Gulf of Mexico Produced Water Bioaccumulation Study

Executive Summaries

April 1997

(Reformatted for Microsoft Word in May 2009)

Prepared For:

Offshore Operators Committee
P.O. Box 50751
New Orleans, Louisiana 70150

Prepared By:

Continental Shelf Associates, Inc.
759 Parkway Street
Jupiter, Florida 33477

ACKNOWLEDGEMENTS
WE WOULD LIKE TO ACKNOWLEDGE THE OOC BIOACCUMULATION STUDY
CO-SPONSORS FOR THEIR SUPPORT OF THE PROJECT:

AEDC (USA), Inc.
Agip Petroleum Company, Inc.
Amerada Hess Corporation
American Exploration Company
Amoco Production Company
Anadarko Petroleum Company
ANR Production Company
Apache Corporation
(includes Aquila Energy Resources)
Ashland Exploration, Inc.
Ashlawn Energy, Inc.
Aviara Energy Corporation
(formerly Columbia Gas Development Corporation)
BHP Petroleum (Americas) Incorporated
Blue Dolphin Exploration Company
(includes Ivory Production Company)
BP Exploration
British-Borneo Exploration, Inc.
Chevron USA Prod. Company
CNG Producing Company, Inc.
Coastal Oil & Gas Corporation
Cockrell Oil Corporation
Conn Energy, Inc.
Conoco, Inc.
CXY Energy, Inc.
Elf Exploration Inc.
Enron Oil & Gas Company
Enserch Exploration Company
(includes DALEN Resources Oil & Gas
and EP Operating Ltd. Partnership)
Exxon Co., USA
Fina Oil & Chemical
Flores & Rucks, Inc.
Forcenergy Gas Exploration, Inc.
Forest Oil Corporation
Freeport-McMoran Oil & Gas Company
Greenhill Petroleum Corporation
Gulfstar Energy, Inc.
Gulfstream Resources, Inc.
Hall-Houston Oil Company
Houston Exploration Company
Howell Petroleum Company
Kerr-McGee Corporation

Louisiana Land & Exploration Company
Marathon Oil Company
Matrix Oil & Gas Company
Meridian Oil
Mesa Operating Ltd. Partnership
MidCon Offshore Corporation
Mitchell Energy Corporation
Mobil E & P Company
Murphy Exploration & Production Company
NCX Company, Inc.
Newfield Exploration Company
Nippon Oil Exploration USA (NOEX)
Norcen Explorer, Inc.
Oryx Energy Company
Oxy USA, Inc.
O.E.D.C. Partners
Panaco, Inc.
Pel Tex Oil Company
Pennzoil E & P Company
Phillips Petroleum Company
Pogo Producing Company
Samedan Oil Corporation
Santa Fe Energy Resources, Inc.
Seagull Energy Corporation
Shell Offshore Inc.
Sonat Exploration Company
Taylor Energy Company
Texaco Exploration & Production, Inc.
Torch Operating Company
Total Minatome Corporation
Trade & Development Corporation
UMC Petroleum Corporation
(includes General Atlantic Resources, Inc.)
Union Oil of California (UNOCAL)
Union Pacific Resources Company
Vastar Resources, Inc.
W & T Offshore
Zilkha Energy Company

THE CONTRACTORS FOR THIS STUDY WOULD LIKE TO ACKNOWLEDGE THE MEMBERS OF THE BIOACCUMULATION WORKING GROUP FOR THEIR SUPPORT AND COOPERATION DURING THIS PROJECT:

Dr. James P. Ray (Shell) - Chairman
Dr. R. C. Ayers (Robert Ayers & Associates)
Ms. Jan Farmer (BP Oil)
Mr. Brian E. Shannon (Arco)
Dr. Stanley Curtice (Texaco)
Dr. Andrew Glickman (Chevron)
Mr. Larry R. Henry (Chevron)
Dr. Bela M. James (Shell)
Mr. David J. LeBlanc (Texaco)
Dr. Lawrence A. Reitsema (Marathon)
Dr. Joseph P. Smith (Exxon Production Research Co.)
Dr. James E. O'Reilly (Exxon Production Research Co.)
Dr. Jerry Hall (Texaco)

THE CONTRACTOR WOULD ALSO LIKE TO ACKNOWLEDGE THE FOLLOWING INDIVIDUALS FOR THEIR CONTRIBUTION TO THIS PROJECT:

Dr. Woollcott Smith (Temple University)
Mr. Keith R. Parker (Data Analysis Group)
Dr. Dan D. Caudle (Sound Environmental Solutions, Inc.)

