1	20.2	20.2	20.1
Mean dry wt. (g)	13.3	11.0	8.57	13.3	14.3	13.8	13.3
N	1	3	3	1	2	3	3
PAH's(ng/g)							
Naph	2.67	0.57	1.58	0.92	0.95	0.71	0.25
Menap2	0.77	-	0.41	0.71	0.35	-	1.07
Menap1	-	-	-	-	-	-	-
Dimeth	-	-	-	-	-	-	-
C2naph	1.63	1.20	2.37	2.43	0.75	0.67	1.84
Trimeth	-	-	-	-	-	-	0.57
C3naph	1.91	0.96	0.64	1.09	0.66	1.14	1.94
C4naph	2.08	9.21	17.2	-	-	0.24	-
Biphenyl	-	-	-	-	-	-	-
Acenthy	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-
Fluorene	-	-	-	-	-	-	-
C1fluor	-	-	-	-	-	-	-
C2fluor	-	-	-	-	-	-	-
C3fluor	-	-	-	-	-	-	-
Dithio	-	-	-	-	-	-	-
C1dithio	-	-	-	-	-	-	-
C2dithio	-	-	-	-	-	-	-
C3dithio	-	1.81	-	-	-	-	-
Phenanth	1.08	0.56	0.72	-	-	-	1.08
Mephen1	-	1.50	-	-	-	-	-
C1phenan	-	3.09	3.14	-	-	-	1.26
C2phenan	-	-	2.26	-	-	-	0.81
C3phenan	-	-	-	-	-	-	0.79
C4phenan	-	2.35	1.44	-	-	-	-
Anthra	-	-	-	-	-	-	-
Fluorant	-	1.04	1.70	0.74	-	-	0.25
Pyrene	-	0.95	1.28	-	-	-	-
C1fluora	-	-	-	-	-	-	-
Benanth	-	-	-	-	-	0.29	-
Chrysene	-	0.70	-	-	-	-	0.95
C1chrys	-	1.59	-	-	-	-	-
C2chrys	-	-	-	-	-	-	-
C3chrys	-	-	-	-	-	-	-
C4chrys	-	-	-	-	-	-	-
Benzobfl	1.49	-	-	-	-	-	1.48
Benzokfl	-	-	-	-	-	-	-
Benepy	1.46	-	-	1.10	-	-	-
Benapy	-	-	-	-	-	-	-
Perylene	2.45	2.40	6.45	3.36	3.65	5.05	4.45
Indeno	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-
Benzop	-	-	-	0.73	-	0.31	0.29
Total Aromatics (w/o Perylene)	13.1	24.0±16.6	32.8±13.6	7.72	2.71±1.71	3.36±0.27	12.0±6.53

Prince William Sound sediment samples

Station	Constantine	Constantine	Constantine	Constantine	Constantine	Constantine
Name (#)	Harbor (4)	Harbor (4)	Harbor (4)	Harbor (4)	Harbor (4)	Harbor (4)
Date collected	26-Mar-89	03-May-89	20-Aug-89	25-Apr-90	22-Jun-90	08-Aug-90
Mean wet wt. (g)	20.1	20.1	20.1	20.1	20.0	20.1
Mean dry wt. (g)	12.1	12.3	12.2	12.5	12.8	12.2
N	3	3	3	2	2	3
PAH's(ng/g)						
Naph	11.1	8.72	7.09	9.41	7.70	8.17
Menap2	22.7	19.7	17.8	20.6	18.7	18.8
Menap1	22.3	19.0	17.4	21.2	19.1	18.4
Dimeth	15.3	12.4	13.5	13.7	11.6	12.1
C2naph	68.2	57.0	61.1	63.8	53.1	37.3
Trimeth	9.44	9.25	8.77	9.73	9.39	8.37
C3naph	47.6	45.6	45.6	50.8	48.3	41.6
C4naph	17.2	18.0	19.9	18.6	42.3	18.9
Biphenyl	16.6	14.1	13.9	14.5	13.6	13.6
Acenthy	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-
Fluorene	5.59	6.00	5.30	6.00	6.17	6.05
C1fluor	14.9	17.6	15.0	18.8	26.8	14.4
C2fluor	16.7	21.3	17.8	23.1	32.1	18.1
C3fluor	9.26	10.1	8.82	12.8	26.9	9.22
Dithio	4.50	4.24	4.18	4.00	3.55	3.70
C1dithio	5.71	5.36	5.10	5.26	6.04	4.62
C2dithio	4.16	3.89	3.85	4.05	4.41	3.45
C3dithio	9.87	7.67	8.55	15.3	13.7	5.68
Phenanth	48.7	50.3	45.2	41.4	39.0	45.6
Mephen1	16.6	17.8	14.7	14.4	16.1	15.7
C1phenan	73.8	77.5	70.1	64.5	69.1	66.4
C2phenan	48.9	52.4	45.9	43.9	48.0	45.1
C3phenan	27.0	26.2	26.0	28.6	27.0	21.6
C4phenan	13.1	8.37	12.6	10.4	16.3	7.38
Anthra	-	-	-	-	-	-
Fluorant	5.55	5.13	5.22	4.47	4.58	5.06
Pyrene	6.39	6.23	6.24	5.65	5.77	6.29
C1fluora	30.8	22.7	23.1	24.8	25.2	21.2
Benanth	2.25	2.50	2.21	2.53	1.29	1.97
Chrysene	12.6	12.9	12.1	10.1	9.59	11.9
C1chrys	14.4	16.4	14.8	18.1	13.6	12.3
C2chrys	14.7	15.2	15.0	15.8	13.8	9.32
C3chrys	6.45	9.98	6.48	8.25	7.04	4.44
C4chrys	-	-	-	-	-	-
Benzobfl	7.85	5.75	7.20	6.97	7.07	7.35
Benzokfl	-	-	-	-	-	-
Benepy	6.39	5.09	6.00	5.46	5.27	6.48
Benapy	-	-	-	-	-	-
Perylene	31.6	24.4	32.7	28.2	30.3	28.9
Indeno	0.95	0.80	0.93	1.25	1.06	1.06
Dibenz	0.97	0.89	1.03	1.40	1.13	1.10
Benzop	3.96	3.06	3.94	4.14	3.95	4.57
Total Aromatics (w/o Perylene)	601±26.1	579±24.3	555±17.8	586±39.2	621±75.3	501±27.2

Prince William Sound sediment samples

Station	Crab	Crab	Crab	Crab	Crab	Crab	Crab
Name (#)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)
Date collected	01-Apr-89	07-May-89	17-Aug-89	26-Apr-90	23-Jun-90	07-Aug-90	20-Apr-91
Mean wet wt. (g)	20.1	20.2	20.1	20.4	20.2	20.2	20.1
Mean dry wt. (g)	14.3	12.9	12.8	14.1	13.0	13.3	13.4
N	3	3	3	2	2	3	3
PAH's(ng/g)							
Naph	2.18	1.60	0.42	2.67	7.42	6.25	-
Menap2	1.17	0.92	0.31	1.03	3.71	4.00	-
Menap1	-	-	-	-	1.17	2.84	-
Dimeth	-	-	-	-	1.05	1.11	-
C2naph	3.36	2.74	1.07	2.30	3.52	5.38	-
Trimeth	0.94	0.32	-	-	0.42	0.46	-
C3naph	3.53	3.08	0.66	3.84	2.56	4.34	0.57
C4naph	2.81	1.32	-	13.8	0.78	1.97	4.60
Biphenyl	-	-	-	-	5.33	3.88	-
Acenthy	-	-	-	-	-	-	-
Acenthe	0.38	-	-	-	-	-	-
Fluorene	1.56	-	-	-	0.84	0.73	-
C1fluor	1.92	-	-	1.27	2.62	1.71	-
C2fluor	2.20	0.54	-	0.77	2.21	2.36	-
C3fluor	2.46	0.54	-	-	1.04	0.97	-
Dithio	0.48	-	-	-	0.71	0.55	-
C1dithio	1.49	1.30	0.36	0.79	0.65	0.71	-
C2dithio	1.82	2.40	0.97	-	-	0.94	0.31
C3dithio	6.53	2.88	0.93	0.86	-	1.07	-
Phenanth	18.4	3.18	2.10	3.78	9.25	7.95	-
Mephen1	2.17	0.77	-	1.06	2.37	0.80	-
C1phenan	12.1	6.42	3.96	4.11	8.04	6.99	-
C2phenan	8.50	6.18	3.39	2.81	2.86	3.58	-
C3phenan	5.42	4.17	-	-	6.88	2.50	-
C4phenan	2.63	-	-	-	-	-	-
Anthra	4.33	-	-	-	-	-	-
Fluorant	29.5	4.88	5.72	5.91	3.65	3.53	1.34
Pyrene	25.4	4.99	4.71	5.06	2.39	1.74	0.88
C1fluora	10.2	3.26	1.80	2.32	2.26	2.04	-
Benanth	9.38	2.48	1.97	2.06	1.56	1.36	0.55
Chrysene	15.5	2.13	1.91	2.55	4.83	3.94	-
C1chrys	5.94	1.35	-	1.26	1.64	1.49	-
C2chrys	3.42	-	-	-	-	0.70	-
C3chrys	1.40	-	-	-	-	-	-
C4chrys	-	-	-	-	-	-	-
Benzobfl	18.3	2.84	2.54	3.18	2.90	2.93	1.04
Benzokfl	2.09	-	0.92	0.41	-	-	-
Benepy	8.34	0.92	1.86	1.79	1.37	1.89	-
Benapy	10.8	1.70	1.40	1.18	-	-	-
Perylene	10.0	9.82	9.35	11.9	7.51	7.79	11.5
Indeno	5.60	0.73	0.52	0.89	0.39	0.72	0.40
Dibenz	1.89	0.21	-	-	0.20	0.16	-
Benzop	7.17	0.57	1.30	1.47	0.54	1.15	0.57
Total Aromatics (w/o Perylene)	238±86.8	63.3±31.1	38.8±19.4	66.1±7.44	81.3±64.6	80.4±46.9	10.3±3.65

Prince William Sound sediment samples

Station Name (#)	Elrington Island (6)	Elrington Island (6)	Elrington Island (6)	Elrington Island (6)	Elrington Island (6)	Elrington Island (6)	Elrington Island (6)	Elrington Island (6)
Date collected	10-May-89	10-May-89	19-Jun-89	17-Aug-89	26-Apr-90	23-Jun-90	07-Aug-90	19-Apr-91
Mean wet wt. (g)	2.17	13.7	20.1	13.8	20.3	20.3	20.1	20.2
Mean dry wt. (g)	1.83	10.7	15.6	10.4	17.5	16.8	15.8	17.9
N	3	3	3	3	2	2	2	3
PAH's(ng/g)								
Naph	4.96	0.37	1.64	1.88	1.34	-	-	0.23
Menap2	89.7	0.69	0.51	1.06	0.30	-	-	-
Menap1	79.0	-	-	-	0.82	-	-	-
Dimeth	139	0.84	-	-	-	-	-	-
C2naph	644	6.22	-	1.72	0.66	-	-	0.40
Trimeth	216	0.30	-	-	-	-	-	-
C3naph	1300	8.45	0.64	0.23	0.90	0.31	0.36	-
C4naph	733	0.31	3.12	0.78	21.7	1.30	1.83	-
Biphenyl	22.8	-	-	1.99	-	-	-	-
Acenthy	-	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-	-
Fluorene	46.3	-	-	-	-	-	-	-
C1fluor	286	-	-	-	43.3	-	-	-
C2fluor	420	7.85	1.58	-	6.34	1.32	-	7.55
C3fluor	429	2.57	2.55	-	3.22	-	-	-
Dithio	147	0.81	-	-	-	-	-	-
C1dithio	448	5.23	0.38	0.48	13.1	-	-	-
C2dithio	847	10.5	3.34	0.28	8.07	0.34	-	-
C3dithio	751	10.9	4.89	0.45	6.88	0.34	-	-
Phenanth	208	3.05	1.53	4.32	3.96	0.60	-	-
Mephen1	510	6.07	-	-	-	-	-	-
C1phenan	1020	13.2	1.55	3.89	13.3	1.04	-	-
C2phenan	1440	18.9	4.54	2.45	3.84	-	-	-
C3phenan	1320	14.7	7.70	0.80	4.10	-	-	-
C4phenan	401	-	3.04	0.62	1.30	-	-	-
Anthra	-	-	-	-	-	-	-	-
Fluorant	-	0.81	0.90	0.42	0.29	-	-	-
Pyrene	13.0	-	0.25	0.55	-	-	-	-
C1fluora	191	1.16	0.58	0.23	4.79	-	-	-
Benanth	3.92	-	-	0.44	-	-	0.22	0.13
Chrysene	117	2.40	2.04	3.74	1.20	1.01	-	-
C1chrys	225	5.69	-	0.74	3.68	-	-	-
C2chrys	194	2.34	0.59	0.62	6.07	-	-	-
C3chrys	128	-	-	-	12.9	-	-	-
C4chrys	46.5	-	-	-	-	-	-	-
Benzobfl	18.2	0.33	0.80	0.40	-	0.48	-	0.90
Benzokfl	-	-	-	-	-	-	-	-
Benepy	33.4	0.96	0.80	0.60	0.63	0.70	-	-
Benapy	-	-	-	-	-	-	-	-
Perylene	-	-	-	-	-	-	-	1.11
Indeno	-	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-	-
Benzop	-	-	-	0.20	-	0.31	-	-
Total Aromatics (w/o Perylene)	11600±2740	117±35.7	43.0±14.1	28.9±17.4	163±88.9	7.77±7.77	2.42±1.98	9.19±0.79

Prince William Sound sediment samples

Station	Naked	Naked	Naked	Naked	Naked	Naked	Naked	Naked	Naked
Name (#)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)	Island (8)
Date collected	28-Mar-89	08-Apr-89	08-May-89	18-Jun-89	15-Aug-89	24-Apr-90	21-Jun-90	05-Aug-90	15-Apr-91
Mean wet wt. (g)	16.8	10.4	13.6	20.2	13.6	20.1	20.1	20.2	20.1
Mean dry wt. (g)	12.5	6.63	10.0	13.7	9.35	14.9	13.8	11.8	14.6
N	3	2	3	3	3	2	2	3	3
PAH's(ng/g)									
Naph	2.23	-	3.13	1.26	3.11	2.63	2.50	10.5	2.07
Menap2	-	-	1.48	0.50	1.68	0.59	0.49	6.13	0.91
Menap1	-	-	-	-	-	-	0.84	4.35	-
Dimeth	-	-	0.98	-	-	-	-	2.59	-
C2naph	-	-	4.62	1.19	4.50	0.79	2.40	9.82	13.8
Trimeth	-	-	-	0.29	-	-	-	0.72	-
C3naph	-	-	1.09	1.91	0.71	0.85	1.84	6.52	13.9
C4naph	0.87	-	-	-	-	3.03	-	2.44	24.2
Biphenyl	-	-	2.27	-	1.97	-	-	7.00	-
Acenthy	-	-	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-	-	-
Fluorene	-	-	-	-	-	-	-	0.74	-
C1fluor	-	-	-	-	0.92	-	-	3.27	4.94
C2fluor	-	-	-	0.52	2.49	1.12	-	2.34	2.93
C3fluor	-	-	-	-	-	-	-	0.79	1.85
Dithio	0.61	-	0.44	-	-	-	-	1.08	-
C1dithio	-	-	1.15	1.05	0.40	-	-	1.20	1.24
C2dithio	-	-	0.78	2.23	-	-	-	0.82	0.64
C3dithio	0.22	-	0.95	2.50	0.35	-	-	2.08	0.38
Phenanth	-	-	4.33	4.65	7.46	0.48	1.00	12.6	1.74
Mephen1	-	-	1.44	-	-	-	-	2.30	-
C1phenan	2.91	-	4.77	6.13	6.15	0.94	2.47	10.3	3.67
C2phenan	1.46	-	2.60	6.50	1.96	-	2.10	4.74	3.09
C3phenan	-	-	2.66	4.87	-	2.65	-	2.49	4.13
C4phenan	-	-	-	2.24	-	-	-	0.88	8.78
Anthra	-	-	-	-	-	-	-	-	-
Fluorant	1.72	1.46	3.99	3.27	3.62	0.31	0.92	3.24	2.48
Pyrene	1.48	1.09	3.23	3.22	4.18	-	0.39	2.69	2.21
C1fluora	0.93	-	1.14	2.21	1.49	-	-	2.03	1.33
Benanth	0.46	-	-	1.19	1.13	-	-	0.73	0.70
Chrysene	2.04	-	2.85	3.18	3.68	-	-	5.42	0.95
C1chrys	2.52	-	2.96	2.47	1.63	-	-	2.39	-
C2chrys	-	-	-	1.95	-	-	-	-	-
C3chrys	-	-	-	-	1.01	-	-	-	-
C4chrys	-	-	-	-	-	-	-	-	-
Benzobfl	2.05	-	-	2.78	3.22	-	-	2.35	1.36
Benzokfl	-	-	-	-	-	-	-	-	-
Benepy	2.03	-	-	1.85	0.60	0.57	-	2.00	0.67
Benapy	-	-	-	-	-	-	-	-	1.00
Perylene	4.93	19.4	6.63	16.1	13.3	5.86	12.7	25.0	9.27
Indeno	-	-	-	0.59	-	-	-	0.29	0.41
Dibenz	-	-	-	-	-	-	-	-	-
Benzop	-	-	-	0.94	-	0.35	-	1.37	0.61
Total Aromatics (w/o Perylene)	21.5±12.8	2.55±2.55	44.4±23.7	59.2±13.4	52.3±12.3	14.3±1.13	15.0±0.82	113±52.0	99.9±10.5

Prince William Sound sediment samples

Station Name (#)	Olsen Bay (9)	Olsen Bay (9)	Olsen Bay (9)	Olsen Bay (9)	Olsen Bay (9)	Olsen Bay (9)	Olsen Bay (9)
Date collected	06-Apr-89	01-May-89	16-Aug-89	28-Apr-90	25-Jun-90	09-Aug-90	15-Apr-91
Mean wet wt. (g)	10.4	10.3	20.3	18.9	20.1	20.1	20.0
Mean dry wt. (g)	6.14	6.89	14.3	11.6	13.5	14.8	12.7
N	3	3	3	3	2	3	3
PAH's(ng/g)							
Naph	2.40	7.11	2.79	2.54	1.73	0.69	3.46
Menap2	0.51	1.67	1.12	1.95	0.36	-	1.36
Menap1	2.63	5.74	-	1.01	0.80	-	0.67
Dimeth	-	-	-	3.43	-	-	-
C2naph	-	1.27	2.41	9.78	-	0.86	15.8
Trimeth	-	-	-	4.40	-	-	-
C3naph	1.81	2.88	1.61	16.5	1.19	0.79	14.0
C4naph	8.56	3.59	0.76	12.2	1.25	2.43	23.9
Biphenyl	-	-	-	-	-	-	-
Acenthy	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-
Fluorene	-	-	-	-	-	-	-
C1fluor	-	0.83	-	1.95	-	-	5.54
C2fluor	-	-	-	3.12	-	1.49	1.22
C3fluor	-	-	-	2.67	-	2.56	0.95
Dithio	-	-	-	-	-	-	-
C1dithio	-	-	-	1.39	-	-	1.34
C2dithio	-	-	-	1.41	-	-	0.36
C3dithio	-	-	-	0.85	-	-	-
Phenanth	-	5.04	1.81	1.84	-	-	3.02
Mephen1	-	-	-	0.32	-	-	-
C1phenan	-	3.72	2.21	2.27	2.71	0.67	5.10
C2phenan	-	-	-	2.12	-	-	3.38
C3phenan	-	-	-	1.17	-	-	5.03
C4phenan	-	-	-	0.81	-	-	8.94
Anthra	-	-	-	-	-	-	-
Fluorant	-	0.94	-	-	-	-	0.37
Pyrene	-	0.82	-	-	-	-	0.38
C1fluora	-	-	0.20	-	-	-	1.07
Benanth	-	0.49	-	-	-	-	-
Chrysene	-	-	1.80	-	-	-	2.20
C1chrys	-	3.39	1.05	-	-	-	-
C2chrys	-	-	-	-	-	-	-
C3chrys	-	-	-	-	-	-	-
C4chrys	-	-	-	-	-	-	-
Benzobfl	-	1.54	0.49	-	-	0.35	0.75
Benzokfl	-	-	-	-	-	-	-
Benepy	-	1.21	1.06	-	-	0.37	0.89
Benapy	-	-	-	-	-	-	-
Perylene	4.67	5.00	2.60	5.67	3.28	3.51	3.19
Indeno	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-
Benzop	-	-	0.24	0.30	-	0.49	0.56
Total Aromatics (w/o Perylene)	15.9±2.93	40.2±13.7	17.6±4.36	63.9±55.8	8.04±4.87	10.7±6.99	100±20.4

Prince William Sound sediment samples

Station	Perry	Perry	Perry	Perry	Perry
Name (#)	Island (10)	Island (10)	Island (10)	Island (10)	Island (10)
Date collected	16-Aug-89	24-Apr-90	21-Jun-90	05-Aug-90	18-Apr-91
Mean wet wt. (g)	19.9	20.2	20.1	20.2	20.1
Mean dry wt. (g)	13.9	13.0	13.6	15.3	14.1
N	3	2	2	2	3
PAH's(ng/g)					
Naph	0.61	-	3.81	-	5.70
Menap2	-	-	4.05	-	2.82
Menap1	-	-	1.45	-	0.50
Dimeth	-	-	0.97	-	-
C2naph	-	-	1.26	-	2.05
Trimeth	-	-	0.41	-	0.52
C3naph	0.51	0.92	3.40	0.38	2.05
C4naph	1.39	-	0.84	-	1.01
Biphenyl	-	-	-	-	2.72
Acenthy	-	-	-	-	-
Acenthe	-	-	-	-	-
Fluorene	-	-	0.70	-	-
C1fluor	-	-	-	-	0.59
C2fluor	0.80	-	-	-	0.74
C3fluor	1.16	-	-	-	-
Dithio	-	-	-	-	-
C1dithio	0.76	-	-	-	-
C2dithio	4.16	-	-	-	-
C3dithio	4.29	-	-	0.36	-
Phenanth	1.25	1.23	2.38	2.11	4.23
Mephen1	0.99	-	-	-	-
C1phenan	2.02	-	-	-	2.53
C2phenan	5.33	-	-	-	0.69
C3phenan	7.92	-	-	-	-
C4phenan	0.80	-	-	-	-
Anthra	-	-	-	-	-
Fluorant	1.05	1.06	1.07	2.98	0.74
Pyrene	0.32	-	-	2.23	0.58
C1fluora	1.04	-	-	0.54	-
Benanth	0.38	0.22	-	1.07	-
Chrysene	3.02	-	-	1.52	2.18
C1chrys	1.03	-	-	-	-
C2chrys	-	-	-	-	-
C3chrys	0.68	-	-	-	-
C4chrys	-	-	-	-	-
Benzobfl	2.19	-	-	2.15	1.22
Benzokfl	-	-	-	-	-
Benepy	1.60	-	-	0.90	-
Benapy	-	-	-	1.37	-
Perylene	1.13	0.51	1.17	0.66	-
Indeno	0.19	-	-	0.63	-
Dibenz	-	-	-	0.18	-
Benzop	0.60	-	-	0.64	0.24
Total Aromatics (w/o Perylene)	43.1±31.0	3.44±0.10	19.0±7.04	17.1±16.6	30.6±11.7