GULF OF MEXICO
PRODUCED WATER BIOACCUMULATION STUDY

TABLE OF CONTENTS

METALS AND ORGANIC CHEMICALS ASSOCIATED WITH OIL AND GAS WELL PRODUCED WATER: BIOACCUMULATION, FATES, AND EFFECTS IN THE MARINE ENVIRONMENT

EXECUTIVE SUMMARY

The current National Pollutant Discharge Elimination System (NPDES) General Permit (No. GMG290000) for discharges of 4,600 barrels/day or more of treated produced water from offshore oil and gas production platforms to offshore waters of the western Gulf of Mexico requires a site-specific bioaccumulation monitoring study. The offshore oil industry is participating in a U.S. Environmental Protection Agency-approved, generic bioaccumulation study that includes a more thorough evaluation of a smaller number of geographically distributed offshore produced water discharges. This report was prepared for the Gulf of Mexico Offshore Operators Committee to evaluate the scientific data concerning the bioaccumulation of chemicals commonly found in produced water to aid in interpreting the bioaccumulation monitoring data. This report evaluates the potential for bioaccumulation of the chemicals identified in the NPDES permit that require bioaccumulation evaluation and several other chemicals of environmental concern frequently found in treated produced water that is discharged to ocean waters of the Gulf of Mexico. The chemicals evaluated in this report include

- metals: arsenic, barium, cadmium, mercury, chromium, copper, lead, and zinc;
- naturally occurring radioactive material: radium-226 and radium-228;
- monocyclic aromatic hydrocarbons: benzene, toluene, ethylbenzene, and xylenes;
- polycyclic aromatic hydrocarbons (PAHs): fluorene, benzo(a)pyrene, total PAHs;
- miscellaneous organic chemicals: phenol and bis(2-ethylhexyl)phthalate (BEHP).

All these chemicals, except BEHP, are natural components of oil and gas well produced water and are natural trace ingredients of sea water.

The metals evaluated here are all, with the exception of mercury, nearly always found in produced water from the Gulf of Mexico. Mercury is only occasionally detected in produced water. These metals also are natural constituents of clean sea water. The metals most frequently found in produced water at concentrations substantially higher (1,000-fold or more) than their natural concentrations in clean sea water are barium, cadmium, chromium, copper, iron, lead, nickel, and zinc.

Some produced waters from the Gulf of Mexico contain concentrations of naturally occurring radioactivity higher than that encountered in sea water and brackish water. The most abundant radionuclides in produced water are radium-226 and radium-228. Concentrations in produced water may be up to 5,000 times higher than natural concentrations in sea water.

Monocyclic aromatic hydrocarbons (consisting primarily of benzene, toluene, ethylbenzene, and xylenes: BTEX) and PAHs are natural constituents of crude petroleum and dissolve from the oil into the produced water. Concentrations of BTEX are higher than those of PAHs in produced water and the relative concentration decreases with increasing molecular weight. High molecular weight, four- through six-ring PAHs are present at trace (sub-parts per billion) concentrations, when they can be detected at all. There are also traces of BTEX and PAHs in clean sea water, much of them derived from deposition of airborne hydrocarbons from combustion sources, and from natural oil and gas seeps that are abundant in the northwestern Gulf of Mexico.

Phenol often is present at high concentrations in produced water. BEHP is not a natural ingredient, nor is it added intentionally to produced water. It is a ubiquitous trace contaminant of the environment, being derived from leaching of plasticizers from plastics. Any traces detected in produced water probably are from this source.

For each of the chemicals, this report discusses the information available from the scientific literature on

- its occurrence in sea water;
- its occurrence in marine sediments;
- what is known about its tendency to bioaccumulate in tissues of marine organisms;
- concentrations in tissues of marine organisms in the Gulf of Mexico and in the other oceans of the world; and
- its toxicity to marine organisms.

Based on this information and information on the concentration of each chemical in Gulf of Mexico produced water, a judgement is made about the relative risk to the health of marine ecosystems and human consumers of fisheries products from these chemicals in produced water discharged to the ocean.

As a general rule, concentrations of metals in tissues of marine organisms in the Gulf of Mexico and in the immediate vicinity of offshore discharges of produced water are in the normal range and do not show evidence of bioaccumulation to potentially toxic levels for the organisms themselves or their consumers, including man. A review of the concentration of each metal in typical Gulf of Mexico produced water and its potential for bioaccumulation and toxicity reveals that only two metals have the potential to pose a health risk to marine organisms and their consumers. These metals are cadmium and copper. Any adverse effects of these metals, if they occur at all, are likely to be very localized in the immediate vicinity of the produced water discharge and affect mainly plants and animals living attached to submerged platform structures.

Radium isotopes, although often abundant in produced water, do not appear to bioaccumulate in the tissues of marine animals following discharge of produced water to the ocean. Radium is quantitatively removed from sea water by coprecipitation with barium as barium sulfate upon mixing of produced water (rich in barium) with sea water

(rich in sulfate). Radium is not toxic to marine organisms at the concentrations at which it occurs in produced water or in the receiving water environment of a produced water discharge. Therefore, it does not represent a hazard to marine organisms near produced water discharges, nor to human consumers of fishery products.

Phenol from produced water has a low potential to bioaccumulate and both phenol and BEHP are rapidly metabolized and excreted by marine animals. Therefore, these chemicals are not considered hazardous to marine organisms. BTEX are abundant in produced water, but disappear very rapidly from the receiving water environment through evaporation, dilution, and biodegradation. They are only moderately toxic and do not biaccumulate to high concentrations in tissues of marine animals. They are not transferred to man through consumption of fishery products. Therefore, BTEX in produced water does not pose a health risk to marine organisms or human consumers of fishery products.

PAHs in produced water, represented by the low molecular weight PAH, fluorene, and the high molecular weight PAH, benzo(a)pyrene, have a low or moderate potential risk to marine organisms and human consumers of fishery products. The low molecular weight two- and three-ring PAHs often are relatively abundant in produced water, concentrations decreasing with increasing molecular weight. They have a tendency to bioaccumulate and often are persistent in sediments near produced water discharges. Because they are toxic, they pose a moderate risk to organisms near the produced water discharge or in sediments near the outfall. High molecular weight four- through six-ring PAHs, on the other hand, are rarely present in produced water at greater than trace (sub-parts per billion) concentrations. Although some, such as benzo(a)pyrene, are known or suspected mammalian carcinogens and readily bioaccumulate, their extremely low concentrations in produced water renders them a low risk to marine ecosystems and human consumers of fishery products from the vicinity of produced water discharges. The major source of high molecular weigh PAHs in offshore waters of the Gulf of Mexico is soot from various combustion sources. PAHs associated with soot are tightly bound to the particles and are not readily bioavailable to marine organisms. These compounds are not accumulated efficiently from the food and are biodegraded rapidly in the tissues of most marine animals; therefore, they do not biomagnify in marine food webs and do not pose a potential hazard to fish that consume biofouling organisms from submerged platform structures.

GULF OF MEXICO PRODUCED WATER BIOACCUMULATION STUDY
DEFINITIVE COMPONENT

EXECUTIVE SUMMARY

The objectives of the Definitive Component of the Gulf of Mexico Produced Water Bioaccumulation Study were to

- determine whether statistically significant bioaccumulation of target chemicals in produced water occurs in the edible tissues of resident fishes and invertebrates at representative Gulf of Mexico offshore platforms that discharge more than 4,600 barrels per day (bbl/d) of produced water relative to non-discharging platforms; and

- evaluate the ecological and human health implications of observed concentrations of target chemicals in edible tissues of fishes and invertebrates collected near offshore platforms in the Gulf of Mexico.

The study was performed in response to a U.S. Environmental Protection Agency (EPA) Region VI National Pollutant Discharge Elimination System General Permit requirement and was funded through the Offshore Operators Committee. The Definitive Component was designed to compare concentrations of 60 target chemicals (metals, radium isotopes, phenol, bis(2-ethylhexyl)phthalate [BEHP], monocyclic aromatic hydrocarbons, and polycyclic aromatic hydrocarbons [PAHs]) in edible tissues of fish and bivalve mollusk species from two discharging/non-discharging platform pairs. The two discharging platforms discharged approximately 7,000 and 11,000 bbl/d of treated produced water. Samples of produced water, ambient seawater, and the selected fish and mollusk species were collected from the two platform pairs during two cruises, one in the spring and one in the fall. The samples were analyzed with state-of-the-art methods that included a rigorous quality assurance/quality control program. Low detection limits for the target chemicals were achieved that made it possible to determine if the target chemicals were present in edible tissues at concentrations of ecological and human health concern. Despite the low detection limits, the target organic chemicals were not present in most tissue samples at concentrations above the method detection limits. Radium isotopes were detected in 55% of the tissue samples, but at concentrations below EPA risk-based concentrations (RBCs). The four target metals were present in tissues at concentrations typical for marine animals from clean marine environments.