Prince William Sound sediment samples

Station Name (#)	Rocky Bay (11)	Rocky Bay (11)	Rocky Bay (11)	Rocky Bay (11)	Rocky Bay (11)	Rocky Bay (11)	Rocky Bay (11)
Date collected	26-Mar-89	04-May-89	20-Aug-89	25-Apr-90	22-Jun-90	08-Aug-90	02-May-91
Mean wet wt. (g)	13.7	20.1	10.2	20.1	20.3	20.1	20.1
Mean dry wt. (g)	9.41	14.0	7.05	14.2	13.9	13.9	14.8
N	3	3	3	2	2	3	2
PAH's(ng/g)							
Naph	17.7	10.3	5.24	8.90	10.1	7.63	6.88
Menap2	13.1	11.0	8.44	11.3	12.5	8.86	8.35
Menap1	12.3	2.86	5.31	3.97	2.29	3.57	2.57
Dimeth	7.37	6.30	6.90	4.89	6.09	5.31	4.87
C2naph	16.4	14.2	13.8	10.9	13.2	11.9	21.2
Trimeth	0.63	1.18	0.46	0.57	1.02	0.85	0.80
C3naph	7.72	5.82	2.66	4.12	6.27	4.50	14.1
C4naph	18.7	1.61	9.94	11.4	3.04	2.21	26.7
Biphenyl	8.44	7.33	2.51	6.16	8.30	5.65	5.24
Acenthy	-	-	-	-	-	-	-
Acenthe	1.53	1.75	-	0.87	1.33	0.64	-
Fluorene	15.0	12.6	13.5	16.9	15.1	12.0	14.2
C1fluor	15.1	13.5	13.1	20.7	15.7	12.9	17.0
C2fluor	5.64	7.91	2.80	12.8	8.68	7.35	9.36
C3fluor	0.55	1.93	-	6.09	6.18	0.74	3.91
Dithio	2.14	2.00	1.39	1.53	1.94	1.40	1.35
C1dithio	2.53	2.09	0.86	2.01	2.40	1.22	2.21
C2dithio	0.51	1.86	-	2.00	5.69	1.34	1.47
C3dithio	1.10	2.12	-	3.96	9.80	2.81	0.34
Phenanth	52.2	42.7	44.8	40.2	47.2	33.1	35.9
Mephen1	5.87	3.81	3.77	2.78	5.61	0.83	2.60
C1phenan	34.8	31.5	32.5	31.5	36.0	24.8	30.6
C2phenan	11.4	11.5	12.0	11.9	27.5	8.41	12.2
C3phenan	-	5.05	1.56	6.35	47.3	4.14	9.00
C4phenan	5.29	3.28	-	3.01	18.8	-	7.53
Anthra	3.27	3.04	2.35	4.04	3.69	0.80	-
Fluorant	12.4	9.25	9.85	10.6	7.64	5.13	6.05
Pyrene	13.3	9.27	10.5	11.4	11.6	6.69	8.41
C1fluora	10.4	9.24	8.33	11.8	31.7	7.86	9.92
Benanth	2.43	1.75	-	2.40	4.36	0.30	0.50
Chrysene	9.76	10.8	8.36	7.28	16.6	6.21	7.29
C1chrys	7.40	6.93	9.11	5.06	34.6	4.78	6.72
C2chrys	-	2.68	-	1.83	32.9	2.20	3.35
C3chrys	-	-	-	-	20.0	-	-
C4chrys	-	-	-	-	6.02	-	-
Benzobfl	17.4	12.7	13.2	12.2	12.1	8.95	12.2
Benzokfl	-	-	-	-	-	-	-
Benepy	9.49	6.61	6.35	4.94	9.58	4.75	6.71
Benapy	0.94	-	-	1.62	2.71	-	-
Perylene	21.4	20.8	20.2	17.5	28.8	16.9	17.2
Indeno	1.62	0.91	-	1.92	2.09	1.15	1.67
Dibenz	0.30	0.79	-	1.47	1.85	1.06	1.41
Benzop	9.14	5.16	4.57	5.24	6.59	4.05	6.97
Total Aromatics (w/o Perylene)	340±23.4	272±36.4	243±24.4	298±10.7	503±218	209±10.9	301±23.6

Prince William Sound sediment samples

Station	Siwash	Siwash	Siwash	Siwash	Siwash	Siwash	Siwash
Name (#)	Bay (12)	Bay (12)	Bay (12)	Bay (12)	Bay (12)	Bay (12)	Bay (12)
Date collected	29-Mar-89	03-May-89	16-Aug-89	24-Apr-90	25-Jun-90	09-Aug-90	18-Apr-91
Mean wet wt. (g)	10.3	20.4	10.2	20.3	20.0	20.2	20.0
Mean dry wt. (g)	7.28	10.7	6.81	12.4	12.9	12.0	12.2
N	3	3	3	3	1	3	3
PAH's(ng/g)							
Naph	5.53	1.85	1.43	1.72	1.22	0.31	0.76
Menap2	2.60	-	0.70	0.93	-	-	0.72
Menap1	8.38	-	0.99	-	-	-	-
Dimeth	-	-	1.00	-	-	-	-
C2naph	4.73	-	2.68	3.02	2.12	-	1.41
Trimeth	-	-	-	-	-	-	0.31
C3naph	2.96	-	0.73	1.35	-	-	1.83
C4naph	18.4	-	15.2	2.31	5.58	1.92	0.86
Biphenyl	-	-	-	-	-	-	-
Acenthy	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-
Fluorene	-	-	-	-	-	-	-
C1fluor	2.15	-	0.97	-	-	-	-
C2fluor	-	-	-	-	-	-	-
C3fluor	-	-	-	-	9.44	-	-
Dithio	-	-	-	-	-	-	-
C1dithio	-	-	-	-	-	-	-
C2dithio	-	-	-	-	-	-	-
C3dithio	-	-	-	-	-	-	-
Phenanth	4.87	-	2.43	1.59	-	-	1.04
Mephen1	-	-	-	-	-	-	-
C1phenan	5.28	-	2.74	3.64	-	-	3.45
C2phenan	2.13	-	1.51	-	-	-	-
C3phenan	-	-	-	-	3.29	-	-
C4phenan	2.09	-	-	-	-	-	-
Anthra	-	-	-	-	-	-	-
Fluorant	-	0.31	-	0.52	0.84	-	-
Pyrene	-	-	-	0.30	-	-	-
C1fluora	0.45	-	-	-	-	-	-
Benanth	0.20	-	-	-	-	-	-
Chrysene	1.76	-	-	1.08	-	-	1.13
C1chrys	2.11	-	1.60	-	-	-	-
C2chrys	-	-	-	-	-	-	-
C3chrys	-	-	-	-	-	-	-
C4chrys	-	-	-	-	-	-	-
Benzobfl	2.35	-	1.34	-	1.01	-	1.01
Benzokfl	-	-	-	-	-	-	-
Benepy	2.93	-	1.81	0.73	-	-	0.34
Benapy	-	-	-	-	-	-	-
Perylene	4.95	5.25	7.77	5.10	4.12	6.27	4.38
Indeno	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-
Benzop	0.94	-	-	0.26	-	-	0.28
Total Aromatics (w/o Perylene)	69.9±14.6	2.16±0.74	34.1±11.3	17.4±3.93	23.5	2.24±1.19	12.8±3.63

Prince William Sound sediment samples

Station	Sleepy	Sleepy	Sleepy	Sleepy	Sleepy	Sleepy
Name (#)	Bay (13)	Bay (13)	Bay (13)	Bay (13)	Bay (13)	Bay (13)
Date collected	07-May-89	17-Aug-89	26-Apr-90	23-Jun-90	07-Aug-90	19-Apr-91
Mean wet wt. (g)	13.8	16.8	20.3	20.1	20.0	20.1
Mean dry wt. (g)	11.3	12.9	15.8	15.0	15.2	15.2
N	3	3	2	2	3	2
PAH's(ng/g)						
Naph	4.60	4.04	1.69	1.08	0.75	-
Menap2	5.96	4.10	1.38	0.87	0.35	0.46
Menap1	4.44	2.61	0.68	0.91	-	-
Dimeth	11.8	0.99	-	-	-	-
C2naph	59.4	5.80	2.56	2.07	2.09	0.71
Trimeth	17.0	1.82	-	0.36	-	-
C3naph	105	18.1	2.02	1.91	2.32	0.45
C4naph	44.8	14.1	4.84	12.9	4.87	-
Biphenyl	3.00	1.50	-	-	-	-
Acenthy	-	-	-	-	-	-
Acenthe	-	1.50	-	-	-	-
Fluorene	3.11	2.28	-	-	-	-
C1fluor	16.8	5.95	-	1.52	0.40	-
C2fluor	32.1	26.4	1.31	4.32	2.31	1.00
C3fluor	26.2	34.4	4.32	9.73	5.04	-
Dithio	12.4	2.36	0.31	-	0.23	-
C1dithio	39.9	22.0	1.53	1.19	2.24	-
C2dithio	63.9	82.4	6.93	5.66	8.74	1.41
C3dithio	59.3	98.1	17.0	21.2	27.1	1.97
Phenanth	30.9	16.0	2.26	1.35	1.24	-
Mephen1	26.5	19.7	0.88	-	0.60	-
C1phenan	91.2	42.0	3.15	1.63	3.11	-
C2phenan	116	120	9.46	6.94	10.3	2.62
C3phenan	90.2	133	24.2	15.3	19.6	4.79
C4phenan	27.4	35.8	17.7	13.4	16.4	2.59
Anthra	-	-	-	-	-	-
Fluorant	5.95	8.52	5.02	1.87	1.31	1.05
Pyrene	5.40	8.18	3.09	1.25	1.03	0.40
C1fluora	13.7	20.5	7.59	7.25	9.09	1.13
Benanth	-	2.64	5.45	2.73	1.69	-
Chrysene	17.4	17.2	3.52	1.34	3.51	1.89
C1chrys	18.2	31.4	10.4	9.42	11.1	3.42
C2chrys	13.2	21.8	12.2	10.5	12.7	3.57
C3chrys	4.94	17.9	12.4	10.1	10.6	3.42
C4chrys	-	1.67	-	3.51	4.53	-
Benzobfl	4.10	5.81	2.32	1.39	1.23	0.41
Benzokfl	-	-	-	-	-	-
Benepy	4.67	6.58	3.29	2.30	3.20	1.85
Benapy	-	2.02	-	-	-	-
Perylene	-	0.85	-	-	-	-
Indeno	-	0.78	-	-	-	-
Dibenz	-	0.51	-	-	-	-
Benzop	0.65	2.05	0.80	0.63	0.58	-
Total Aromatics (w/o Perylene)	924±407	821±116	167±25.7	154±14.9	168±42.4	33.1±5.43

Table II-4.--Concentrations of alkanes in SEDIMENTS collected from PWS, Alaska, for this study. Table I-4 contains a key for the alkane abbreviations used here. Tables 1 and 2 list the station names, numbers, locations, and collection dates that correspond with those listed here. Stations established in 1977 described by Karinen et al. (1993) are italicized. Concentrations are means of n replicated determinations reported as ng alkane/g dry tissue weight; the mean sample wet and dry weights are also given. "ALKANES" indicates the mean of the sum of all alkanes detected, and "UCM" indicates the unresolved complex mixture. "Total NAlkanes" is the sum of the listed mean normal alkane concentrations (i.e., pristane and phytane excluded), followed by the standard error of the sum. Hyphens indicate concentrations below MDLs adjusted for the sample weight. Only samples that had surrogate standard recoveries greater than 30% and less than 150% are included in this table; samples that were excluded on this basis are listed in Table II-10.

Prince William Sound sediment samples

Station	Barnes	Barnes	Barnes	Barnes	Barnes	Barnes	Barnes	Barnes	Barnes
Name (#)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)	Cove (1)
Date collected	31-Mar-89	31-Mar-89	07-Apr-89	06-May-89	17-Aug-89	25-Apr-90	22-Jun-90	06-Aug-90	20-Apr-91
Mean wet wt. (g)	20.2	20.2	10.1	15.1	20.3	20.0	20.3	20.1	20.1
Mean dry wt. (g)	10.8	13.9	3.98	4.84	9.29	7.73	8.79	10.9	8.85
N	2	3	3	2	3	2	2	3	3
Alkanes (ng/g)									
C10alk	-	-	-	-	-	5.83	-	-	-
C11alk	2.20	1.12	6.81	-	-	-	-	-	-
C12alk	-	-	-	-	-	-	-	-	-
C13alk	8.25	6.14	-	-	2.65	4.68	-	4.24	-
C14alk	-	-	-	9.67	6.06	3.24	3.60	1.58	4.61
C15alk	16.9	-	-	24.9	23.9	57.9	50.3	27.5	9.58
C16alk	-	-	-	13.1	9.59	6.05	5.82	6.00	-
C17alk	33.9	36.1	149	206	161	155	115	104	100
Pristane	37.5	5.79	-	54.5	31.5	35.8	46.6	32.2	-
C18alk	-	-	-	-	-	-	-	-	-
Phytane	-	-	-	-	-	-	-	-	-
C19alk	14.4	82.1	367	447	228	277	213	117	239
C20alk	6.64	12.4	31.1	22.2	78.8	30.6	24.6	13.0	24.5
C21alk	22.3	94.7	304	373	258	296	218	109	172
C22alk	9.84	30.3	44.1	81.4	76.3	70.7	74.4	42.7	53.0
C23alk	40.5	135	288	427	311	346	286	161	226
C24alk	-	75.8	-	163	90.9	98.3	84.6	50.7	54.8
C25alk	62.6	182	425	566	401	496	399	235	288
C26alk	11.9	65.1	99.5	187	130	135	107	62.2	41.9
C27alk	219	539	1320	1740	1150	1470	1150	740	1070
C28alk	11.6	47.1	86.1	123	107	121	90.8	63.7	75.4
C29alk	122	394	858	1060	845	914	743	469	715
C30alk	-	52.1	106	138	126	113	70.6	50.4	95.1
C31alk	-	-	-	-	-	-	-	-	-
C32alk	-	36.9	57.6	55.4	70.2	99.4	88.4	45.3	69.0
C33alk	-	-	-	-	-	-	-	-	-
C34alk	-	4.59	-	13.7	6.30	71.5	35.1	8.40	5.76
ALKANES	1360	3430	8430	11500	8920	10400	7640	5160	6430
UCM	1200	1780	8090	7410	2090	5320	-	694	1530
Total NAlkanes	582±48.8	1790±264	4140±444	5650±948	4080±302	4770±10.2	3760±172	2310±97.6	3250±81.7

Prince William Sound sediment samples

Station	Bay of	Bay of	Bay of	Bay of	Bay of	Bay of	Bay of	Bay of
Name (#)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)
Date collected	30-Mar-89	08-Apr-89	06-May-89	16-Aug-89	25-Apr-90	22-Jun-90	06-Aug-90	19-Apr-91
Mean wet wt. (g)	13.9	13.8	16.9	16.9	20.2	20.3	20.3	20.1
Mean dry wt. (g)	7.24	6.91	7.95	11.1	9.48	12.5	9.48	12.7
N	3	3	3	3	2	2	3	3
Alkanes (ng/g)								
C10alk	-	-	-	-	-	-	-	-
C11alk	3.16	-	-	-	-	-	-	-
C12alk	-	-	-	-	3.65	-	-	-
C13alk	3.65	-	2.67	-	-	3.59	-	-
C14alk	2.51	2.00	10.3	-	9.73	2.25	21.9	-
C15alk	-	10.0	33.7	10.1	160	23.9	79.0	-
C16alk	-	13.7	14.3	-	11.9	-	23.5	-
C17alk	33.2	69.7	122	27.1	105	74.5	142	34.3
Pristane	-	-	45.0	15.6	15.3	16.6	44.5	-
C18alk	-	-	24.2	-	23.9	-	24.6	-
Phytane	-	-	24.2	-	20.8	-	28.1	-
C19alk	146	147	183	57.9	106	66.8	155	46.9
C20alk	13.8	16.5	34.4	11.3	43.7	19.9	32.2	2.88
C21alk	155	125	173	82.9	138	86.1	149	58.3
C22alk	43.5	28.4	90.7	40.7	84.8	56.2	72.9	17.1
C23alk	230	153	236	116	207	146	193	79.8
C24alk	57.0	32.0	104	41.9	83.5	46.9	75.8	-
C25alk	357	222	319	142	263	167	250	109
C26alk	90.9	31.4	138	54.9	101	68.5	97.7	-
C27alk	1060	442	1040	417	939	489	823	439
C28alk	66.5	51.9	88.0	37.8	104	53.5	81.5	14.2
C29alk	629	374	521	259	492	291	460	245
C30alk	93.5	43.3	78.3	43.7	81.2	54.7	74.9	-
C31alk	-	-	-	-	-	-	-	-
C32alk	72.6	36.6	43.1	27.2	54.3	44.1	63.3	7.94
C33alk	-	-	-	-	-	-	-	-
C34alk	-	-	22.2	29.4	35.1	51.6	47.3	8.82
ALKANES	5340	3690	6790	2960	9640	4290	7880	2460
UCM	7450	4280	6950	5960	8540	8160	12200	4410
Total NAlkanes	3050±591	1800±227	3280±806	1400±652	3050±622	1750±634	2870±657	1060±269

Prince William Sound sediment samples

Station	Bligh	Bligh	Bligh	Bligh	Bligh	Bligh	Bligh
Name (#)	Island (3)	Island (3)	Island (3)	Island (3)	Island (3)	Island (3)	Island (3)
Date collected	28-Mar-89	02-May-89	15-Aug-89	28-Apr-90	21-Jun-90	05-Aug-90	17-Apr-91
Mean wet wt. (g)	20.3	16.8	13.6	20.2	20.2	20.2	20.1
Mean dry wt. (g)	13.4	11.0	8.57	13.3	14.3	13.8	13.3
N	2	3	3	2	2	3	3
Alkanes (ng/g)							
C10alk	-	-	-	-	-	-	1.72
C11alk	-	-	-	-	-	-	-
C12alk	-	-	-	-	2.63	-	-
C13alk	-	1.61	-	3.11	-	4.85	-
C14alk	-	1.12	-	-	-	-	-
C15alk	16.3	63.2	10.9	49.9	20.7	17.2	41.8
C16alk	-	2.61	2.57	-	-	-	-
C17alk	59.2	89.2	48.6	80.9	50.4	50.2	36.7
Pristane	-	22.3	-	-	-	-	-
C18alk	13.4	11.5	-	-	-	-	-
Phytane	-	-	-	-	-	-	-
C19alk	161	184	173	188	121	133	97.2
C20alk	14.8	10.2	3.46	-	-	-	-
C21alk	50.1	79.6	83.4	95.2	55.1	64.4	66.2
C22alk	5.83	12.4	11.8	4.33	6.65	8.35	14.9
C23alk	38.5	48.9	90.6	54.4	45.4	49.5	37.3
C24alk	-	-	23.0	-	22.4	-	-
C25alk	25.5	34.0	78.6	41.7	34.2	40.4	37.0
C26alk	8.32	-	18.8	8.54	7.83	-	-
C27alk	53.9	61.4	195	85.8	28.7	64.8	61.0
C28alk	19.1	14.3	15.1	5.40	-	12.0	7.52
C29alk	39.7	46.3	112	49.0	24.8	61.9	46.4
C30alk	-	-	17.6	-	-	-	-
C31alk	-	-	-	-	-	-	-
C32alk	-	-	-	-	-	-	-
C33alk	-	-	-	-	-	-	-
C34alk	-	-	11.4	-	-	-	-
ALKANES	1560	2370	3040	2020	1390	1600	1540
UCM	1060	1930	1180	810	3830	550	1990
Total NAlkanes	506±25.8	660±149	896±178	667±114	420±70.5	506±23.9	448±39.7

Prince William Sound sediment samples

Station	Constantine	Constantine	Constantine	Constantine	Constantine	Constantine
Name (#)	Harbor (4)	Harbor (4)	Harbor (4)	Harbor (4)	Harbor (4)	Harbor (4)
Date collected	26-Mar-89	03-May-89	20-Aug-89	25-Apr-90	22-Jun-90	08-Aug-90
Mean wet wt. (g)	20.1	20.1	20.1	20.1	20.0	20.1
Mean dry wt. (g)	12.1	12.3	12.2	12.5	12.8	12.2
N	3	3	3	2	2	3
Alkanes (ng/g)						
C10alk	18.1	24.6	23.5	10.2	-	23.6
C11alk	25.0	27.7	27.3	27.3	26.4	24.1
C12alk	24.9	32.1	35.2	35.1	29.2	28.1
C13alk	38.2	37.5	44.0	44.0	38.0	40.8
C14alk	31.9	36.9	38.2	39.7	35.6	38.5
C15alk	62.7	64.5	78.0	84.6	71.3	82.2
C16alk	32.0	38.6	37.7	32.2	37.6	41.4
C17alk	126	102	124	126	137	245
Pristane	33.3	47.6	38.0	33.5	35.4	37.3
C18alk	30.7	33.8	38.3	36.2	32.9	38.1
Phytane	-	-	-	-	-	-
C19alk	156	141	154	176	125	122
C20alk	41.1	33.9	42.2	40.1	40.8	41.0
C21alk	206	195	188	171	181	170
C22alk	94.3	67.7	96.5	84.4	94.9	80.5
C23alk	259	195	272	254	268	243
C24alk	90.2	95.4	97.2	139	111	111
C25alk	306	258	327	318	332	299
C26alk	87.6	71.7	94.5	114	88.0	91.3
C27alk	357	286	373	417	349	307
C28alk	69.5	54.7	81.4	99.3	63.5	78.5
C29alk	602	457	618	517	549	481
C30alk	81.9	61.4	86.7	114	75.2	68.9
C31alk	-	-	-	-	-	-
C32alk	59.0	57.4	66.5	92.9	62.3	56.2
C33alk	-	-	-	-	-	-
C34alk	25.4	26.3	29.1	56.1	42.2	21.4
ALKANES	7460	6970	6630	9830	7990	7400
UCM	2180	1460	5940	4510	2830	3820
Total NAlkanes	2820±151	2400±83.0	2970±199	3030±698	2790±292	2730±209

Prince William Sound sediment samples

Station	Crab	Crab	Crab	Crab	Crab	Crab	Crab
Name (#)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)	Bay (5)
Date collected	01-Apr-89	07-May-89	17-Aug-89	26-Apr-90	23-Jun-90	07-Aug-90	20-Apr-91
Mean wet wt. (g)	20.1	20.2	20.1	20.4	20.2	20.2	20.1
Mean dry wt. (g)	14.3	12.9	12.8	14.1	13.0	13.3	13.4
N	3	3	3	2	2	3	3
Alkanes (ng/g)							
C10alk	-	-	-	-	7.66	3.80	-
C11alk	-	-	-	-	6.01	1.97	-
C12alk	-	-	-	-	7.20	3.89	-
C13alk	-	-	3.19	-	6.90	4.02	-
C14alk	-	-	14.3	1.62	7.26	3.42	-
C15alk	10.6	27.1	73.2	82.4	70.7	30.9	-
C16alk	-	10.6	23.4	3.20	3.66	2.61	-
C17alk	52.2	91.3	45.8	46.3	47.3	36.0	84.5
Pristane	17.0	263	313	31.9	367	63.9	7.23
C18alk	-	-	9.84	-	-	-	-
Phytane	-	-	-	-	-	-	-
C19alk	84.4	89.9	89.1	70.4	35.0	43.2	19.9
C20alk	4.35	15.7	13.2	13.0	13.0	7.72	-
C21alk	80.2	141	162	76.7	92.7	64.5	19.0
C22alk	17.5	35.7	32.6	24.1	67.4	37.6	5.83
C23alk	79.3	71.7	83.2	97.8	110	90.9	41.5
C24alk	23.8	38.7	31.7	33.2	66.3	41.4	-
C25alk	92.6	86.8	98.3	118	104	100	48.3
C26alk	31.8	34.3	38.3	41.3	74.4	51.2	-
C27alk	204	143	177	211	136	159	110
C28alk	27.9	22.9	27.2	41.5	37.6	31.7	-
C29alk	141	97.2	111	156	117	114	65.8
C30alk	22.4	19.1	6.71	55.3	33.0	23.7	-
C31alk	-	-	-	-	-	-	-
C32alk	6.61	-	-	15.2	15.9	6.66	-
C33alk	-	-	-	-	-	-	-
C34alk	13.7	10.2	-	-	-	-	-
ALKANES	2690	4880	8830	4570	4630	2980	1140
UCM	3150	4900	7170	4860	2320	1830	4240
Total NAlkanes	892±188	936±69.3	1040±50.8	1090±52.0	1060±90.7	858±201	395±32.7

Prince William Sound sediment samples

Station	Elrington	Elrington	Elrington	Elrington	Elrington	Elrington	Elrington	Elrington
Name (#)	Island (6)	Island (6)	Island (6)	Island (6)	Island (6)	Island (6)	Island (6)	Island (6)
Date collected	10-May-89	10-May-89	19-Jun-89	17-Aug-89	26-Apr-90	23-Jun-90	07-Aug-90	19-Apr-91
Mean wet wt. (g)	13.7	2.04	20.1	13.8	20.3	20.3	20.1	20.2
Mean dry wt. (g)	10.7	1.73	15.6	10.4	17.5	16.8	15.9	17.9
N	3	1	3	3	2	2	3	3
Alkanes (ng/g)								
C10alk	-	-	-	-	-	-	-	-
C11alk	-	64.3	1.32	-	-	-	-	-
C12alk	-	116	2.31	-	-	-	-	-
C13alk	5.97	158	3.75	6.98	-	-	-	-
C14alk	2.29	306	4.92	5.70	-	-	-	-
C15alk	-	511	18.8	-	-	-	-	-
C16alk	6.55	870	4.25	4.64	-	-	3.34	-
C17alk	-	659	6.96	4.86	-	3.86	7.29	-
Pristane	136	1720	133	25.1	44.8	67.8	40.6	8.79
C18alk	-	1170	-	-	-	-	8.08	-
Phytane	44.6	1770	15.2	-	-	-	5.20	-
C19alk	10.5	500	3.48	5.39	1.78	2.41	8.85	-
C20alk	9.76	417	5.67	-	-	-	8.44	-
C21alk	9.83	315	4.78	-	-	-	3.19	-
C22alk	15.5	366	7.30	2.13	-	-	6.77	-
C23alk	9.69	300	-	-	-	-	6.06	-
C24alk	-	480	-	-	-	-	-	-
C25alk	32.1	608	14.5	8.15	-	2.28	7.55	-
C26alk	27.7	821	15.8	9.55	-	-	-	-
C27alk	14.2	803	20.0	4.74	-	12.2	5.86	-
C28alk	10.0	584	12.6	5.49	4.70	-	-	-
C29alk	31.9	374	12.5	12.8	-	7.91	10.8	-
C30alk	26.2	345	10.1	8.35	-	-	-	-
C31alk	-	-	-	-	-	-	-	-
C32alk	17.1	319	6.56	-	-	-	-	-
C33alk	-	-	-	-	-	-	-	-
C34alk	21.8	654	19.4	-	-	-	-	-
ALKANES	639	70100	631	43.5	76.3	321	293	A
UCM	5700	237000	4040	2010	1570	1460	1230	674
Total NAlkanes	251±97.3	10700	175±110	78.8±26.8	6.48±6.48	28.7±21.0	76.2±38.3	-

Prince William Sound sediment samples

Station	Naked Island (8)	Naked Island (8)	Naked Island (8)	Naked Island (8)	Naked Island (8)	Naked Island (8)	Naked Island (8)	Naked Island (8)	Naked Island (8)
Date collected	28-Mar-89	08-Apr-89	08-May-89	18-Jun-89	15-Aug-89	24-Apr-90	21-Jun-90	05-Aug-90	15-Apr-91
Mean wet wt. (g)	16.8	10.5	13.6	20.2	13.6	20.1	20.1	20.2	20.1
Mean dry wt. (g)	12.5	6.91	10.0	13.7	9.35	14.9	13.8	11.8	14.6
N	3	3	3	3	3	2	2	3	3
Alkanes (ng/g)									
C10alk	-	-	1.48	-	-	2.08	-	4.95	-
C11alk	2.14	-	-	-	-	-	-	3.83	-
C12alk	2.20	-	-	-	-	-	-	6.86	-
C13alk	4.25	5.40	15.1	-	5.26	-	-	9.29	-
C14alk	3.64	8.82	4.48	7.06	4.29	-	1.98	10.5	11.3
C15alk	8.39	-	-	52.1	33.3	10.2	24.4	55.2	51.9
C16alk	3.71	21.2	6.94	10.2	4.29	-	-	10.9	4.73
C17alk	6.59	51.6	25.0	59.1	40.7	16.8	41.6	74.7	59.4
Pristane	19.6	55.5	138	166	70.4	20.1	40.9	144	10.7
C18alk	-	-	-	7.06	-	-	-	7.87	-
Phytane	-	-	-	-	-	-	-	-	-
C19alk	17.6	75.8	49.4	149	90.3	21.8	57.2	108	52.2
C20alk	-	22.1	7.87	23.1	3.39	-	-	21.0	31.8
C21alk	17.7	80.2	45.0	134	74.1	25.3	45.1	129	38.7
C22alk	3.19	32.3	19.2	25.5	23.7	4.59	13.7	48.3	30.3
C23alk	28.5	91.4	48.9	111	87.6	31.7	72.8	163	41.2
C24alk	-	-	-	47.3	11.9	-	-	61.9	-
C25alk	42.9	142	72.9	133	121	37.7	90.9	212	61.2
C26alk	4.90	18.1	22.4	50.2	42.8	7.41	28.9	82.4	17.7
C27alk	88.8	276	124	296	202	100	189	589	158
C28alk	16.8	8.67	6.07	41.4	11.4	7.96	18.0	62.4	14.1
C29alk	64.3	137	84.0	152	137	52.3	99.6	288	75.9
C30alk	15.1	11.3	16.7	37.9	24.3	7.51	10.0	70.6	14.3
C31alk	-	-	-	-	-	-	-	-	-
C32alk	18.0	-	11.1	32.1	21.2	-	29.8	53.3	6.39
C33alk	-	-	-	-	-	-	-	-	-
C34alk	5.27	-	9.09	17.2	4.10	-	9.50	27.9	-
ALKANES	981	2460	1520	3870	2630	1020	2110	4810	4120
UCM	3570	8370	596	7530	826	1510	-	1180	1120
Total NAlkanes	354±35.7	982±145	569±70.2	1390±135	943±144	326±73.1	733±119	2100±69.1	669±82.3

Prince William Sound sediment samples

Station	Olsen	Olsen	Olsen	Olsen	Olsen	Olsen	Olsen
Name (#)	Bay (9)	Bay (9)	Bay (9)	Bay (9)	Bay (9)	Bay (9)	Bay (9)
Date collected	06-Apr-89	01-May-89	16-Aug-89	28-Apr-90	25-Jun-90	09-Aug-90	15-Apr-91
Mean wet wt. (g)	10.5	10.3	20.3	18.9	20.1	20.1	20.0
Mean dry wt. (g)	6.08	6.89	14.3	11.6	13.5	14.8	12.7
N	2	3	3	3	2	3	3
Alkanes (ng/g)							
C10alk	-	-	-	20.1	-	-	-
C11alk	-	-	-	4.42	-	-	-
C12alk	45.5	-	-	19.9	-	-	-
C13alk	68.5	11.9	7.77	16.8	6.69	-	2.20
C14alk	78.9	6.04	1.53	25.3	5.25	-	6.39
C15alk	114	53.5	26.8	54.5	40.6	5.07	44.2
C16alk	-	-	-	27.4	7.31	-	9.49
C17alk	52.8	63.6	87.9	71.3	53.7	23.4	139
Pristane	-	-	-	16.1	-	-	-
C18alk	-	-	-	7.96	-	-	-
Phytane	-	-	-	6.55	-	-	-
C19alk	143	147	121	214	161	55.6	441
C20alk	-	-	3.36	10.4	10.9	-	7.35
C21alk	79.5	63.3	59.4	105	74.1	45.4	174
C22alk	25.1	15.4	9.43	15.9	14.3	9.40	18.4
C23alk	77.4	65.5	53.0	91.1	69.4	42.7	97.3
C24alk	-	-	-	6.67	-	-	-
C25alk	79.7	69.4	45.2	82.1	64.9	54.8	72.9
C26alk	-	-	7.28	13.6	8.62	5.71	16.3
C27alk	146	116	86.0	158	112	81.9	118
C28alk	-	7.74	17.1	18.4	6.55	15.6	19.0
C29alk	146	117	75.3	143	110	110	109
C30alk	-	20.1	-	20.2	27.9	23.9	16.0
C31alk	-	-	-	77.0	-	-	-
C32alk	-	-	-	12.7	14.1	5.88	6.30
C33alk	-	-	-	40.2	-	-	-
C34alk	-	-	-	16.2	14.1	-	-
ALKANES	4910	1930	1630	2000	2510	1550	3050
UCM	1420	2930	329	197	2260	1450	1210
Total NAlkanes	1060±282	757±44.4	601±68.5	1270±417	801±86.2	479±46.4	1300±101

Prince William Sound sediment samples

Station	Perry	Perry	Perry	Perry	Perry
Name (#)	Island (10)	Island (10)	Island (10)	Island (10)	Island (10)
Date collected	16-Aug-89	24-Apr-90	21-Jun-90	05-Aug-90	18-Apr-91
Mean wet wt. (g)	19.9	20.2	20.1	20.2	20.1
Mean dry wt. (g)	13.9	13.0	13.6	15.3	14.1
N	3	2	2	2	3
Alkanes (ng/g)					
C10alk	-	-	-	-	5.69
C11alk	1.44	-	-	-	-
C12alk	-	-	-	-	4.05
C13alk	-	-	6.27	-	4.22
C14alk	23.7	-	2.83	-	13.8
C15alk	93.2	87.0	61.2	-	23.1
C16alk	32.4	-	-	-	12.5
C17alk	93.6	95.8	84.3	27.4	25.4
Pristane	29.5	26.3	-	-	-
C18alk	-	-	-	-	-
Phytane	-	-	-	-	-
C19alk	90.0	58.3	71.2	7.03	4.46
C20alk	-	-	-	3.91	-
C21alk	57.1	30.2	44.3	4.77	12.2
C22alk	10.3	-	13.7	6.33	9.00
C23alk	20.7	-	9.24	8.49	-
C24alk	-	-	-	-	-
C25alk	19.4	23.2	19.2	15.6	18.3
C26alk	-	-	-	-	5.93
C27alk	40.9	62.9	57.4	30.6	23.6
C28alk	5.28	-	-	-	11.9
C29alk	14.9	15.8	15.6	-	13.9
C30alk	-	-	-	-	5.10
C31alk	-	-	-	-	-
C32alk	-	-	-	-	-
C33alk	-	-	-	-	-
C34alk	-	-	-	-	-
ALKANES	1810	1140	2040	730	509
UCM	2980	2280	-	1930	798
Total NAlkanes	503±125	373±35.5	385±6.05	104±27.7	193±53.7

Prince William Sound sediment samples

Station Name (#)	Rocky Bay (11)	Rocky Bay (11)	Rocky Bay (11)	Rocky Bay (11)	Rocky Bay (11)	Rocky Bay (11)	Rocky Bay (11)
Date collected	26-Mar-89	04-May-89	20-Aug-89	25-Apr-90	22-Jun-90	08-Aug-90	02-May-91
Mean wet wt. (g)	13.7	20.2	10.2	20.1	20.3	20.1	20.1
Mean dry wt. (g)	9.41	13.9	7.05	14.2	13.9	13.9	14.6
N	3	2	3	2	2	3	3
Alkanes (ng/g)							
C10alk	9.81	7.92	7.21	5.65	10.7	5.96	5.30
C11alk	6.34	6.32	8.03	4.51	7.39	3.20	5.06
C12alk	5.54	4.61	7.93	6.14	10.7	5.81	5.04
C13alk	23.3	11.0	14.4	6.47	10.4	9.17	4.35
C14alk	12.1	4.03	6.49	8.93	13.4	6.69	9.45
C15alk	29.3	12.7	126	35.2	10.8	21.8	20.4
C16alk	4.90	5.54	6.18	15.1	5.31	3.57	4.64
C17alk	522	1040	1570	561	650	354	173
Pristane	-	21.4	-	9.43	19.4	-	-
C18alk	-	-	-	-	-	-	-
Phytane	-	-	-	-	-	-	-
C19alk	55.4	45.1	23.5	29.3	45.4	20.8	16.1
C20alk	3.17	3.98	6.04	-	22.0	3.70	-
C21alk	30.5	32.5	26.9	22.7	39.1	9.21	11.1
C22alk	6.95	5.13	12.7	3.05	21.1	-	-
C23alk	8.38	18.8	-	19.0	54.3	-	-
C24alk	-	-	-	-	37.5	-	-
C25alk	29.2	26.4	22.7	27.5	47.0	17.9	26.2
C26alk	13.0	13.0	-	-	9.83	-	-
C27alk	82.7	76.5	55.0	69.1	77.6	43.4	30.6
C28alk	10.1	13.4	-	12.6	10.2	-	-
C29alk	35.0	35.5	15.8	30.3	39.4	23.5	11.8
C30alk	6.85	12.3	-	-	10.7	-	-
C31alk	-	-	-	-	-	-	-
C32alk	-	-	-	-	27.1	-	-
C33alk	-	-	-	-	-	-	-
C34alk	-	-	-	-	8.81	-	-
ALKANES	2070	2500	3730	2480	3290	1340	1150
UCM	1480	1340	4430	1590	1880	193	-
Total NAlkanes	895±115	1370±250	1900±80.4	857±34.7	1170±42.9	528±39.5	323±53.9

Prince William Sound sediment samples

Station Name (#)	Siwash Bay (12)	Siwash Bay (12)	Siwash Bay (12)	Siwash Bay (12)	Siwash Bay (12)	Siwash Bay (12)	Siwash Bay (12)
Date collected	29-Mar-89	03-May-89	16-Aug-89	24-Apr-90	25-Jun-90	09-Aug-90	18-Apr-91
Mean wet wt. (g)	10.3	20.4	10.2	20.3	20.0	20.2	20.0
Mean dry wt. (g)	7.28	10.7	6.81	12.4	13.0	12.0	12.2
N	3	3	3	3	2	3	3
Alkanes (ng/g)							
C10alk	-	-	-	-	-	-	2.24
C11alk	-	-	-	-	-	-	-
C12alk	-	-	-	1.85	-	-	-
C13alk	11.1	2.55	3.67	3.18	3.28	-	-
C14alk	-	-	2.65	4.22	4.35	-	3.70
C15alk	16.7	-	29.1	-	39.7	-	16.9
C16alk	-	-	-	4.16	9.81	-	6.19
C17alk	22.6	58.0	33.9	38.3	37.9	24.3	48.5
Pristane	-	-	-	-	-	-	-
C18alk	-	-	-	-	-	-	-
Phytane	-	-	-	-	-	-	-
C19alk	26.2	66.9	25.1	23.6	30.7	20.7	34.4
C20alk	5.92	4.22	-	12.3	8.68	-	19.0
C21alk	33.4	110	41.6	47.7	58.1	42.5	97.9
C22alk	16.9	20.6	13.8	18.2	17.3	15.0	34.9
C23alk	44.2	71.8	47.8	61.8	56.0	43.0	57.7
C24alk	-	-	-	-	-	-	21.7
C25alk	56.6	111	65.2	81.6	73.4	80.0	80.8
C26alk	10.1	19.8	12.3	26.0	26.4	35.4	37.3
C27alk	140	334	213	238	206	204	211
C28alk	30.4	24.6	20.9	25.1	22.3	29.7	29.1
C29alk	144	254	186	201	188	184	185
C30alk	10.5	-	11.1	5.67	9.19	17.4	13.0
C31alk	-	-	-	-	-	-	-
C32alk	-	-	-	-	-	-	-
C33alk	-	-	-	-	-	-	-
C34alk	-	-	-	-	-	-	-
ALKANES	1430	3930	2370	2660	4340	2720	4290
UCM	2190	1930	2360	1430	1670	418	700
Total NAlkanes	569±118	1080±13.9	709±77.3	792±35.4	791±23.5	696±20.2	899±72.2

Prince William Sound sediment samples

Station Name (#)	Sleepy Bay (13)	Sleepy Bay (13)	Sleepy Bay (13)	Sleepy Bay (13)	Sleepy Bay (13)	Sleepy Bay (13)
Date collected	07-May-89	17-Aug-89	26-Apr-90	23-Jun-90	07-Aug-90	19-Apr-91
Mean wet wt. (g)	13.8	16.8	20.3	20.1	20.0	20.1
Mean dry wt. (g)	11.3	12.9	15.8	15.0	15.2	15.3
N	3	3	2	2	3	3
Alkanes (ng/g)						
C10alk	-	-	-	-	-	-
C11alk	-	-	-	-	-	-
C12alk	7.77	4.24	-	-	-	-
C13alk	47.8	25.0	9.64	-	-	-
C14alk	92.0	58.3	4.97	7.72	4.75	3.11
C15alk	178	89.3	-	53.1	8.78	6.25
C16alk	215	113	17.9	38.1	19.3	9.27
C17alk	229	151	23.5	43.1	37.6	35.7
Pristane	285	372	282	81.2	72.1	25.0
C18alk	254	183	27.3	45.7	42.3	16.4
Phytane	185	293	32.6	47.4	47.1	20.2
C19alk	255	176	23.2	25.7	29.3	16.1
C20alk	253	223	20.5	28.2	26.0	15.8
C21alk	217	175	16.6	25.7	24.7	17.3
C22alk	217	198	21.4	35.9	28.8	19.6
C23alk	195	146	20.2	23.0	25.3	16.0
C24alk	194	166	30.5	39.2	37.7	23.5
C25alk	197	185	26.5	30.9	30.1	50.8
C26alk	170	190	31.1	29.4	25.1	50.3
C27alk	128	150	42.5	44.3	36.2	79.9
C28alk	89.4	103	30.2	43.9	36.7	83.8
C29alk	105	103	34.8	24.1	27.2	39.2
C30alk	93.7	97.8	23.0	24.7	27.9	15.8
C31alk	-	-	-	-	-	-
C32alk	77.5	71.6	20.9	25.8	27.4	5.38
C33alk	-	-	-	-	-	-
C34alk	60.0	109	22.3	47.3	39.4	22.8
ALKANES	6540	8370	1770	3310	2030	2520
UCM	16800	30300	7830	13700	13800	6710
Total NAlkanes	3280±1200	2720±330	447±61.0	636±57.4	534±61.1	527±241

Table II-5.--Concentrations of PAH in MUSSELS collected from the Gulf of Alaska for this study. Tables I-2 and I-3 contain keys for the PAH abbreviations used here. Tables 1 and 2 list the station names, numbers, locations, and collection dates that correspond with those listed here. Stations established in 1977 described by Karinen et al. (1993) are italicized. Concentrations are means of *n* replicated determinations reported as ng PAH/g dry tissue weight; the mean sample wet and dry weights are also given. Total aromatics (i.e. TPAH) is the sum of the listed mean PAH concentrations with perylene excluded, followed by the standard error of the sum. Hyphens indicate concentrations below MDLs adjusted for the sample weight. Only samples that had surrogate standard recoveries greater than 30% and less than 150% are included in this table; samples that were excluded on this basis are listed in Table II-9.

Gulf of Alaska mussel samples

Station	Anton Larsen	Busker	Foul	Harris	Harris	Harris	McDonald's	Monashka	Paul's	Petrof	Petrof
Name (#)	Bay (14)	River (15)	Bay (16)	Bay (17)	Bay (17)	Bay (17)	Lagoon (18)	Bay (19)	Bay (20)	Point (21)	Point (21)
Date collected	22-Jul-89	21-Jul-89	20-Jul-89	27-Apr-89	27-Apr-90	24-Jun-90	20-Jul-89	21-Jul-89	20-Jul-89	09-May-89	18-Jun-89
Mean wet wt. (g)	8.30	7.78	7.42	8.68	5.08	5.50	5.10	7.37	3.67	8.31	8.37
Mean dry wt. (g)	0.61	0.81	0.69	0.76	1.01	0.95	0.70	0.96	0.42	0.87	1.00
N	3	2	3	1	1	1	2	1	2	2	1
PAH's(ng/g)											
Naph	141	187	316	138	-	-	15.7	31.6	-	172	361
Menap2	6.42	24.1	37.4	24.2	-	-	-	-	-	14.0	46.8
Menap1	-	17.3	23.2	-	-	-	-	-	-	20.3	38.7
Dimeth	-	34.1	4.94	-	-	-	-	-	-	10.0	12.7
C2naph	19.8	161	35.1	-	-	-	-	13.8	-	13.5	20.3
Trimeth	-	76.3	-	-	-	-	-	-	-	18.4	23.9
C3naph	-	477	-	18.1	-	-	-	-	33.4	103	145
C4naph	38.1	410	-	12.0	-	-	-	-	-	138	176
Biphenyl	-	9.32	8.95	-	-	-	-	-	-	-	18.3
Acenthy	-	-	-	-	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-	-	-	-	-
Fluorene	-	22.6	-	-	-	-	9.06	-	-	-	6.36
C1fluor	5.38	109	4.33	14.5	-	-	-	-	-	37.1	58.4
C2fluor	62.1	304	12.2	35.2	-	-	-	-	-	224	297
C3fluor	26.7	135	16.4	60.1	-	-	-	-	-	315	492
Dithio	-	38.9	-	4.90	-	-	-	-	-	17.1	18.3
C1dithio	-	153	-	25.1	-	-	-	-	-	157	172
C2dithio	-	227	-	89.4	-	-	-	-	-	695	804
C3dithio	-	150	-	101	-	-	-	-	-	727	850
Phenanth	-	154	-	-	-	-	-	-	-	40.3	47.4
Mephen1	-	90.0	-	25.7	-	-	-	-	-	134	94.8
C1phenan	13.5	341	4.27	51.7	-	-	-	9.14	-	306	367
C2phenan	-	374	-	124	-	-	-	-	-	918	1150
C3phenan	-	293	-	142	-	-	-	-	-	1180	1470
C4phenan	-	53.5	-	27.3	-	-	-	-	-	216	340
Anthra	-	12.1	-	-	-	-	-	-	-	-	-
Fluorant	-	68.2	6.72	-	-	-	-	-	-	26.2	16.2
Pyrene	-	19.9	-	-	-	-	-	-	-	16.6	18.8
C1fluora	-	9.90	-	-	-	-	-	-	-	106	104
Benanth	-	-	-	-	-	-	-	-	-	5.65	6.19
Chrysene	-	38.1	-	14.4	-	-	-	-	-	74.7	92.7
C1chrys	-	3.09	-	19.1	-	-	-	-	-	137	185
C2chrys	-	-	-	-	-	-	-	-	-	54.7	69.4
C3chrys	-	-	3.68	-	-	-	-	-	-	45.8	65.7
C4chrys	35.4	11.1	17.7	-	-	-	-	8.29	-	-	7.37
Benzobfl	-	-	-	-	-	-	-	-	-	6.41	17.4
Benzokfl	-	-	-	-	-	-	-	-	-	-	-
Benepy	-	-	-	-	-	-	-	-	-	15.3	34.9
Benapy	-	-	-	-	-	-	-	-	-	-	-
Perylene	-	-	-	-	-	-	9.89	-	-	-	-
Indeno	-	-	-	-	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-	-	-	-	-
Benzop	-	-	-	-	-	-	-	-	-	-	-
Total Aromatics (w/o Perylene)	349±97.9	3800±3300	486±81.5	900	-	-	24.8±24.8	62.9	33.4±33.4	5780±1160	7500

Gulf of Alaska mussel samples

Station	Quicksand	Quicksand	Quicksand	Quicksand	Tetrakov	Tetrakov	Verdant	Verdant	Verdant	Verdant	Woman's
Name (#)	Cove (22)	Cove (22)	Cove (22)	Cove (22)	Point (23)	Point (23)	Cove (24)	Cove (24)	Cove (24)	Cove (24)	Bay (25)
Date collected	27-Apr-89	18-Aug-89	27-Apr-90	24-Jun-90	14-Apr-89	20-Jul-89	27-Apr-89	18-Aug-89	27-Apr-90	24-Jun-90	21-Jul-89
Mean wet wt. (g)	8.97	9.13	5.01	5.18	8.41	5.27	8.82	8.28	5.01	5.27	9.23
Mean dry wt. (g)	1.56	0.77	1.01	0.92	1.01	0.79	1.36	0.67	0.82	0.78	1.02
N	3	2	1	1	1	3	2	3	1	2	1
PAH's(ng/g)											
Naph	226	23.0	39.7	-	182	46.2	180	93.2	-	-	127
Menap2	37.1	-	-	-	52.7	-	29.4	-	-	-	25.0
Menap1	23.9	-	-	-	44.9	-	21.5	-	-	-	18.6
Dimeth	1.51	-	-	-	181	-	9.92	-	-	-	54.6
C2naph	3.75	-	-	-	739	13.2	12.3	-	-	-	246
Trimeth	1.31	-	-	-	261	-	22.8	-	-	-	119
C3naph	7.83	-	-	-	1620	-	119	3.43	-	-	779
C4naph	1.29	-	-	-	1080	31.7	131	-	-	-	637
Biphenyl	7.19	-	-	-	22.7	-	4.75	-	-	-	14.2
Acenthy	-	-	-	-	-	-	-	-	-	-	-
Acenthe	4.59	-	-	-	-	-	2.30	2.73	-	-	-
Fluorene	-	-	-	-	41.8	12.6	6.97	-	-	-	33.2
C1fluor	4.33	-	-	-	217	-	43.3	4.08	-	-	159
C2fluor	429	14.0	-	-	688	-	276	53.5	-	-	346
C3fluor	83.1	7.60	-	-	634	-	233	28.5	-	-	217
Dithio	1.20	-	-	-	127	-	25.2	-	-	-	58.7
C1dithio	7.04	-	-	-	573	17.7	168	6.87	-	-	241
C2dithio	10.4	-	-	-	1120	141	466	30.6	-	-	337
C3dithio	7.17	11.0	-	-	928	186	396	47.1	-	-	221
Phenanth	1.84	-	-	-	248	-	47.6	-	-	-	196
Mephen1	3.26	-	-	-	352	-	67.0	2.98	-	-	141
C1phenan	105	12.0	-	-	1390	58.7	324	28.5	-	-	538
C2phenan	17.7	5.53	-	-	2230	179	634	51.7	-	-	563
C3phenan	57.6	4.83	-	-	1560	283	629	103	-	-	310
C4phenan	11.9	-	-	-	475	264	96.4	19.5	-	-	63.0
Anthra	-	-	-	-	14.8	-	-	-	-	-	-
Fluorant	-	-	-	-	34.6	-	5.43	-	-	-	60.1
Pyrene	-	-	-	-	44.5	-	9.56	-	-	-	17.6
C1fluora	2.66	-	-	-	175	67.3	55.3	-	-	-	-
Benanth	-	-	-	-	11.5	-	1.75	-	-	-	-
Chrysene	-	-	-	-	153	9.76	43.1	16.4	-	-	32.9
C1chrys	3.59	-	-	-	262	59.6	73.0	14.5	-	-	-
C2chrys	-	-	-	-	208	66.7	26.9	7.58	-	-	-
C3chrys	-	-	-	-	110	-	34.9	-	-	-	11.8
C4chrys	-	-	-	-	9.58	-	3.36	-	-	-	-
Benzobfl	-	-	-	-	37.6	-	5.47	-	-	-	-
Benzokfl	-	-	-	-	-	-	-	-	-	-	-
Benepy	-	-	-	-	44.3	-	16.5	-	-	-	-
Benapy	-	-	-	-	-	-	-	-	-	-	-
Perylene	-	-	-	-	-	-	-	-	-	-	-
Indeno	-	-	-	-	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-	-	-	-	-
Benzop	-	-	-	-	6.25	-	-	-	-	-	-
Total Aromatics (w/o Perylene)	1050±88.1	78.0±54.3	39.7	-	15100	1440±133	4120±594	511±55.9	-	-	5250

Table II-6.--Concentrations of alkanes in MUSSELS collected from the Gulf of Alaska for this study. Table I-4 contains a key for the alkane abbreviations used here. Tables 1 and 2 list the station names, numbers, locations, and collection dates that correspond with those listed here. Stations established in 1977 described by Karinen et al. (1993) are italicized. Concentrations are means of *n* replicated determinations reported as ng alkane/g dry tissue weight; the mean sample wet and dry weights are also given. "ALKANES" indicates the mean of the sum of all alkanes detected, and "UCM" indicates the unresolved comples mixture. "Total Nalkanes" is the sum of the listed mean normal alkane concentrations (i.e., pristane and phytane excluded), followed by the standard error of the sum. Hyphens indicate concentrations below MDLs for sample weight. Only samples that had surrogate standard recoveries greater than 30% and less than 150% are included in this table; samples that were excluded on this basis are listed in Table II-10.

Gulf of Alaska mussel samples

Station Name (#) Date collected	Anton Larsen Bay (14) 22-Jul-89	Busker River (15) 21-Jul-89	Foul Bay (16) 20-Jul-89	Harris Bay (17) 27-Apr-89	Harris Bay (17) 27-Apr-90	Harris Bay (17) 24-Jun-90	McDonald's Lagoon (18) 09-Apr-89	McDonald's Lagoon (18) 20-Jul-89	Monashka Bay (19) 21-Jul-89	Paul's Bay (20) 10-Apr-89	Paul's Bay (20) 20-Jul-89	Petrof Point (21) 09-May-89	Petrof Point (21) 18-Jun-89
Mean wet wt. (g)	8.30	7.73	7.42	8.68	5.08	5.50	5.46	5.15	8.65	5.36	4.14	8.31	8.37
Mean dry wt. (g)	0.61	0.90	0.69	0.76	1.01	0.95	2.36	0.73	1.06	1.06	0.50	0.87	1.00
N	3	3	3	1	1	1	1	3	3	1	3	2	1
Alkanes (ng/g)													
C10alk	-	225	-	356	-	614	334	284	-	733	-	90.6	279
C11alk	-	206	32.9	112	-	149	202	455	-	147	136	92.2	133
C12alk	-	285	67.8	88.4	49.4	124	49.6	180	-	81.6	50.1	70.2	119
C13alk	-	573	-	260	58.5	-	25.4	103	-	70.7	-	64.2	180
C14alk	-	780	-	-	-	192	54.0	207	-	119	168	-	383
C15alk	632	1780	430	554	482	584	195	665	250	398	-	596	1560
C16alk	-	696	-	478	132	225	133	432	-	272	425	172	707
C17alk	2410	451	1310	-	259	284	120	205	1610	266	352	250	601
Pristane	-	9390	218	2550	2320	3330	91.7	530	266	517	239	13200	26400
C18alk	-	380	-	-	-	-	17.4	84.8	-	33.8	151	182	415
Phytane	-	4010	-	-	-	-	-	-	-	-	60.8	846	1380
C19alk	-	589	-	-	19.6	23.7	-	-	-	-	209	197	469
C20alk	-	1210	-	-	-	-	-	-	-	81.3	295	408	676
C21alk	-	1090	-	-	34.3	-	-	145	-	-	485	413	616
C22alk	-	1110	-	104	33.9	-	-	-	-	-	177	478	744
C23alk	-	696	-	-	45.8	40.4	-	-	-	-	110	425	619
C24alk	-	487	-	-	62.0	32.3	-	-	-	-	89.0	587	750
C25alk	105	519	137	108	47.3	44.8	-	-	-	-	132	798	1040
C26alk	95.2	365	79.2	181	41.7	-	-	-	-	-	45.0	755	973
C27alk	-	241	96.8	443	66.8	96.4	-	94.1	-	40.1	141	747	1030
C28alk	-	216	-	-	39.8	-	-	-	-	-	43.3	438	564
C29alk	-	75.7	-	-	51.6	75.2	-	24.0	-	49.6	44.0	209	461
C30alk	-	251	-	-	-	-	-	-	-	-	68.8	154	338
C31alk	-	-	-	-	43.8	59.0	-	-	-	72.6	66.3	-	-
C32alk	-	-	-	-	-	-	-	-	-	-	64.5	198	257
C33alk	-	-	-	-	-	-	-	-	-	-	-	-	-
C34alk	-	-	-	-	-	-	-	-	-	-	-	-	385
ALKANES	8130	60500	5460	10100	3780	5870	1220	112	6090	2880	178	38600	65800
UCM	11000	547000	5080	209000	-	-	9260	34900	4400	49500	125000	215000	273000
Total NAlkanes	3240±26.8	12200±879	2160±272	2680	1470	2540	1130	2880±165	1860±95.8	2360	3250±1090	7320±2350	13300

Gulf of Alaska mussel samples

Station Name (#)	Quicksand Cove (22)	Quicksand Cove (22)	Quicksand Cove (22)	Quicksand Cove (22)	Tetrakov Point (23)	Tetrakov Point (23)	Verdant Cove (24)	Verdant Cove (24)	Verdant Cove (24)	Verdant Cove (24)	Woman's Bay (25)
Date collected	27-Apr-89	18-Aug-89	27-Apr-90	24-Jun-90	14-Apr-89	20-Jul-89	27-Apr-89	18-Aug-89	27-Apr-90	24-Jun-90	21-Jul-89
Mean wet wt. (g)	9.09	9.13	5.01	5.18	6.84	5.27	8.65	8.28	5.01	5.27	9.23
Mean dry wt. (g)	1.58	0.77	1.01	0.92	1.01	0.79	1.35	0.67	0.82	0.78	1.02
N	2	2	1	1	2	3	3	3	1	2	1
Alkanes (ng/g)											
C10alk	465	-	444	798	1490	321	670	221	308	558	-
C11alk	150	-	123	196	515	172	196	-	156	175	-
C12alk	172	-	73.5	135	108	180	147	23.7	80.9	141	62.7
C13alk	208	74.8	-	-	182	152	254	79.2	-	-	-
C14alk	-	-	106	261	489	177	135	-	158	248	-
C15alk	364	249	671	688	1280	623	688	497	832	749	1730
C16alk	-	-	142	302	1150	499	386	-	175	265	-
C17alk	751	-	226	337	1250	413	580	-	210	452	1000
Pristane	9860	528	2270	1700	2530	169	21900	557	5510	2100	-
C18alk	-	-	51.6	-	1150	122	497	-	-	-	-
Phytane	-	-	44.2	-	935	238	961	-	51.9	-	-
C19alk	-	-	62.0	111	1160	239	591	-	29.9	30.9	-
C20alk	-	-	69.0	-	1360	218	782	-	-	-	-
C21alk	-	-	44.2	-	1280	29.4	856	-	-	-	-
C22alk	-	-	35.2	-	1220	118	851	161	-	-	-
C23alk	-	-	47.3	38.4	1130	68.4	823	-	38.7	36.8	-
C24alk	-	-	53.8	33.3	1010	80.0	1030	64.0	38.0	20.4	160
C25alk	-	-	52.2	-	960	119	1060	270	-	53.3	176
C26alk	24.6	-	32.2	-	816	94.3	1140	157	-	-	93.9
C27alk	89.4	210	87.7	74.3	638	138	1360	523	41.2	88.7	220
C28alk	-	-	38.2	-	518	112	842	232	-	-	-
C29alk	-	-	46.8	-	523	90.9	607	296	-	-	-
C30alk	139	-	-	-	409	222	352	85.6	-	-	-
C31alk	-	-	61.0	-	17.2	147	-	-	39.8	-	-
C32alk	-	-	-	-	284	57.6	238	-	-	-	-
C33alk	-	-	-	-	-	46.7	-	-	-	-	-
C34alk	-	-	-	-	372	-	-	-	-	-	-
ALKANES	18100	2090	4780	4670	34900	208	55200	7840	7670	4920	3630
UCM	83200	28300	-	-	164000	167000	205000	137000	-	-	-
Total NAlkanes	2360±461	533±334	2470	2970	19300±13500	4440±857	14100±1770	2610±279	2110	2820±31.8	3440

Table II-7.--Concentrations of PAH in SEDIMENTS collected from the Gulf of Alaska for this study. Tables I-2 and I-3 contain keys for the PAH abbreviations used here. Tables 1 and 2 list the station names, numbers, locations, and collection dates that correspond with those listed here. Stations established in 1977 described by Karinen et al. (1993) are italicized. Concentrations are means of *n* replicated determinations reported as ng PAH/g dry tissue weight; the mean sample wet and dry weights are also given. Total aromatics (i.e. TPAH) is the sum of the listed mean PAH concentrations with perylene excluded, followed by the standard error of the sum. Hyphens indicate concentrations below MDLs adjusted for the sample weight. Only samples that had surrogate standard recoveries greater than 30% and less than 150% are included in this table; samples that were excluded on this basis are listed in Table II-9.

Gulf of Alaska sediment samples

Station Name (#)	Anton Larsen Bay (14)	Foul Bay (16)	Harris Bay (17)	Harris Bay (17)	Harris Bay (17)	McDonald's Lagoon (18)	McDonald's Lagoon (18)	Monashka Bay (19)
Date collected	22-Jul-89	20-Jul-89	27-Apr-89	27-Apr-90	24-Jun-90	09-Apr-89	20-Jul-89	21-Jul-89
Mean wet wt. (g)	20.0	20.1	20.0	17.3	20.0	14.4	10.4	20.1
Mean dry wt. (g)	7.14	19.5	15.8	14.4	16.0	10.1	10.1	17.8
N	3	3	3	3	2	3	3	3
PAH's(ng/g)								
Naph	13.3	37.1	2.93	1.03	2.83	16.8	5.55	13.0
Menap2	2.09	3.94	0.96	0.27	0.32	4.08	3.51	1.08
Menap1	1.48	1.89	-	-	-	2.79	2.45	0.61
Dimeth	-	-	-	0.92	-	3.33	0.86	-
C2naph	1.25	0.76	5.08	2.30	-	4.43	5.64	-
Trimeth	1.67	0.19	-	1.52	-	-	-	-
C3naph	3.60	1.34	4.29	5.21	0.31	2.98	8.05	-
C4naph	16.9	6.32	9.60	10.6	12.2	2.94	11.4	6.47
Biphenyl	-	-	-	-	-	3.91	-	-
Acenthy	-	-	-	-	-	-	-	-
Acenthe	1.81	1.10	-	-	-	-	-	0.39
Fluorene	1.43	2.74	-	-	-	-	-	-
C1fluor	1.78	1.46	1.45	-	-	0.96	-	-
C2fluor	2.24	1.60	-	1.45	-	10.2	13.6	-
C3fluor	1.39	0.48	0.54	2.24	-	2.67	14.9	-
Dithio	-	0.63	-	-	-	-	-	-
C1dithio	1.20	0.71	0.31	0.83	-	-	5.38	-
C2dithio	3.26	1.07	-	1.60	-	-	11.0	-
C3dithio	2.48	0.67	-	1.83	-	-	5.72	-
Phenanth	-	5.27	0.52	0.69	0.83	5.56	3.88	-
Mephen1	1.57	-	-	0.33	-	3.60	2.97	-
C1phenan	7.78	2.67	-	1.35	1.21	5.35	12.2	-
C2phenan	7.79	1.55	-	2.01	0.86	1.40	12.8	-
C3phenan	3.20	0.61	0.98	2.19	-	-	6.79	-
C4phenan	-	-	3.01	2.03	-	-	-	-
Anthra	-	-	-	-	-	-	-	-
Fluorant	2.84	2.25	-	-	-	2.42	0.67	0.48
Pyrene	1.94	2.74	-	-	-	-	-	0.21
C1fluora	1.57	0.89	-	-	-	-	-	-
Benanth	0.63	0.12	-	-	-	-	-	-
Chrysene	1.39	0.50	0.56	-	0.97	1.33	-	-
C1chrys	-	-	-	-	-	-	-	-
C2chrys	-	-	-	-	-	-	-	-
C3chrys	-	-	-	-	-	-	-	-
C4chrys	-	-	-	-	-	-	-	-
Benzobfl	-	0.45	-	-	-	-	-	0.26
Benzokfl	-	-	-	-	-	-	-	-
Benepy	-	0.56	-	-	-	-	-	-
Benapy	-	-	-	-	-	-	-	-
Perylene	4.98	-	-	-	-	2.96	-	-
Indeno	-	-	-	-	-	-	-	-
Dibenz	-	-	-	-	-	-	-	-
Benzop	-	1.87	-	-	-	3.35	-	-
Total Aromatics (w/o Perylene)	81.4±15.5	81.2±17.6	30.2±22.4	35.6±25.6	19.5±0.28	71.1±24.2	124±5.28	22.5±5.30

Gulf of Alaska sediment samples

Station	Paul's	Paul's	Petrof	Quicksand	Quicksand	Tetrakov	Tetrakov	Verdant	Verdant
Name (#)	Bay (20)	Bay (20)	Point (21)	Cove (22)	Cove (22)	Point (23)	Point (23)	Cove (24)	Cove (24)
Date collected	10-Apr-89	20-Jul-89	09-May-89	27-Apr-89	18-Aug-89	14-Apr-89	20-Jul-89	27-Apr-89	18-Aug-89
Mean wet wt. (g)	12.1	10.5	20.1	20.0	20.1	10.8	13.6	20.2	20.1
Mean dry wt. (g)	10.1	10.1	17.8	15.2	17.6	10.1	10.0	17.7	17.4
N	3	3	3	3	3	3	3	3	3
PAH's(ng/g)									
Naph	10.0	4.40	8.04	1.02	0.98	10.5	11.2	3.93	2.26
Menap2	2.40	2.89	1.56	1.49	0.21	1.22	9.56	1.79	0.60
Menap1	1.46	1.99	0.42	-	-	0.84	6.25	0.40	-
Dimeth	-	-	-	-	-	-	5.89	-	-
C2naph	-	5.41	4.74	6.54	-	-	12.5	5.30	0.98
Trimeth	-	-	-	-	-	-	4.40	-	-
C3naph	-	8.02	4.50	6.37	-	-	19.9	4.16	0.16
C4naph	-	13.4	9.24	11.8	-	-	27.8	13.4	-
Biphenyl	1.85	-	-	-	-	-	3.08	-	-
Acenthy	-	-	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	13.5	-	-
Fluorene	-	-	-	-	-	-	14.0	-	-
C1fluor	-	-	1.68	2.47	-	-	5.91	1.72	-
C2fluor	-	20.1	-	2.38	-	-	34.8	2.23	-
C3fluor	-	19.7	0.50	0.73	-	-	37.3	0.53	-
Dithio	-	-	-	-	-	-	6.04	-	-
C1dithio	-	4.18	0.39	0.52	-	-	9.31	0.35	-
C2dithio	-	13.2	0.69	-	-	-	23.6	0.50	-
C3dithio	-	6.78	-	-	-	-	13.4	0.46	-
Phenanth	2.07	4.38	0.70	-	-	1.06	41.2	0.62	1.00
Mephen1	0.75	2.59	-	-	-	-	9.54	-	-
C1phenan	0.75	14.2	1.29	-	-	-	44.4	1.38	0.98
C2phenan	-	14.1	0.58	-	-	-	34.8	1.32	0.58
C3phenan	-	9.06	0.98	1.25	-	-	18.4	1.84	0.69
C4phenan	-	1.08	2.55	4.20	-	-	-	2.73	-
Anthra	-	-	-	-	-	-	15.2	-	-
Fluorant	0.55	1.14	-	0.24	-	0.36	29.9	0.18	-
Pyrene	-	-	-	-	-	-	20.3	-	-
C1fluora	-	-	-	-	-	-	20.8	-	-
Benanth	-	-	-	0.08	-	-	28.5	-	-
Chrysene	-	-	-	-	-	-	27.2	-	0.80
C1chrys	-	-	-	-	-	-	12.9	-	-
C2chrys	-	-	-	-	-	-	-	-	-
C3chrys	-	-	-	-	-	-	-	-	-
C4chrys	-	-	-	-	-	-	-	-	-
Benzobfl	-	-	0.67	-	-	-	22.0	-	0.46
Benzokfl	-	-	-	-	-	-	17.0	-	-
Benepy	-	-	0.72	-	-	-	12.5	0.28	0.51
Benapy	-	-	-	-	-	-	25.7	-	-
Perylene	-	-	-	-	-	-	12.3	-	-
Indeno	-	-	-	-	-	-	16.3	-	-
Dibenz	-	-	-	-	-	-	5.08	-	-
Benzop	-	-	-	-	-	-	17.6	-	0.26
Total Aromatics (w/o Perylene)	19.1±4.92	144±13.1	39.3±21.7	39.1±26.7	1.19±0.76	13.9±5.55	658±324	43.1±19.7	9.30±3.12

Table II-8.--Concentrations of alkanes in SEDIMENTS collected from the Gulf of Alaska for this study. Table I-4 contains a key for the alkane abbreviations used here. Tables 1 and 2 list the station names, numbers, locations, and collection dates that correspond with those listed here. Stations established in 1977 described by Karinen et al. (1993) are italicized. Concentrations are means of *n* replicated determinations reported as ng alkane/g dry tissue weight; the mean sample wet and dry weights are also given. "ALKANES" indicates the mean of the sum of all alkanes detected, and "UCM" indicates the unresolved complex mixture. "Total NAlkanes" is the sum of the listed mean normal alkane concentrations (i.e., pristane and phytane excluded), followed by the standard error of the sum. Hyphens indicate concentrations below MDLs adjusted for the sample weight. Only samples that had surrogate standard recoveries greater than 30% and less than 150% are included in this table; samples that were excluded on this basis are listed in Table II-10.

Gulf of Alaska sediment samples

Station Name (#)	Anton Larsen Bay (14)	Foul Bay (16)	Harris Bay (17)	Harris Bay (17)	Harris Bay (17)	McDonald's Lagoon (18)	McDonald's Lagoon (18)	Monashka Bay (19)	Paul's Bay (20)	Petrof Point (21)
Date collected	22-Jul-89	20-Jul-89	27-Apr-89	27-Apr-90	24-Jun-90	09-Apr-89	20-Jul-89	21-Jul-89	10-Apr-89	09-May-89
Mean wet wt. (g)	20.0	20.1	20.0	17.3	20.0	14.4	10.5	20.1	12.1	20.1
Mean dry wt. (g)	7.14	19.5	15.8	14.4	16.0	10.1	10.1	17.8	10.1	17.8
N	3	3	3	3	2	3	1	3	3	3
Alkanes (ng/g)										
C10alk	3.59	2.19	-	-	-	28.9	90.1	-	31.5	-
C11alk	-	1.90	-	-	-	8.88	6.26	-	32.1	-
C12alk	-	-	-	3.75	-	6.58	8.11	-	2.57	-
C13alk	-	-	-	2.69	-	4.43	5.18	-	7.26	-
C14alk	-	-	-	7.82	-	14.2	11.6	-	11.8	-
C15alk	99.3	8.39	-	16.2	-	29.0	11.8	-	12.7	5.62
C16alk	17.5	-	-	15.1	-	15.3	16.8	-	9.43	-
C17alk	726	-	8.08	13.6	6.65	33.9	20.8	-	16.5	-
Pristane	67.5	40.9	-	9.53	40.8	28.5	69.1	-	14.2	24.7
C18alk	29.4	-	-	6.03	-	7.58	13.8	-	4.44	-
Phytane	107	-	-	3.46	-	8.94	43.9	-	42.6	-
C19alk	330	-	4.89	3.22	-	9.40	21.3	-	7.53	-
C20alk	64.8	-	-	6.60	-	21.9	7.33	-	4.57	-
C21alk	290	-	4.71	5.86	-	26.3	6.37	-	16.6	-
C22alk	133	-	3.54	5.42	-	8.88	-	-	5.44	-
C23alk	722	-	-	5.42	-	19.7	-	-	28.6	-
C24alk	33.7	-	-	3.91	-	10.7	3.97	-	10.9	-
C25alk	1740	3.08	28.9	3.79	15.0	53.0	-	3.25	52.2	1.41
C26alk	12.9	-	13.1	16.8	20.9	8.07	-	-	9.36	-
C27alk	9740	6.28	76.5	5.05	39.2	112	-	-	64.8	-
C28alk	327	-	30.5	3.59	-	41.1	-	-	14.4	4.46
C29alk	2560	-	99.8	3.67	22.0	91.7	-	-	81.2	-
C30alk	118	-	18.9	-	-	8.16	-	-	5.58	-
C31alk	-	-	-	7.29	-	79.9	-	-	60.7	-
C32alk	121	-	11.8	-	-	11.1	-	-	5.34	-
C33alk	-	-	-	-	-	35.8	-	-	48.9	-
C34alk	28.0	-	5.06	-	-	18.0	-	-	11.2	-
ALKANES	23100	163	715	361	450	741	24.9	2.25	613	79.4
UCM	5610	-	228	3070	909	13100	7270	-	16500	186
Total NAlkanes	17100±1190	21.8±10.0	306±86.1	136±110	104±48.9	704±110	224	3.25±3.25	556±147	11.5±9.45

Gulf of Alaska sediment samples

Station Name (#)	Quicksand Cove (22)	Quicksand Cove (22)	Tetrakov Point (23)	Tetrakov Point (23)	Verdant Cove (24)	Verdant Cove (24)
Date collected	27-Apr-89	18-Aug-89	14-Apr-89	20-Jul-89	27-Apr-89	18-Aug-89
Mean wet wt. (g)	20.0	20.1	10.8	13.6	20.2	20.1
Mean dry wt. (g)	15.2	17.6	10.1	10.0	17.7	17.4
N	3	3	3	3	3	3
Alkanes (ng/g)						
C10alk	-	-	17.9	40.3	2.91	-
C11alk	-	-	45.2	-	-	-
C12alk	-	-	1.86	-	-	-
C13alk	-	-	3.07	-	-	-
C14alk	1.70	-	-	19.0	2.13	-
C15alk	-	8.38	-	15.7	4.78	-
C16alk	-	-	6.75	26.0	-	-
C17alk	-	-	10.6	28.8	-	-
Pristane	-	-	17.5	66.6	128	4.34
C18alk	-	-	2.75	26.4	-	-
Phytane	-	-	-	45.9	-	-
C19alk	-	-	-	25.1	-	-
C20alk	-	-	1.46	9.63	-	-
C21alk	-	-	-	12.0	-	-
C22alk	-	-	-	7.11	-	-
C23alk	-	-	-	5.02	-	-
C24alk	-	-	2.99	5.08	-	-
C25alk	1.80	-	-	9.55	1.60	-
C26alk	-	-	-	-	-	-
C27alk	-	-	-	22.4	-	-
C28alk	-	-	-	-	-	-
C29alk	-	-	1.58	4.82	-	-
C30alk	-	-	-	-	-	-
C31alk	-	-	-	13.5	-	-
C32alk	-	-	-	-	-	-
C33alk	-	-	-	5.10	-	-
C34alk	-	-	-	-	-	-
ALKANES	42.3	48.9	112	728	141	72.1
UCM	2090	-	5620	12500	1360	325
Total NAlkanes	3.50±3.50	8.38±8.38	94.2±12.0	275±20.0	11.4±7.06	-

Table II-9.--Concentrations of PAHs in samples where deuterated surrogate standard recoveries were outside the range 30% to 150%. Affected PAH concentrations are indicated by the symbol "A". Other symbols and conventions are as described in Table II-1.

Prince William Sound mussel samples

Station	Barnes	Barnes	Bay of	Bay of	Bay of	Bay of	Bay of	*Bligh*	*Bligh*	Crab	Crab	Crab
Name (#)	Cove (1)	Cove (1)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	Isles (2)	*Island (3)*	*Island (3)*	Bay (5)	Bay (5)	Bay (5)
Date collected	22-Jun-90	06-Aug-90	06-May-89	16-Aug-89	25-Apr-90	22-Jun-90	06-Aug-90	*05-Aug-90*	*17-Apr-91*	07-May-89	23-Jun-90	20-Apr-91
Mean wet wt. (g)	10.6	10.9	10.2	9.79	10.1	10.9	9.79	*11.5*	*8.88*	10.5	10.7	9.79
Mean dry wt. (g)	0.95	0.98	0.71	0.59	0.91	0.92	0.75	*0.81*	*0.80*	0.84	1.18	0.78
N	1	2	1	2	1	2	3	*1*	*1*	1	1	1
PAH's(ng/g)												
Naph	A	A	A	A	A	A	A	*A*	-	A	A	A
Menap2	A	A	A	A	A	A	A	*A*	-	A	A	A
Menap1	A	A	A	A	A	A	A	*A*	-	A	A	A
Dimeth	-	-	83.6	-	-	-	-	*A*	-	10.9	-	-
C2naph	11.8	-	419	-	-	17.9	10.0	*A*	*10.6*	44.5	-	11.4
Trimeth	-	-	126	-	-	-	-	*A*	-	20.1	-	-
C3naph	-	-	823	-	-	13.2	16.2	*A*	-	103	-	11.3
C4naph	-	-	636	-	-	9.82	17.0	*A*	-	50.1	-	-
Biphenyl	-	-	27.3	-	-	-	19.9	*A*	-	12.9	8.07	13.9
Acenthy	-	-	-	-	-	-	-	*A*	-	-	-	-
Acenthe	-	-	-	-	-	-	-	*A*	-	-	-	-
Fluorene	-	-	19.4	-	-	-	-	*A*	-	-	-	-
C1fluor	6.35	7.76	145	-	23.8	13.1	25.7	*A*	-	29.6	-	13.6
C2fluor	-	8.21	539	-	14.1	22.3	20.2	*A*	-	64.3	-	-
C3fluor	13.4	8.50	661	-	12.9	22.7	20.2	*A*	-	70.6	-	7.50
Dithio	-	-	95.4	-	-	-	2.21	*A*	-	17.1	-	-
C1dithio	-	-	562	21.8	-	9.38	11.1	*A*	-	73.1	-	-
C2dithio	-	-	1750	165	7.89	44.3	25.2	*A*	-	189	-	-
C3dithio	-	-	2070	294	17.0	57.2	35.5	*A*	-	149	-	-
Phenanth	-	-	183	-	-	-	5.01	*A*	-	37.3	-	13.6
Mephen1	-	-	271	7.97	-	-	6.63	*A*	-	108	-	-
C1phenan	-	-	1320	44.6	8.00	20.7	21.9	*A*	-	204	-	10.5
C2phenan	-	-	3050	254	19.2	64.3	24.6	*A*	-	376	-	12.5
C3phenan	-	-	2940	348	26.2	92.7	47.4	*A*	-	278	-	-
C4phenan	-	-	768	64.9	7.11	28.6	11.0	*A*	-	38.4	-	-
Anthra	-	-	-	-	-	-	-	*A*	-	-	-	-
Fluorant	-	-	49.5	-	-	-	-	*A*	-	-	-	-
Pyrene	-	-	45.9	-	-	-	-	*A*	-	-	-	-
C1fluora	-	-	279	12.2	-	-	-	*A*	-	-	-	-
Benanth	-	-	283	-	-	-	-	*A*	-	-	-	-
Chrysene	-	-	-	58.0	-	14.9	5.30	*A*	-	37.9	-	-
C1chrys	-	-	474	182	8.89	19.1	8.81	*A*	-	73.0	10.9	-
C2chrys	-	-	282	59.7	-	17.2	8.20	*A*	-	8.00	-	-
C3chrys	-	-	158	-	-	-	-	*A*	-	-	-	-
C4chrys	-	-	9.42	-	-	-	-	*A*	-	-	-	-
Benzobfl	-	-	24.4	A	-	-	-	*A*	*A*	-	-	-
Benzokfl	-	-	-	A	-	-	-	*A*	*A*	-	-	-
Benepy	-	-	47.5	A	-	-	-	*A*	*A*	-	-	-
Benapy	-	-	-	A	-	-	-	*A*	*A*	-	-	-
Perylene	-	-	-	A	-	-	-	*A*	-	-	-	-
Indeno	-	-	-	A	-	-	-	*A*	*A*	-	-	-
Dibenz	-	-	-	A	-	-	-	*A*	*A*	-	-	-
Benzop	-	-	-	A	-	-	-	*A*	*A*	-	-	-

Prince William Sound mussel samples

Station	Green	Naked	Naked	Olsen	Olsen	Olsen	Perry	Perry	Siwash	Siwash
Name (#)	Island (7)	Island (8)	Island (8)	Bay (9)	Bay (9)	Bay (9)	Island (10)	Island (10)	Bay (12)	Bay (12)
Date collected	03-Apr-89	21-Jun-90	05-Aug-90	16-Aug-89	09-Aug-90	15-Apr-91	16-Aug-89	18-Apr-91	16-Aug-89	18-Apr-91
Mean wet wt. (g)	9.00	10.7	10.9	9.92	11.2	10.1	9.96	9.15	9.08	9.11
Mean dry wt. (g)	0.80	1.28	1.20	0.66	1.12	0.81	0.74	1.01	0.73	0.73
N	1	1	1	3	1	1	1	1	1	1
PAH's(ng/g)										
Naph	A	A	A	A	A	-	-	-	A	A
Menap2	A	A	A	A	A	-	20.5	-	A	A
Menap1	A	A	A	A	A	-	-	-	A	A
Dimeth	5200	-	-	-	-	-	-	-	-	-
C2naph	6110	5.68	-	-	6.30	-	26.9	-	-	11.6
Trimeth	5870	-	-	-	-	-	7.00	-	-	-
C3naph	31600	-	-	-	-	-	25.6	-	-	-
C4naph	18700	-	-	-	-	-	18.2	-	-	-
Biphenyl	1100	-	9.17	-	9.00	-	-	-	-	-
Acenthy	-	-	-	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-	-	-	-
Fluorene	1530	-	-	-	-	-	-	-	-	-
C1fluor	6450	-	-	8.64	-	-	-	-	-	26.9
C2fluor	12400	8.53	-	41.9	-	-	24.5	-	7.75	-
C3fluor	8760	6.44	-	13.5	-	-	21.7	-	-	-
Dithio	3260	-	-	-	-	-	-	-	-	-
C1dithio	10600	-	-	-	-	-	-	-	-	-
C2dithio	15200	-	-	-	-	-	21.1	-	-	-
C3dithio	8930	-	-	-	-	-	26.5	-	-	-
Phenanth	5500	-	-	-	-	-	19.7	-	-	-
Mephen1	5010	-	-	-	-	-	7.81	-	-	-
C1phenan	18400	-	-	3.06	-	-	27.6	-	-	-
C2phenan	21400	-	-	-	-	-	53.6	-	-	-
C3phenan	15900	-	-	-	-	-	51.2	-	-	-
C4phenan	1690	-	-	-	-	-	13.5	-	-	-
Anthra	197	-	-	-	-	-	-	-	-	-
Fluorant	334	-	-	-	-	-	-	-	-	-
Pyrene	384	-	-	-	-	-	-	-	-	-
C1fluora	1920	-	-	-	-	-	-	-	-	-
Benanth	52.0	-	-	-	-	-	A	9.15	-	-
Chrysene	1140	-	-	-	-	-	A	10.2	-	-
C1chrys	1750	-	-	-	-	-	A	-	-	-
C2chrys	586	-	-	15.8	-	-	A	-	-	-
C3chrys	1200	-	-	-	-	-	A	-	-	-
C4chrys	396	-	-	-	-	-	A	-	-	-
Benzobfl	159	-	-	-	-	A	-	A	A	-
Benzokfl	-	-	-	-	-	A	-	A	A	-
Benepy	297	-	-	-	-	A	-	A	A	-
Benapy	52.4	-	-	-	-	A	-	A	A	-
Perylene	-	-	-	-	-	-	-	10.4	A	-
Indeno	-	-	-	-	-	A	-	A	A	-
Dibenz	-	-	-	-	-	A	-	A	A	-
Benzop	54.6	-	-	-	-	A	-	A	A	-

Gulf of Alaska mussel samples

Station Name (#)	Busker River (15)	Harris Bay (17)	McDonald's Lagoon (18)	McDonald's Lagoon (18)	Monashka Bay (19)	Paul's Bay (20)	Paul's Bay (20)	Tetrakov Point (23)	Verdant Cove (24)
Date collected	21-Jul-89	27-Apr-89	09-Apr-89	20-Jul-89	21-Jul-89	10-Apr-89	20-Jul-89	14-Apr-89	27-Apr-89
Mean wet wt. (g)	7.62	9.36	5.46	5.24	9.29	5.36	5.08	5.27	8.31
Mean dry wt. (g)	1.07	0.79	2.36	0.79	1.11	1.06	0.67	1.02	1.33
N	1	2	1	1	2	1	1	1	1
PAH's(ng/g)									
Naph	A	A	27.0	38.5	A	-	-	336	A
Menap2	A	A	-	-	A	-	-	51.2	A
Menap1	A	A	-	-	A	-	-	35.0	A
Dimeth	A	-	-	-	-	-	-	-	13.2
C2naph	A	-	-	-	-	-	-	-	15.6
Trimeth	A	-	-	-	-	-	-	-	32.8
C3naph	A	17.7	-	-	-	-	-	-	167
C4naph	A	3.80	-	-	-	-	-	-	172
Biphenyl	A	-	-	-	-	-	-	-	9.25
Acenthy	A	-	-	-	-	-	-	-	-
Acenthe	A	-	-	-	-	-	-	-	4.37
Fluorene	A	-	-	17.8	-	-	-	16.9	11.4
C1fluor	A	18.5	-	-	-	-	-	-	83.5
C2fluor	A	62.6	-	-	-	-	-	-	488
C3fluor	A	58.4	-	-	32.2	-	-	-	381
Dithio	A	-	-	-	A	-	-	-	33.8
C1dithio	A	23.0	-	-	A	-	-	-	216
C2dithio	A	85.0	-	-	A	-	-	-	563
C3dithio	A	95.8	-	-	A	-	-	-	435
Phenanth	A	-	-	-	A	-	-	-	71.9
Mephen1	A	27.1	-	-	A	-	-	-	97.4
C1phenan	A	58.1	-	-	A	-	-	-	462
C2phenan	A	124	-	-	A	-	-	-	818
C3phenan	A	144	-	-	A	-	-	-	773
C4phenan	A	28.6	-	-	A	-	-	-	98.1
Anthra	A	-	-	-	A	-	-	-	-
Fluorant	A	-	-	-	A	-	-	-	12.8
Pyrene	A	-	-	-	A	-	-	-	12.5
C1fluora	A	-	-	-	A	-	-	-	63.8
Benanth	A	-	-	-	-	-	-	-	3.31
Chrysene	A	13.0	-	-	-	-	-	-	51.4
C1chrys	A	16.7	-	-	-	-	-	-	74.1
C2chrys	A	4.54	-	-	-	-	-	-	28.6
C3chrys	A	-	-	-	-	-	-	-	33.3
C4chrys	A	-	-	-	-	-	-	-	-
Benzobfl	A	-	A	A	A	A	A	A	9.75
Benzokfl	A	-	A	A	A	A	A	A	-
Benepy	A	-	A	A	A	A	A	A	17.1
Benapy	A	-	A	A	A	A	A	A	-
Perylene	A	-	A	A	A	A	A	A	-
Indeno	A	-	A	A	A	A	A	A	-
Dibenz	A	-	A	A	A	A	A	A	-
Benzop	A	-	A	A	A	A	A	A	-

Prince William Sound sediment samples

Station	*Bligh*	*Bligh*	Elrington	Naked	Rocky	*Siwash*	Sleepy
Name (#)	*Island (3)*	*Island (3)*	Island (6)	Island (8)	Bay (11)	*Bay (12)*	Bay (13)
Date collected	*28-Mar-89*	*28-Apr-90*	07-Aug-90	08-Apr-89	02-May-91	*25-Jun-90*	19-Apr-91
Mean wet wt. (g)	*20.3*	*20.3*	20.2	10.6	20.0	*20.0*	20.0
Mean dry wt. (g)	*13.4*	*13.3*	16.2	7.48	14.2	*13.0*	15.5
N	*1*	*1*	1	1	1	*1*	1
PAH's(ng/g)							
Naph	*A*	*A*	A	A	2.63	*A*	-
Menap2	*A*	*A*	A	A	6.58	*A*	-
Menap1	*A*	*A*	A	A	1.88	*A*	-
Dimeth	-	-	-	A	4.62	-	-
C2naph	*1.67*	*2.50*	-	A	8.46	-	-
Trimeth	-	-	-	A	0.69	-	-
C3naph	*0.80*	*2.08*	-	A	3.50	*1.48*	1.11
C4naph	-	*24.2*	7.38	A	-	*17.5*	-
Biphenyl	-	-	-	A	3.94	-	-
Acenthy	-	-	-	A	-	-	-
Acenthe	-	-	-	A	-	-	-
Fluorene	-	-	-	A	10.9	-	-
C1fluor	*2.12*	*1.62*	-	A	10.3	-	-
C2fluor	-	-	-	A	4.82	-	-
C3fluor	-	-	-	A	-	-	-
Dithio	-	-	-	-	1.32	-	-
C1dithio	-	-	-	1.66	1.27	-	0.67
C2dithio	-	-	-	1.98	0.70	-	1.79
C3dithio	-	-	-	1.46	-	-	2.72
Phenanth	-	-	-	17.4	34.8	-	1.32
Mephen1	-	-	-	-	4.75	-	-
C1phenan	-	-	-	9.62	24.4	-	-
C2phenan	-	-	-	4.29	7.42	-	2.41
C3phenan	-	-	-	-	2.52	-	4.02
C4phenan	-	-	-	7.33	-	-	2.54
Anthra	-	-	-	-	-	-	-
Fluorant	-	-	-	-	4.57	-	1.10
Pyrene	-	-	-	-	6.07	-	0.77
C1fluora	-	-	-	-	5.74	-	1.48
Benanth	-	-	-	-	A	-	A
Chrysene	-	-	-	-	A	-	A
C1chrys	-	-	-	-	A	-	A
C2chrys	*6.30*	-	-	-	A	-	A
C3chrys	-	-	-	-	A	-	A
C4chrys	-	-	-	-	A	-	A
Benzobfl	-	-	-	-	8.11	-	A
Benzokfl	-	-	-	-	-	-	A
Benepy	-	-	-	-	4.01	-	A
Benapy	-	-	-	-	-	-	A
Perylene	*2.44*	*3.51*	-	9.75	11.4	*4.77*	0.89
Indeno	-	-	-	-	0.94	-	A
Dibenz	-	-	-	-	0.90	-	A
Benzop	-	-	-	-	3.58	-	A

Table II-10.--Concentrations of alkanes in samples where deuterated surrogate standard recoveries were outside the range 30% to 150%. Affected alkane concentrations are indicated by the symbol "A". Other symbols and conventions are as described in Table II-2.

Prince William Sound mussel samples

Station Name (#)	Barnes Cove (1)	Barnes Cove (1)	Barnes Cove (1)	Bay of Isles (2)	Bay of Isles (2)	Bay of Isles (2)	Bay of Isles (2)	Crab Bay (5)	Crab Bay (5)	Elrington Island (6)	Elrington Island (6)	Elrington Island (6)	Elrington Island (6)
Date collected	24-Jun-89	17-Aug-89	22-Jun-90	25-Apr-90	22-Jun-90	06-Aug-90	19-Apr-91	07-May-89	20-Apr-91	19-Jun-89	17-Aug-89	26-Apr-90	07-Aug-90
Mean wet wt. (g)	9.36	9.49	11.0	10.1	10.3	9.66	8.81	10.4	9.79	10.7	9.92	9.48	11.8
Mean dry wt. (g)	0.75	0.61	0.88	0.90	0.93	0.77	0.58	0.78	0.78	0.75	0.79	0.95	1.29
N	1	2	1	1	1	1	2	2	1	1	1	1	1
Alkanes (ng/g)													
C10alk	A	A	A	A	A	A	A	A	A	A	A	A	A
C11alk	A	A	A	A	A	A	A	A	A	A	A	A	A
C12alk	A	A	A	A	A	A	A	A	A	A	A	A	A
C13alk	A	A	A	A	A	A	A	A	A	A	A	A	A
C14alk	-	-	265	-	-	-	-	169	-	-	-	-	309
C15alk	-	255	860	-	695	521	-	658	732	-	717	243	999
C16alk	-	-	372	-	-	441	-	515	651	910	1460	-	912
C17alk	-	-	504	-	-	600	-	281	1770	2760	1210	-	1270
Pristane	1310	-	651	-	421	640	-	11200	3190	15200	2810	6460	3470
C18alk	-	-	-	-	-	357	-	188	-	973	-	-	447
Phytane	-	-	-	-	205	388	-	576	838	3200	1650	167	2450
C19alk	-	-	-	-	-	263	-	-	-	2000	-	-	995
C20alk	-	-	-	-	-	-	-	262	-	4320	-	-	1230
C21alk	-	-	-	-	163	-	-	-	-	2390	1230	-	531
C22alk	-	-	-	-	71.8	116	-	295	-	1990	-	-	851
C23alk	-	-	-	-	-	-	-	-	-	2660	296	-	421
C24alk	-	-	-	-	-	-	-	-	-	3470	-	-	149
C25alk	-	-	-	-	148	177	-	192	-	2650	282	88.3	145
C26alk	-	-	-	-	173	-	-	-	-	3560	-	-	64.3
C27alk	-	-	-	-	-	-	-	181	-	2270	476	-	-
C28alk	-	-	-	-	140	-	-	195	-	2580	220	-	-
C29alk	-	225	-	-	-	-	-	-	-	1390	-	-	-
C30alk	-	-	-	-	-	-	-	-	-	850	-	-	-
C31alk	-	-	-	-	-	-	-	-	-	-	-	-	-
C32alk	-	-	-	-	-	-	-	-	-	262	-	-	-
C33alk	-	-	-	-	-	-	-	-	-	-	-	-	-
C34alk	-	-	-	-	-	-	-	-	-	-	-	-	-
ALKANES	7780	5200	5970	5110	9590	131000	3880	32200	30200	212000	42800	12400	91300
UCM	-	18700	79200	74000	76800	76800	99000	142000	114000	1800	106000	-	75900

Prince William Sound mussel samples

Station	Green	Naked	Naked	Naked	Olsen	Olsen	Perry	Rocky	Siwash	Sleepy	Sleepy
Name (#)	Island (7)	Island (8)	Island (8)	Island (8)	Bay (9)	Bay (9)	Island (10)	Bay (11)	Bay (12)	Bay (13)	Bay (13)
Date collected	03-Apr-89	08-Apr-89	18-Jun-89	15-Aug-89	28-Apr-90	09-Aug-90	16-Aug-89	08-Aug-90	18-Apr-91	17-Aug-89	26-Apr-90
Mean wet wt. (g)	8.68	10.4	10.8	9.95	10.2	10.8	9.86	10.9	9.11	10.4	9.58
Mean dry wt. (g)	0.76	0.83	1.19	0.80	0.91	0.92	0.65	0.88	0.73	0.62	0.96
N	2	2	1	1	1	2	1	1	1	2	1
Alkanes (ng/g)											
C10alk	A	A	A	A	A	A	A	A	A	A	A
C11alk	A	A	A	A	A	A	A	A	A	A	A
C12alk	A	A	A	A	A	A	A	A	A	A	A
C13alk	A	A	A	A	A	A	A	A	A	A	A
C14alk	27800	475	232	252	-	223	-	246	-	1430	-
C15alk	29500	1100	-	507	-	671	-	372	422	2560	408
C16alk	-	460	-	-	-	-	-	-	-	3100	-
C17alk	-	272	-	555	-	-	-	494	-	3710	-
Pristane	21700	1770	1760	565	536	-	-	-	1800	6870	15600
C18alk	29800	214	-	283	-	-	-	-	-	1780	217
Phytane	16900	502	146	450	-	-	-	-	-	4450	641
C19alk	29400	-	-	397	-	-	-	-	-	1990	-
C20alk	28900	259	-	571	-	-	-	-	-	3190	-
C21alk	26500	258	-	404	-	-	-	-	-	2290	-
C22alk	19400	334	200	460	-	74.8	-	-	-	3480	86.4
C23alk	17400	294	96.4	-	-	-	-	-	-	3110	-
C24alk	18000	354	-	-	-	-	-	-	-	3930	187
C25alk	16700	388	167	217	99.9	60.4	-	-	-	3660	199
C26alk	13600	373	163	-	-	-	-	-	-	4410	81.6
C27alk	11900	404	413	-	-	-	-	227	-	3890	-
C28alk	10400	555	318	-	-	-	-	-	-	3940	145
C29alk	8480	436	393	-	-	-	-	-	-	2340	-
C30alk	7070	132	195	-	-	-	-	-	-	1690	208
C31alk	-	-	-	-	-	-	-	-	-	-	-
C32alk	4940	-	-	-	-	-	-	-	-	1660	137
C33alk	-	-	-	-	-	-	-	-	-	-	-
C34alk	2680	-	-	-	-	-	-	-	-	1200	-
ALKANES	890000	30000	13000	15700	4580	98300	3940	36800	6590	276000	34700
UCM	3150000	129000	93200	79400	29600	16600	66400	69800	5510	795000	122000

Gulf of Alaska mussel samples		
Station	Harris	Quicksand
Name (#)	Bay (17)	Cove (22)
Date collected	27-Apr-89	27-Apr-89
Mean wet wt. (g)	9.36	8.73
Mean dry wt. (g)	0.79	1.53
N	2	1
Alkanes (ng/g)		
C10alk	A	A
C11alk	A	A
C12alk	A	A
C13alk	A	A
C14alk	-	239
C15alk	687	582
C16alk	-	189
C17alk	-	807
Pristane	3110	10200
C18alk	-	-
Phytane	296	-
C19alk	-	-
C20alk	136	-
C21alk	-	-
C22alk	124	-
C23alk	-	-
C24alk	-	-
C25alk	102	-
C26alk	171	-
C27alk	337	260
C28alk	-	-
C29alk	-	-
C30alk	-	204
C31alk	-	-
C32alk	-	-
C33alk	-	-
C34alk	-	516
ALKANES	14000	21200
UCM	161000	104000

Prince William Sound sediment samples

Station	Barnes	Barnes	Elrington	*Olsen*	Rocky
Name (#)	Cove (1)	Cove (1)	Island (6)	*Bay (9)*	Bay (11)
Date collected	06-May-89	31-Mar-89	10-May-89	*04-Apr-89*	04-May-89
Mean wet wt. (g)	20.2	20.2	2.23	*10.3*	20.1
Mean dry wt. (g)	7.05	10.4	1.88	*6.27*	14.2
N	1	1	2	*1*	1
Alkanes (ng/g)					
C10alk	A	A	A	*A*	A
C11alk	A	A	A	*A*	A
C12alk	A	A	A	*A*	A
C13alk	A	A	A	*A*	A
C14alk	-	-	1130	*82.2*	-
C15alk	63.1	-	1600	-	39.3
C16alk	-	-	2210	-	6.36
C17alk	201	28.0	2450	*38.8*	1050
Pristane	60.8	24.9	3050	-	25.0
C18alk	-	-	2180	-	-
Phytane	-	-	2160	-	-
C19alk	302	9.50	1770	*124*	76.8
C20alk	33.0	-	2600	-	8.29
C21alk	461	22.9	1910	72.0	45.5
C22alk	95.7	11.7	1660	*14.8*	-
C23alk	404	40.5	1830	75.7	34.9
C24alk	110	-	2060	-	-
C25alk	511	54.9	1650	82.2	39.4
C26alk	193	22.7	2030	-	-
C27alk	1680	231	1510	*143*	115
C28alk	135	17.5	2360	-	18.0
C29alk	1080	119	1090	*140*	59.9
C30alk	158	21.5	557	*31.2*	-
C31alk	-	-	-	-	-
C32alk	86.0	-	728	-	-
C33alk	-	-	-	-	-
C34alk	-	-	772	-	-
ALKANES	11900	1110	138000	*8820*	3670
UCM	2550	303	71200	-	1400

Gulf of Alaska sediment samples

Station	McDonald's	Paul's
Name (#)	Lagoon (18)	Bay (20)
Date collected	20-Jul-89	20-Jul-89
Mean wet wt. (g)	10.4	10.5
Mean dry wt. (g)	10.1	10.1
N	2	3
Alkanes (ng/g)		
C10alk	29.9	43.5
C11alk	3.59	7.50
C12alk	6.34	4.49
C13alk	2.48	-
C14alk	12.8	14.6
C15alk	12.8	12.4
C16alk	13.8	16.6
C17alk	19.6	24.4
Pristane	64.2	41.6
C18alk	12.1	18.1
Phytane	39.9	46.6
C19alk	18.8	23.3
C20alk	5.84	8.34
C21alk	4.72	8.91
C22alk	1.78	6.52
C23alk	A	A
C24alk	A	A
C25alk	A	A
C26alk	A	A
C27alk	A	A
C28alk	A	A
C29alk	A	A
C30alk	-	-
C31alk	-	-
C32alk	-	-
C33alk	-	-
C34alk	-	-
ALKANES	47.4	38.4
UCM	9470	8870

APPENDIX III

Table III-1.--Summary of calibrated PAH concentrations measured in calibration stability samples. A mid-level calibration standard (prepared from NIST standards) was analyzed in the middle and near the end of each batch of 12 mussel or sediment samples, to verify the accuracy and stability of the calibration curve determined initially for the batch. Listed below for each calibrated PAH is (1) the mean measured concentration, calculated from all the verification standards analyzed; (2) the standard deviation associated with (1); (3) CV, calculated as 100 times the ratio of (2) and (1); (4) the nominal concentration of the standard; (5) the percent accuracy, calculated as 100 times the ratio of (1) and (4); and (6) the number, *n*, of verification standards included for these calculations. A total of 73 batches were analyzed; *n* may be less than twice this number due to unacceptable recovery of associated deuterated surrogate standards (see Methods section). Concentrations are ng PAH/g, with 1 g dry weight sample assumed.

Aromatic Hydrocarbon	Mean	SD	CV (%)	Expected Value	Percent Accuracy	*n*
Naph	345	6.41	1.86	345	100.1	146
Menap2	394	9.36	2.37	395	99.9	146
Menap1	413	10.6	2.57	415	99.6	146
Dimeth	358	9.55	2.67	360	99.4	146
Trimeth	325	8.43	2.59	330	98.5	146
Biphenyl	349	10.1	2.89	350	99.8	146
Acenthy	343	15.1	4.40	348	98.4	146
Acenthe	365	9.65	2.64	364	100.4	146
Fluorene	362	13.4	3.69	364	99.6	146
Dithio	394	15.3	3.88	400	98.4	146
Phenanth	351	9.87	2.62	351	100.0	146
Mephen1	343	11.7	3.42	350	98.0	146
Anthra	393	13.8	3.51	391	100.5	146
Fluorant	286	15.3	5.37	296	96.7	146
Pyrene	285	14.8	5.19	295	96.9	146
Benanth	178	19.3	10.8	180	99.4	143
Chrysene	349	24.0	6.88	352	99.2	143
Benzobfl	253	18.0	7.11	263	96.5	143
Benzokfl	272	16.5	6.07	279	97.5	143
Benepy	273	21.7	7.95	281	97.7	143
Benapy	333	15.8	4.73	340	98.2	143
Perylene	351	19.3	5.48	356	98.6	143
Indeno	298	22.5	7.57	315	94.8	143
Dibenz	248	22.9	9.23	259	95.7	143
Benzop	249	19.8	7.97	265	94.0	143

Table III-2.--Summary of selected calibrated PAH concentrations measured in mussel reference samples. Two reference samples were processed and analyzed with each batch of 12 mussel samples. Listed below for each calibrated PAH is (1) the mean measured concentration, calculated from all the reference samples analyzed; (2) the standard deviation associated with (1); (3) CV, calculated as 100 times the ratio of (2) and (1), (4) the nominal PAH concentrations present in each sample due to the reference spike, as determined by the NIST; (5) the percent accuracy, calculated as 100 times the ratio of (1) and (4); and (6) the number, *n*, of reference samples included for these calculations. A total of 36 batches were analyzed; *n* is less than twice this number due to unacceptable recovery of associated deuterated surrogate standards, and because nine batches were analyzed with a different reference material (see Methods section). The PAHs in these reference samples were supplied by NIST. Concentrations are ng PAH/g, with 1 g dry weight sample assumed.

Aromatic Hydrocarbon	Mean	SD	CV (%)	Expected Value	Percent Accuracy	*n*
Phenanth	235	31.4	13.4	205	114.7	53
Mephen1	81	16.9	20.9	69	117.6	53
Fluorant	227	38.2	16.8	169	134.4	53
Pyrene	183	35.8	19.6	136	134.4	53
Benanth	92	18.0	19.6	78	118.3	53
Chrysene	133	25.2	19.0	106	125.1	53
Benepy	66	9.30	14.0	50	133.3	52
Benapy	42	8.80	20.9	39	108.4	52
Indeno	14	3.97	28.0	19	74.3	52

Table III-3.--Summary of calibrated PAH concentrations measured in sediment reference samples. Two reference samples were processed and analyzed with each batch of 12 sediment samples. Listed below for each calibrated PAH is (1) the mean measured concentration, calculated from all the reference samples analyzed; (2) the standard deviation associated with (1); (3) CV, calculated as 100 times the ratio of (2) and (1), and the number, *n*, of reference samples included for these calculations. A total of 37 batches were analyzed; *n* is less than twice this number due to unacceptable recovery of associated deuterated surrogate standards. The PAHs in these reference samples were supplied by NIST. Concentrations are ng PAH/g, with 1 g dry weight sample assumed.

Aromatic Hydrocarbon	Mean	SD	CV (%)	*n*
Naph	935	66.4	7.10	72
Menap2	1120	63.7	5.69	72
Menap1	730	39.3	5.39	72
Dimeth	524	58.4	11.2	72
Trimeth	262	21.1	8.04	72
Biphenyl*	210	29.5	14.0	68
Acenthy	33	3.07	9.32	72
Acenthe	33	8.08	24.3	72
Fluorene	114	17.7	15.4	72
Dithio	155	22.6	14.6	73
Phenanth	713	91.3	12.8	73
Mephen1	309	155	50.1	73
Anthra	108	28.2	26.1	73
Fluorant	533	114	21.3	73
Pyrene	491	68.6	14.0	73
Benanth	195	44.4	22.7	73
Chrysene	319	65.7	20.6	73
Benzobfl	663	122	18.5	64
Benzokfl**				64
Benepy	283	53.2	18.8	64
Benapy	142	24.6	17.4	64
Perylene	254	48.5	19.1	64
Indeno	141	33.1	23.4	64
Dibenz	41	14.4	35.2	64
Benzop	131	38.7	29.6	64

* Excluding results from one batch of reference material that was consistently elevated by a factor of about nine.

** Below MDL in the reference samples.

Table III-4.--Summary of calibrated PAH concentrations measured in spiked method blank samples. A method blank sample spiked with a NIST PAH standard was analyzed with each batch of 12 samples, to assess method accuracy. Listed below for each calibrated PAH is (1) the mean measured concentration, calculated from all the verification standards analyzed; (2) the standard deviation associated with (1); (3) CV, calculated as 100 times the ratio of (2) and (1); (4) the nominal concentration of the standard; (5) the percent accuracy, calculated as 100 times the ratio of (1) and (4); and (6) the number, *n*, of verification standards included for these calculations. A total of 73 batches were analyzed; *n* is less than this number due to unacceptable recovery of associated deuterated surrogate standards (see Methods section). Concentrations are ng PAH/g, with 1 g dry weight sample assumed.

Aromatic Hydrocarbon	Mean	SD	CV (%)	Expected Value	Percent Accuracy	*n*
Naph	821	51.5	6.27	827	99.3	70
Menap2	975	48.0	4.92	947	103.0	70
Menap1	1030	54.9	5.33	996	103.4	70
Dimeth	789	87.1	11.0	864	91.4	72
Trimeth	787	43.2	5.49	792	99.4	72
Biphenyl	850	48.4	5.70	840	101.2	72
Acenthy	805	64.6	8.02	835	96.5	72
Acenthe	878	43.2	4.98	874	100.4	72
Fluorene	928	101.5	10.9	872	106.4	72
Dibenzo	554	62.1	11.2	600	92.4	72
Phenanth	883	80.5	9.11	841	105.0	72
Mephen1	868	67.1	7.73	840	103.3	72
Anthra	908	86.2	9.50	938	96.8	72
Fluorant	723	58.8	8.13	709	102.0	72
Pyrene	716	65.4	9.13	707	101.3	72
Benanth	411	59.5	14.5	431	95.4	70
Chrysene	849	122.3	14.4	844	100.6	70
Benzobfl	734	109.2	14.9	630	116.6	70
Benzokfl	756	106.2	14.1	668	113.2	70
Benepy	785	106.4	13.6	674	116.5	70
Benapy	805	64.4	8.00	815	98.8	70
Perylene	833	81.7	9.80	854	97.6	65
Indeno	743	70.9	9.54	755	98.4	70
Dibenz	608	77.3	12.7	622	97.8	70
Benzop	644	47.8	7.42	635	101.4	70

Table III-5.--Summary of alkane concentrations measured in calibration stability samples. A mid-level calibration standard was analyzed in the middle and near the end of each batch of 12 samples to verify the stability of the calibration curve determined initially for the batch. Listed below for each alkane is (1) the mean measured concentration, calculated from all the verification standards analyzed; (2) the standard deviation associated with (1); (3) CV, calculated as 100 times the ratio of (2) and (1); (4) the nominal concentration of the standard; and (5) the percent accuracy, calculated as 100 times the ratio of (1) and (4); and (6) the number, *n*, of verification standards included for these calculations. A total of 73 batches were analyzed. Concentrations are ng alkane/g, with 1 g dry weight assumed.

Alkane	Mean	SD	CV (%)	Spike Amount	Percent Accuracy	*n*
C10	12770	581	4.55	12740	100.2	146
C11	12170	131	1.08	12120	100.5	146
C12	13000	96.1	0.94	12890	100.9	146
C13	13440	146	1.09	13260	101.4	146
C14	12900	275	2.13	12740	101.3	146
C15	12130	182	1.50	11980	101.3	146
C16	13420	147	1.09	13180	101.8	146
C17	14750	500	3.39	14470	102.0	146
Pristane	13960	334	2.39	13550	103.0	146
C18	15490	277	1.79	15410	100.6	146
C19	13600	195	1.43	13490	100.8	146
C20	12190	196	1.61	12080	100.9	146
C21	11860	236	1.99	11750	101.0	146
C22	13270	382	2.88	13370	99.3	146
C23	11890	332	2.79	11980	99.2	146
C24	12360	349	2.82	12470	99.1	146
C25	11640	344	2.96	11760	99.0	146
C26	11540	371	3.21	11680	98.8	146
C27	4860	175	3.60	4930	98.7	146
C28	13120	359	2.74	13010	100.8	146
C29	11730	377	3.22	11650	100.7	146
C30	12290	286	2.33	12300	99.9	146
C32	11390	1170	10.3	11640	97.9	146
C34	11320	1930	17.1	11920	95.0	146

Table III-6.--Summary of alkane concentrations measured in mussel reference samples. Two reference samples were processed and analyzed with the 27 batches of mussels (9 of the batches were analyzed with different reference materials not summarized here). Listed below for each alkane is (1) the mean measured concentration, calculated from all the reference samples analyzed; (2) the standard deviation associated with (1); (3) CV, calculated as 100 times the ratio of (2) and (1); and (4) the number, *n*, of reference samples included for these calculations. The reference spikes were prepared from commercially purchased alkanes. The concentrations are ng alkane/g, with 1 g dry weight assumed.

Alkane	Mean	SD	CV (%)	*n*
C10	1140	156	13.7	54
C11	1200	148	12.3	54
C12	1300	150	11.6	54
C13	1420	191	13.4	54
C14	1310	196	14.9	53
C15	1200	175	14.6	54
C16	1290	158	12.3	54
C17	1420	183	12.9	54
Pristane	1400	168	12.0	54
C18	1550	181	11.7	54
C19	1380	165	12.0	54
C20	1230	154	12.5	54
C21	1230	158	12.9	54
C22	1375	168	12.2	54
C23	1230	156	12.6	54
C24	1280	163	12.7	54
C25	1210	160	13.2	54
C26	1190	165	13.9	54
C27	512	75.2	14.7	54
C28	1350	179	13.2	54
C29	1220	156	12.8	54
C30	1270	163	12.8	54
C32	1190	168	14.1	54
C34	1220	190	15.5	54

Table III-7.--Summary of alkane concentrations measured in sediment reference samples. Two reference samples were processed and analyzed with the 37 batches of mussels. Listed below for each alkane is (1) the mean measured concentration, calculated from all the reference samples analyzed; (2) the standard deviation associated with (1); (3) CV, calculated as 100 times the ratio of (2) and (1); and (4) the number, *n*, of reference samples included for these calculations (*n* is less than twice the number of batches analyzed due to unacceptable recovery of associated deuterated surrogate standards; see Methods section). The reference spikes were prepared from commercially purchased alkanes. The concentrations are ng alkane/g, with 1 g dry weight assumed.

Alkane	Mean	SD	CV (%)	*n*
C10	1230	245	19.9	73
C11	1490	154	10.4	73
C12	1930	228	11.9	73
C13	2210	240	10.9	73
C14	2210	452	20.5	73
C15	2470	1010	40.9	73
C16	2010	595	29.6	73
C17	2220	181	8.17	73
Pristane	1280	272	21.3	73
C18	1580	185	11.7	73
C19	1590	289	18.3	73
C20	1430	188	13.2	73
C21	1400	124	8.86	73
C22	1350	126	9.30	73
C23	1480	129	8.67	73
C24	1290	116	9.01	73
C25	1720	170	9.89	73
C26	1290	251	19.4	73
C27	2000	413	20.7	73
C28	1020	270	6.6	73
C29	1890	267	14.2	73
C30	710	139	19.6	73
C32	471	110	23.3	73
C34	965	227	23.5	73

Table III-8.--Summary of alkane concentrations measured in spiked blank accuracy evaluation standards. One of these standards was analyzed at the end of each batch of 12 samples to verify the accuracy of alkane determinations. Listed below for each alkane is (1) the mean measured concentration, calculated from all the verification standards analyzed; (2) the standard deviation associated with (1); (3) CV, calculated as 100 times the ratio of (2) and (1); (4) the nominal concentration of the standard; and (5) the percent accuracy, calculated as 100 times the ratio of (1) and (4). A total of 73 batches were analyzed; *n* is 71 because the spiked blank samples of two batches were compromised during analysis. Concentrations are ng alkane/g, with 1 g dry weight assumed.

Alkane	Mean	SD	CV (%)	Spike Amount	Percent Accuracy	*n*
C10	9610	1350	14.10	10620	90.5	71
C11	9970	410	4.11	10100	98.7	71
C12	10890	392	3.60	10740	101.4	71
C13	11340	431	3.81	11050	102.6	71
C14	10300	653	6.34	10620	97.0	71
C15	10010	707	7.06	9980	100.1	71
C16	11210	572	5.11	10980	102.1	71
C17	12510	1230	9.82	12060	103.7	71
Pristane	12160	789	6.49	11290	107.7	71
C18	12480	681	5.46	12840	97.2	71
C19	11060	678	6.13	11240	96.4	71
C20	10000	575	5.75	10070	99.3	71
C21	9750	638	6.55	9790	99.6	71
C22	11160	428	3.84	11140	100.2	71
C23	9960	420	4.21	9980	99.8	71
C24	10350	432	4.17	10390	99.6	71
C25	9710	461	4.75	9800	99.1	71
C26	9600	489	5.10	9730	98.6	71
C27	4040	254	6.29	4110	98.4	71
C28	10900	554	5.09	10840	100.6	71
C29	9730	389	4.00	9710	100.2	71
C30	10200	420	4.11	10250	99.6	71
C32	9550	844	8.84	9700	98.4	71
C34	9620	1470	15.20	9930	96.9	71

Table III-9.--Summary of alkane concentrations measured in NIST-derived accuracy evaluation standards (QA-CH-2). One of these standards was analyzed at the end of each batch of 12 samples to verify the accuracy of alkane determinations. Listed below for each alkane is (1) the mean measured concentration, calculated from all the verification standards analyzed; (2) the standard deviation associated with (1); (3) the coefficient of variation (CV), calculated as 100 times the ratio of (2) and (1); (4) the nominal concentration of the standard, as determined by NIST; and (5) the percent accuracy, calculated as 100 times the ratio of (1) and (4). A total of 73 batches were analyzed; *n* may be less than this number due to unacceptable recovery of associated deuterated surrogate standards (see Methods section). Concentrations are ng alkane/g, with 1 g dry weight assumed.

Alkane	Mean	SD	CV (%)	Spike Amount	Percent Accuracy	*n*
C10	17490	786	4.49	18600	94.0	71
C11	18150	596	3.29	21160	85.8	73
C12	17580	550	3.13	18600	94.5	73
C13	16550	560	3.39	17400	95.1	73
C14	16290	576	3.54	17250	94.4	73
C15	15970	667	4.18	16950	94.2	73
C16	13960	426	3.05	14810	94.3	73
C17	13210	669	5.06	13670	96.7	73
Pristane	7920	432	5.46	8690	91.2	73
C18	11920	513	4.31	12810	93.1	73
Phytane	839	298	35.6	900	93.3	73
C19	10190	423	4.16	10950	93.0	73
C20	9910	461	4.66	10550	93.9	73
C22	8150	334	4.10	8570	95.0	73
C24	6100	294	4.82	6420	95.0	73
C26	4570	359	7.85	4730	96.6	73
C28	2940	289	9.82	3210	91.5	73
C30	2200	303	13.8	2330	94.4	73
C32	1980	885	44.6	1880	105.5	73
C34	2060	1340	65.2	1610	127.9	73

APPENDIX IV

About one-third of the sediment samples collected in April and in June 1990 were sent to a different laboratory for analysis than the remainder of the samples of this study. A total of 28 samples were sent to the other laboratory, and the hydrocarbon results reported by that laboratory, together with the circumstances of storage at that laboratory, indicate these samples were contaminated by diesel oil. We arrived at this conclusion after we established the following facts:

(1) Sediment samples were collected and stored as triplicates. Only 1 sample of each triplicate was sent to the other laboratory. The remaining 2 samples were analyzed at our laboratory. The sample selected from each triplicate for analysis at the other laboratory was selected at random. These samples were shipped in two catalogues; samples collected in April 1990 were in catalogue 6476, and those collected in June 1990 were in catalogue 6472.

(2) For each triplicate of samples, PAH concentrations were consistently highest in samples analyzed at the other laboratory. For example, TPAH concentrations in the samples analyzed at the other laboratory were higher than in the remaining samples of respective triplicates by 100 to over 1,000 ng/g (dry weight basis; Fig. IV-1).

(3) The pattern of relative PAH concentrations in each of the samples analyzed at the other laboratory is consistent with contamination by diesel oil. In samples from Constantine Harbor, Rocky Bay, and Sleepy Bay, this diesel oil-PAH pattern augments PAH patterns evident in samples collected from these stations at other sampling times (compare PAH data of Tables II-1 and IV-1; also see Fig. IV-2), while at the remaining stations, this diesel oil-PAH pattern is consistently present by itself (Fig. IV-2).

These facts establish that samples sent to the other laboratory were all contaminated by diesel oil, while the remaining sample replicates were not. The strict association of the diesel oil PAH pattern with the samples in catalogues 6472 and 6476 may have resulted from the following:

(1) The sampled environment was patchily contaminated by diesel oil, and the samples that contained diesel oil were sent to the other laboratory by chance. However, this is very unlikely, because the probability of this outcome if true is $(1/3)^{23}$ (there were 23 triplicate sets involved).

(2) Some of the samples were contaminated by diesel oil during collection, and these samples were sent to the other laboratory by chance. Again, this is unlikely, because the probability of this outcome if true is also $(1/3)^{23}$.

(3) The sampled environment was broadly contaminated by diesel oil, which was not reliably detected by our laboratory. However, such broad-scale diesel oil contamination of sediments has not been corroborated by any other study, including other NRDA studies for which the other laboratory was the primary analytical facility.

(4) Samples shipped to the other laboratory were contaminated during or after shipment. This alternative is fully consistent with the facts established above.

On the basis of these considerations, we decided to exclude from consideration all hydrocarbon data for samples that were included in catalogues 6472 and 6476.

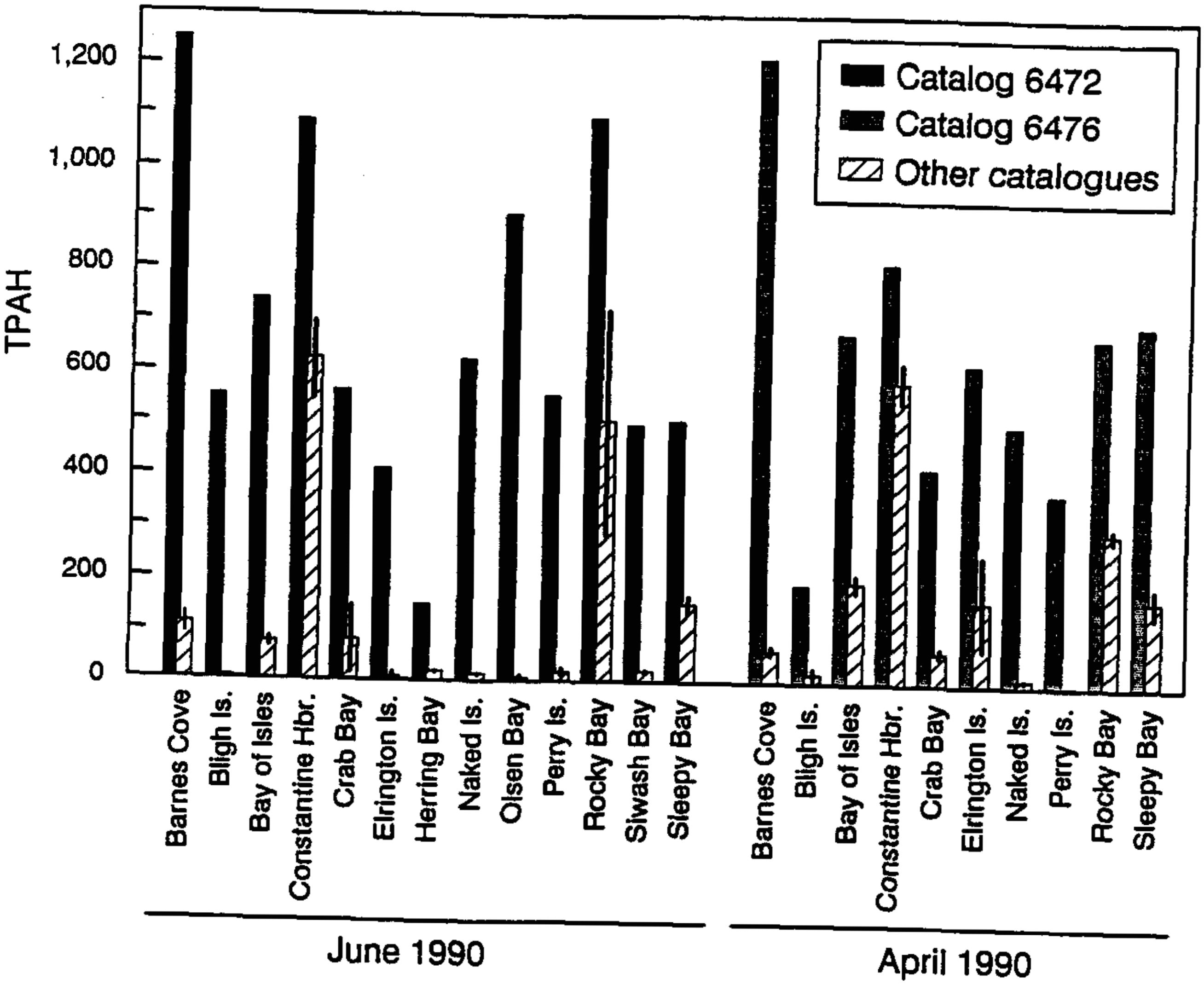

Figure IV-1.--TPAH concentrations in sediment samples analyzed together in catalogues 6472 and 6476, compared with replicates of these samples that were analyzed in different sample batches. Vertical bars indicate the range of results in samples that were not analyzed in the above mentioned catalogues. TPAH concentration units are ng/g dry weight. Note that TPAH concentrations in samples that were analyzed in catalogues 6472 and 6476 are without exception higher than corresponding replicate samples analyzed in other sample batches.

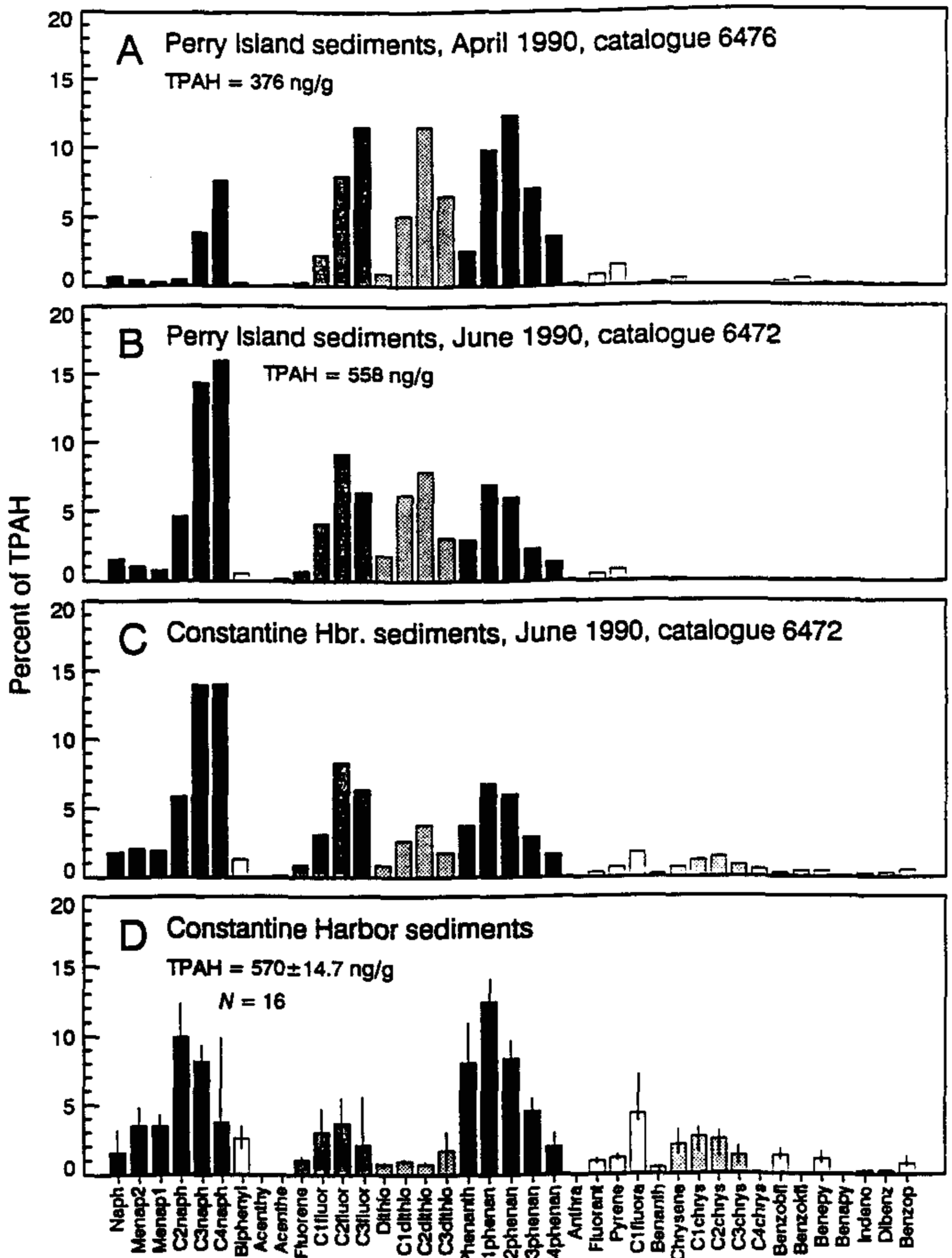

Figure IV-2.--A. Relative PAH concentrations characteristic of sediment samples analyzed in catalogue 6476. This sample was collected from Perry Island in April 1990, and the TPAH concentration was 376 ng/g (dry weight). The TPAH concentrations in the replicates of this sample were less than 5 ng/g. B. Relative PAH concentrations characteristic of sediment samples analyzed in catalogue 6472. This sample was collected from Perry Island in June 1990, and the TPAH concentration was 558 ng/g (dry weight). The TPAH concentrations in the replicates of this sample were less than 30 ng/g. C. Relative PAH concentrations of the sediment sample collected June 1990 from Constantine Harbor and analyzed in catalogue 6472. Note that this pattern is similar to that of B above, augmented with the pattern consistently found in all the other sediment samples analyzed from this station as depicted in Fig. 9 of the main text (reproduced here as D).

Table IV-1. Sediment hydrocarbon data excluded from consideration in this study. These samples were analyzed together in batches, denoted as catalogues 6472 and 6476, and displayed PAH contamination patterns that were characteristic of each batch. The characteristic contamination pattern was consistently present in each sample analyzed in these batches, but was not corroborated in replicate samples analyzed in different batches. Conventions for the data displayed in this table are identical with those given in the tables of Appendix II.

Catalog 6472

Prince William Sound and Gulf of Alaska sediment samples

Station Name (#)	Barnes Cove(1)	Bay of Isles(2)	Bligh Island(3)	Constantine Harbor(4)	Crab Bay(5)	Elrington Island(6)	Naked Island(8)	Olsen Bay(9)	Perry Island(10)	Rocky Bay(11)
Date collected	22-Jun-90	22-Jun-90	21-Jun-90	22-Jun-90	23-Jun-90	23-Jun-90	21-Jun-90	25-Jun-90	21-Jun-90	22-Jun-90
Mean wet wt. (g)	23.7	17.0	14.7	17.0	15.9	11.8	14.2	16.4	16.2	14.1
Mean dry wt. (g)	10.1	10.0	10.0	10.0	10.1	10.1	10.1	10.1	10.0	10.1
N	1	1	1	1	1	1	1	1	1	1
PAH's(ng/g)										
Naph	63.6	19.8	6.68	19.8	13.2	16.3	12.5	16.0	8.74	21.3
Menap2	36.9	10.5	4.97	22.8	8.16	10.5	8.46	11.6	5.99	21.4
Menap1	30.5	8.96	3.88	20.9	6.24	8.81	6.56	8.82	4.28	11.5
Dimeth	39.1	15.7	9.12	24.8	11.1	12.2	13.0	17.8	9.19	25.8
C2naph	96.9	45.5	23.5	64.0	33.0	38.5	33.3	50.2	26.1	61.7
Trimeth	64.1	34.0	26.9	40.0	25.6	16.9	29.8	40.5	25.8	44.7
C3naph	197	112	74.0	153	89.8	74.4	91.5	141	80.7	148
C4naph	178	110	90.4	154	92.5	68.9	104	152	90.2	143
Biphenyl	10.7	4.30	3.16	13.9	3.42	3.80	3.86	5.43	2.96	11.3
Acenthy	-	-	-	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-	-	-	-
Fluorene	9.98	4.96	3.78	9.47	4.16	2.44	5.01	6.55	3.97	21.1
C1fluor	40.6	23.0	23.5	33.9	19.7	11.0	26.2	35.9	23.3	44.3
C2fluor	85.0	132	53.8	91.3	43.5	21.3	51.5	73.4	51.5	68.3
C3fluor	71.6	37.0	40.0	69.7	35.2	21.8	42.4	60.6	35.9	49.0
Dithio	19.6	11.1	9.15	9.17	9.39	5.69	11.1	17.8	10.1	14.7
C1dithio	52.6	34.7	35.1	28.6	29.5	18.1	32.8	53.6	34.8	41.3
C2dithio	70.6	44.3	45.1	41.4	38.8	25.5	44.6	69.0	44.5	52.8
C3dithio	32.5	20.0	18.2	19.3	14.3	12.9	23.1	27.1	17.3	24.6
Phenanth	32.0	18.0	14.7	40.9	16.6	10.3	18.1	27.4	16.5	66.2
Mephen1	18.4	11.8	13.1	21.3	10.3	5.90	8.93	16.9	6.74	16.8
C1phenan	69.0	39.0	41.7	74.5	38.1	21.2	42.0	61.5	38.9	77.7
C2phenan	64.0	35.7	36.2	66.0	35.1	22.6	36.2	52.5	33.8	51.6
C3phenan	27.4	13.8	13.0	31.9	10.8	10.7	16.3	20.2	12.8	19.2
C4phenan	12.8	9.71	7.00	18.0	6.82	4.96	9.21	7.90	7.62	11.5
Anthra	-	-	-	-	-	-	-	-	-	4.32
Fluorant	6.52	1.52	0.86	3.54	3.65	1.26	1.69	1.06	2.67	12.6
Pyrene	14.0	4.00	3.05	7.36	5.50	-	4.71	6.49	4.12	19.0
C1fluora	-	-	-	19.0	-	1.74	-	-	-	-
Benanth	2.80	-	-	2.11	-	-	-	-	-	2.29
Chrysene	3.60	1.46	0.69	7.44	2.08	1.27	1.49	0.73	0.73	11.6
C1chrys	-	-	-	12.9	-	-	-	-	-	-
C2chrys	-	-	-	15.6	-	-	-	-	-	-
C3chrys	-	-	-	9.00	-	-	-	-	-	-
C4chrys	-	-	-	5.70	-	-	-	-	-	-
Benzobfl	3.34	-	-	2.82	-	-	-	-	-	9.47
Benzokfl	3.39	-	-	4.45	-	-	-	-	-	13.6
Benepy	2.54	-	-	4.13	-	-	-	-	-	10.9
Benapy	3.48	-	-	1.22	2.17	-	-	-	-	2.77
Perylene	31.7	4.69	15.5	31.6	36.6	-	45.2	10.8	4.49	51.2
Indeno	4.57	-	-	2.45	-	-	-	-	-	9.26
Dibenz	-	-	-	3.16	-	-	-	-	-	8.12
Benzop	3.98	0.98	0.57	5.43	1.59	-	1.11	0.47	0.44	30.3
Total Aromatics (w/o Perylene)	1250	742	553	1090	563	414	628	907	558	1090

Catalog 6472
Prince William Sound and Gulf of Alaska sediment samples

Station	Siwash	Sleepy	Harris	Quicksand	Verdant
Name (#)	Bay(12)	Bay(13)	Bay(17)	Cove(22)	Cove(24)
Date collected	25-Jun-90	23-Jun-90	24-Jun-90	24-Jun-90	24-Jun-90
Mean wet wt. (g)	15.9	13.9	12.4	13.8	10.5
Mean dry wt. (g)	10.0	10.0	10.0	10.1	10.2
N	1	1	1	1	2
PAH's(ng/g)					
Naph	11.4	15.1	1.61	21.9	13.9
Menap2	7.63	9.51	1.13	10.5	10.7
Menap1	5.97	7.47	0.97	8.59	8.88
Dimeth	11.0	10.7	-	9.77	15.1
C2naph	30.4	28.1	4.30	29.6	41.6
Trimeth	20.8	15.5	3.46	14.8	20.1
C3naph	73.3	57.8	13.5	57.5	76.7
C4naph	88.3	58.9	17.3	51.5	63.1
Biphenyl	3.42	4.05	-	3.40	3.52
Acenthy	-	-	-	-	-
Acenthe	-	-	-	-	-
Fluorene	3.83	3.23	-	-	1.74
C1fluor	20.7	11.1	3.73	9.20	10.9
C2fluor	42.9	25.1	11.9	18.3	21.9
C3fluor	39.1	29.9	19.1	17.1	21.3
Dithio	9.38	6.11	2.70	4.70	5.74
C1dithio	26.0	17.8	9.09	13.5	15.9
C2dithio	36.3	30.0	15.8	17.6	21.3
C3dithio	15.8	25.6	7.99	8.26	9.44
Phenanth	15.6	12.9	6.00	7.74	8.33
Mephen1	6.65	6.44	3.90	4.42	4.02
C1phenan	34.8	22.1	14.6	15.8	17.4
C2phenan	29.5	30.2	15.3	15.0	17.1
C3phenan	-	22.8	5.64	6.18	6.55
C4phenan	-	17.3	-	-	2.04
Anthra	-	-	-	-	-
Fluorant	1.17	5.22	-	0.49	0.41
Pyrene	3.67	4.77	-	-	-
C1fluora	-	8.29	-	-	-
Benanth	-	-	-	-	-
Chrysene	-	7.33	-	-	-
C1chrys	-	9.74	-	-	-
C2chrys	-	15.7	-	-	-
C3chrys	-	8.08	-	-	-
C4chrys	-	7.65	-	-	-
Benzobfl	-	-	-	-	-
Benzokfl	-	-	-	-	-
Benepy	-	2.50	-	-	-
Benapy	-	-	-	-	-
Perylene	12.2	-	-	-	-
Indeno	-	-	-	-	-
Dibenz	-	-	-	-	-
Benzop	0.48	0.94	-	-	-
Total Aromatics (w/o Perylene)	500	505	151	317	378±88.7

Catalog 6476

Prince William Sound and Gulf of Alaska sediment samples

Station Name (#)	Barnes Cove(1)	Bay of Isles(2)	Bligh Island(3)	Constantine Harbor(4)	Crab Bay(5)	Elrington Island(6)	Naked Island(8)	Perry Island(10)	Rocky Bay(11)	Sleepy Bay(13)
Date collected	25-Apr-90	25-Apr-90	28-Apr-90	25-Apr-90	26-Apr-90	26-Apr-90	24-Apr-90	24-Apr-90	25-Apr-90	26-Apr-90
Mean wet wt. (g)	27.3	22.6	16.8	15.7	17.1	11.5	13.5	17.8	15.1	12.7
Mean dry wt. (g)	10.1	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.1	10.1
N	1	1	1	1	1	1	1	1	1	1
PAH's(ng/g)										
Naph	16.4	10.9	7.37	14.0	5.86	6.50	5.79	2.91	11.0	6.76
Menap2	8.21	5.18	2.22	17.8	3.08	4.18	3.41	1.71	13.6	4.83
Menap1	5.05	2.78	0.94	16.4	2.17	2.70	2.17	1.12	4.13	3.08
Dimeth	11.0	4.66	-	14.2	2.99	3.49	3.39	-	9.89	4.46
C2naph	21.8	13.1	3.23	34.0	7.35	10.2	8.94	-	15.3	11.6
Trimeth	26.0	12.7	-	13.4	6.68	12.6	9.66	4.83	6.17	11.3
C3naph	72.0	46.2	6.52	46.1	18.0	41.4	30.3	14.8	25.3	37.2
C4naph	109	74.5	9.60	60.1	34.2	70.7	52.4	29.6	37.8	65.6
Biphenyl	3.91	-	-	14.9	-	-	-	-	7.27	-
Acenthy	-	-	-	-	-	-	-	-	-	-
Acenthe	-	-	-	-	-	-	-	-	-	-
Fluorene	5.54	-	-	5.59	-	-	-	-	16.8	2.38
C1fluor	30.7	16.4	2.56	19.5	10.1	16.8	13.9	8.69	23.3	14.5
C2fluor	109	56.4	13.4	63.8	33.9	56.7	45.3	30.8	40.7	50.3
C3fluor	120	70.7	18.1	73.9	43.9	73.1	58.5	44.6	41.3	65.3
Dithio	11.6	5.70	-	4.86	3.66	5.22	4.76	3.55	5.05	6.68
C1dithio	60.7	33.5	5.05	17.6	20.2	33.2	27.1	19.7	18.9	33.5
C2dithio	111	68.0	12.3	32.7	40.2	67.7	52.7	44.6	34.4	66.5
C3dithio	59.9	42.6	12.4	20.7	22.1	36.9	28.6	25.3	21.0	44.1
Phenanth	42.0	16.9	4.00	41.5	12.9	15.8	12.8	9.95	58.4	19.0
Mephen1	33.8	15.1	2.99	16.6	7.37	10.2	13.8	10.4	13.1	15.3
C1phenan	121	60.2	16.9	81.8	43.4	36.8	50.0	38.3	65.7	55.5
C2phenan	126	75.4	22.8	76.0	57.9	76.9	57.3	48.1	49.7	73.0
C3phenan	58.6	44.0	13.8	43.1	29.7	41.2	27.3	27.5	25.3	43.8
C4phenan	31.8	24.1	14.2	25.6	12.1	16.9	14.0	13.9	14.9	27.9
Anthra	-	-	-	-	-	-	-	-	4.19	-
Fluorant	13.8	3.12	0.84	5.50	5.45	2.03	1.80	3.04	14.1	7.43
Pyrene	22.2	7.19	-	10.2	7.74	6.47	5.55	5.61	18.3	9.34
C1fluora	14.4	-	3.63	28.1	-	-	-	-	20.5	11.4
Benanth	4.13	-	-	2.42	1.45	-	-	-	2.20	-
Chrysene	5.95	3.37	1.62	12.0	2.43	1.28	0.97	1.71	11.8	7.62
C1chrys	-	-	4.46	14.4	-	-	-	-	9.29	9.22
C2chrys	6.88	-	10.3	13.8	-	-	-	-	7.82	13.7
C3chrys	-	-	4.26	4.81	-	-	-	-	2.48	6.58
C4chrys	-	-	2.61	3.38	-	-	-	-	-	-
Benzobfl	2.88	-	-	4.70	-	-	-	-	12.2	-
Benzokfl	4.86	-	-	2.14	-	-	-	-	6.01	-
Benepy	5.35	-	-	4.61	-	-	-	-	9.55	2.71
Benapy	3.45	-	-	-	1.81	-	-	-	3.04	-
Perylene	49.8	15.1	10.5	37.8	45.2	-	36.3	4.37	53.7	-
Indeno	3.18	-	-	-	-	-	-	-	5.03	-
Dibenz	-	-	-	-	-	-	-	-	5.84	-
Benzop	2.99	0.72	0.72	2.37	1.42	-	0.67	0.57	15.2	0.82
Total Aromatics (w/o Perylene)	1210	681	194	818	421	623	504	376	677	700

Catalog 6476

Prince William Sound and Gulf of Alaska sediment samples

Station	Quicksand	Verdant
Name (#)	Cove(22)	Cove(24)
Date collected	27-Apr-90	27-Apr-90
Mean wet wt. (g)	12.6	10.2
Mean dry wt. (g)	10.1	10.0
N	1	1
PAH's(ng/g)		
Naph	4.73	2.79
Menap2	2.64	2.03
Menap1	1.58	1.01
Dimeth	-	-
C2naph	6.08	-
Trimeth	6.20	5.17
C3naph	18.1	18.8
C4naph	28.8	36.3
Biphenyl	-	-
Acenthy	-	-
Acenthe	-	-
Fluorene	-	-
C1fluor	8.27	8.23
C2fluor	26.0	33.8
C3fluor	35.4	38.8
Dithio	2.53	2.41
C1dithio	15.8	15.6
C2dithio	30.0	31.3
C3dithio	16.9	18.6
Phenanth	7.47	7.36
Mephen1	4.16	9.41
C1phenan	28.2	33.2
C2phenan	33.1	39.0
C3phenan	18.2	19.8
C4phenan	9.12	8.58
Anthra	-	-
Fluorant	0.64	-
Pyrene	-	-
C1fluora	-	-
Benanth	-	-
Chrysene	-	-
C1chrys	-	-
C2chrys	-	-
C3chrys	-	-
C4chrys	-	-
Benzobfl	A	A
Benzokfl	A	A
Benepy	A	A
Benapy	A	A
Perylene	A	A
Indeno	A	A
Dibenz	A	A
Benzop	A	A
Total Aromatics (w/o Perylene)	293	318

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Prince William Sound and Gulf of Alaska sediment samples

Station Name (#)	Barnes Cove(1)	Bay of Isles(2)	Bligh Island(3)	Constantine Harbor(4)	Crab Bay(5)	Elrington Island(6)	Naked Island(8)	Olsen Bay(9)	Perry Island(10)	Rocky Bay(11)
Date collected	22-Jun-90	22-Jun-90	21-Jun-90	22-Jun-90	23-Jun-90	23-Jun-90	21-Jun-90	25-Jun-90	21-Jun-90	22-Jun-90
Mean wet wt. (g)	23.7	17.0	14.7	17.0	15.9	11.8	14.2	16.4	16.2	14.1
Mean dry wt. (g)	10.1	10.0	10.0	10.0	10.1	10.1	10.1	10.1	10.0	10.1
N	1	1	1	1	1	1	1	1	1	1
Alkanes (ng/g)										
C10alk	170	114	-	272	-	44.6	64.3	60.5	23.5	118
C11alk	84.5	32.4	14.3	148	-	30.1	44.4	30.3	16.5	65.1
C12alk	18.7	8.23	-	34.9	-	8.88	13.0	9.86	6.22	24.1
C13alk	40.2	17.0	12.3	44.6	16.0	18.5	20.4	25.5	-	39.8
C14alk	117	68.0	48.7	109	60.8	46.3	74.8	72.0	53.8	111
C15alk	206	159	148	194	183	100	153	178	181	228
C16alk	4270	184	185	208	175	156	185	324	175	235
C17alk	251	189	263	332	213	124	224	331	330	885
Pristane	225	167	218	215	363	259	209	250	204	231
C18alk	106	102	148	165	126	67.8	160	218	151	173
Phytane	119	94.9	120	99.7	114	60.4	116	164	118	122
C19alk	188	91.2	147	183	102	41.4	120	324	115	120
C20alk	72.0	32.2	58.6	98.6	45.2	17.0	58.7	56.1	64.0	39.7
C21alk	136	42.4	39.4	151	32.6	11.9	50.9	121	33.1	29.0
C22alk	45.4	16.9	8.06	95.4	22.5	6.86	19.7	22.7	3.39	10.2
C23alk	A	A	A	A	A	A	A	A	A	A
C24alk	A	A	A	A	A	A	A	A	A	A
C25alk	A	A	A	A	A	A	A	A	A	A
C26alk	A	A	A	A	A	A	A	A	A	A
C27alk	A	A	A	A	A	A	A	A	A	A
C28alk	A	A	A	A	A	A	A	A	A	A
C29alk	A	A	A	A	A	A	A	A	A	A
C30alk	52.5	16.1	-	127	8.33	7.68	10.3	-	-	4.98
C31alk	951	188	22.3	2020	142	3.18	136	193	12.5	41.7
C32alk	135	43.5	5.43	73.8	12.8	-	28.7	8.67	6.15	7.65
C33alk	510	103	-	482	92.1	-	136	94.9	-	4.98
C34alk	227	57.7	-	593	60.9	-	32.6	-	36.3	26.2
ALKANES	10500	2370	1790	8170	2330	1020	2380	3150	2370	2770
UCM	38100	21500	15400	33200	23300	12400	27400	25900	23400	90700
Total NAlkanes	7580	1470	1100	5330	1290	684	1530	2070	1210	2160

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Prince William Sound and Gulf of Alaska sediment samples

Station	Siwash	Sleepy	Harris	Quicksand	Verdant
Name (#)	Bay(12)	Bay(13)	Bay(17)	Cove(22)	Cove(24)
Date collected	25-Jun-90	23-Jun-90	24-Jun-90	24-Jun-90	24-Jun-90
Mean wet wt. (g)	15.9	13.9	12.4	13.8	10.5
Mean dry wt. (g)	10.0	10.0	10.0	10.1	10.2
N	1	1	1	1	2
Alkanes (ng/g)					
C10alk	26.2	46.0	-	103	83.3
C11alk	25.5	22.3	-	41.0	35.2
C12alk	7.11	6.08	-	13.8	13.4
C13alk	19.1	14.4	-	14.3	23.4
C14alk	37.6	36.5	-	30.3	54.9
C15alk	93.8	77.2	20.3	49.7	95.0
C16alk	168	153	72.1	109	158
C17alk	163	127	60.0	68.3	130
Pristane	136	183	55.6	47.0	108
C18alk	118	82.0	49.6	46.7	82.1
Phytane	90.0	79.5	38.7	28.9	58.0
C19alk	84.4	66.9	31.5	24.8	44.5
C20alk	41.7	44.0	15.6	10.4	17.1
C21alk	34.7	37.3	7.44	7.23	12.9
C22alk	9.03	36.2	5.21	4.37	6.11
C23alk	A	21.6	A	A	A
C24alk	A	37.1	A	A	A
C25alk	A	33.3	A	A	A
C26alk	A	28.0	A	A	A
C27alk	A	24.9	A	A	A
C28alk	A	21.3	A	A	A
C29alk	A	16.4	A	A	A
C30alk	8.65	43.3	-	-	-
C31alk	110	18.2	15.6	-	-
C32alk	10.5	25.8	-	-	-
C33alk	35.6	17.6	-	-	-
C34alk	12.6	33.2	-	-	-
ALKANES	1800	1320	418	609	927
UCM	18200	30700	7440	6960	8430
Total NAlkanes	1010	1070	278	523	756±212

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Prince William Sound and Gulf of Alaska sediment samples

Station	Barnes	Bay of	Bligh	Constantine	Crab	Elrington	Naked	Perry	Rocky	Sleepy
Name (#)	Cove(1)	Isles(2)	Island(3)	Harbor(4)	Bay(5)	Island(6)	Island(8)	Island(10)	Bay(11)	Bay(13)
Date collected	25-Apr-90	25-Apr-90	28-Apr-90	25-Apr-90	26-Apr-90	26-Apr-90	24-Apr-90	24-Apr-90	25-Apr-90	26-Apr-90
Mean wet wt. (g)	27.3	22.6	16.8	15.7	17.1	11.5	13.5	17.8	15.1	12.7
Mean dry wt. (g)	10.1	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.1	10.1
N	1	1	1	1	1	1	1	1	1	1
Alkanes (ng/g)										
C10alk	44.1	-	117	59.5	-	-	-	-	-	-
C11alk	28.0	15.8	66.7	37.6	-	-	-	-	23.3	-
C12alk	8.40	5.48	16.1	45.8	-	-	-	-	9.04	-
C13alk	15.8	12.2	-	30.3	-	6.46	-	-	20.2	6.90
C14alk	47.6	37.1	-	47.3	15.2	30.6	20.6	12.3	21.3	30.0
C15alk	235	111	49.8	96.0	110	45.6	54.1	117	51.0	48.2
C16alk	101	59.2	14.5	60.6	52.5	65.2	49.2	28.8	34.9	67.2
C17alk	214	115	158	144	71.6	102	102	134	608	113
Pristane	189	127	26.3	83.8	113	412	153	98.8	52.9	245
C18alk	91.0	76.2	13.2	59.0	38.1	81.0	63.8	61.1	43.4	91.6
Phytane	151	104	18.9	38.0	78.0	146	98.8	80.8	58.6	143
C19alk	337	112	121	133	65.1	77.7	142	146	77.4	93.1
C20alk	364	69.0	-	63.2	29.9	51.3	40.5	54.4	26.8	77.3
C21alk	211	107	51.0	125	57.4	31.0	67.8	50.1	31.0	41.5
C22alk	50.8	44.8	34.6	83.9	30.3	16.3	64.7	13.0	14.9	34.9
C23alk	A	A	A	A	A	A	A	A	A	A
C24alk	A	A	A	A	A	A	A	A	A	A
C25alk	A	A	A	A	A	A	A	A	A	A
C26alk	A	A	A	A	A	A	A	A	A	A
C27alk	A	A	A	A	A	A	A	A	A	A
C28alk	A	A	A	A	A	A	A	A	A	A
C29alk	A	A	A	A	A	A	A	A	A	A
C30alk	72.4	51.0	6.62	126	4.87	27.1	16.6	32.1	4.86	64.5
C31alk	892	444	33.3	2000	187	-	190	22.7	41.3	19.8
C32alk	82.7	28.6	-	111	6.38	-	27.5	44.7	25.1	47.0
C33alk	339	190	5.47	336	76.0	-	128	-	16.4	27.0
C34alk	20.6	83.6	75.2	505	59.9	-	114	60.9	-	31.4
ALKANES	8100	3610	1170	6480	1890	1170	2120	1340	1480	1360
UCM	85900	46800	47700	38300	32500	36900	33500	36100	22100	55100
Total NAlkanes	3150	1560	762	4060	805	534	1080	777	1050	793

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Prince William Sound and Gulf of Alaska sediment samples

Station	Quicksand	Verdant
Name (#)	Cove(22)	Cove(24)
Date collected	27-Apr-90	27-Apr-90
Mean wet wt. (g)	12.6	10.2
Mean dry wt. (g)	10.1	10.0
N	1	1
Alkanes (ng/g)		
C10alk	-	-
C11alk	-	-
C12alk	-	-
C13alk	-	6.85
C14alk	17.3	17.4
C15alk	11.5	-
C16alk	46.0	8.69
C17alk	82.4	34.7
Pristane	53.4	47.6
C18alk	38.5	24.8
Phytane	46.6	46.2
C19alk	29.3	32.2
C20alk	17.4	21.6
C21alk	13.1	6.64
C22alk	6.97	4.80
C23alk	A	A
C24alk	A	A
C25alk	A	A
C26alk	A	A
C27alk	A	A
C28alk	A	A
C29alk	A	A
C30alk	-	-
C31alk	-	-
C32alk	-	-
C33alk	-	-
C34alk	-	-
ALKANES	363	251
UCM	14200	817
Total NAlkanes	263	158