There was no evidence of bioaccumulation from produced water of mercury, BEHP, fluorene, and benzo(a)pyrene. The evidence for bioaccumulation from produced water was weak, inconclusive, doubtful, or contradictory for arsenic, barium, cadmium, radium isotopes, phenol, and total PAHs. Based on a review of the published literature, none of the EPA-specified target chemicals were present in edible tissues at concentrations that might be harmful to the fishes and mollusks. Two of the target chemicals (arsenic and cadmium) were present in a few edible tissue samples, particularly mollusks, at

concentrations slightly higher than RBCs. However, these chemicals were present in tissues in nontoxic forms and do not pose a health hazard to consumers of bivalve fishes and mollusks from the northwestern Gulf of Mexico.

GULF OF MEXICO PRODUCED WATER BIOACCUMULATION STUDY
DEFINITIVE COMPONENT

SYNOPSIS

Objectives

The objectives of the Definitive Component of the Gulf of Mexico Produced Water Bioaccumulation Study were to

- determine whether statistically significant bioaccumulation of target chemicals in produced water occurs in the edible tissues of resident fishes and invertebrates at representative Gulf of Mexico offshore platforms that discharge more than 4,600 barrels per day (bbl/d) of produced water relative to non-discharging platforms; and

- evaluate the ecological and human health significance of observed concentrations of target chemicals in edible tissues of fishes and invertebrates collected near offshore platforms in the Gulf of Mexico.

Background

In December 1993, the U.S. Environmental Protection Agency (EPA) Region VI published a modified version of the final National Pollutant Discharge Elimination System (NPDES) General Permit (GMG290000) for the Western Gulf of Mexico Outer Continental Shelf. The modified permit required that a site-specific bioaccumulation monitoring study be conducted by operators with existing facilities that discharge more than 4,600 bbl/d of produced water. The monitoring study design involved semiannual collections of tissues of mollusk, crustacean, and fish species at each platform discharging more than 4,600 bbl/d and analysis of these samples for volatile organic compounds (benzene, toluene, ethylbenzene), semivolatile organic compounds (phenol, fluorene, benzo[a]pyrene [BAP], bis(2-ethylhexyl)phthalate [BEHP]), metals (arsenic, cadmium, mercury), and radionuclides (^{226}Ra and ^{228}Ra). As an alternative to the preceding requirement, operators could participate in an EPA-approved, industry-wide, bioaccumulation monitoring study rather than conducting individual bioaccumulation monitoring studies. In response, the Offshore Operators Committee (OOC) proposed an industry-wide bioaccumulation study. After imposing additional requirements, EPA Region VI approved the industry-wide bioaccumulation study, which consisted of a Definitive Component and a Platform Survey Component. The Definitive Component involved intensive, statistically designed sampling to determine whether marine organisms at two locations, each representing a discharging and non-discharging platform pair, were bioaccumulating target chemicals from produced water. The Platform Survey Component met EPA requirements for sampling a broad geographic distribution of discharging and non-discharging platform sites to determine tissue concentrations of the target chemicals. Separate reports have been prepared for the Definitive and Platform Survey Components. In addition, a literature review on the

marine bioaccumulation, fate, and effects of produced water constituents has been prepared.

Study Design and Methods

The Definitive Component was designed to compare concentrations of target chemicals (12 NPDES permit chemicals plus 48 additional chemicals [barium, four monoaromatic hydrocarbons, and 43 polycyclic aromatic hydrocarbons] added to the study by the OOC) in the tissues of several fish and invertebrate species living at two platform pairs selected from four pairs that were initially sampled. The abundances of appropriate species and isolation of the platforms from other potential sources of the target chemicals (e.g., the Mississippi River) were the primary factors in the selection of the two platform pairs. One pair consisted of a platform discharging approximately 7,000 bbl/d of produced water and a reference platform and the other pair consisted of a platform discharging approximately 11,000 bbl/d and a reference platform.

The selected platforms (**Figure S-1**) were visited during May and October-December 1995. Three samples of produced water were collected at each discharging platform. Three samples of ambient seawater, and multiple specimens of two bivalve mollusks and three fish species (**Table S-1**) were collected at each platform. Fish tissue samples consisted of muscle (edible fillet) only, while bivalve samples included the whole soft tissue. The samples were analyzed using state-of-the-art instrumentation and methods following a rigorous quality assurance/quality control program to determine the concentrations of the target chemicals. Low method detection limits (MDLs) comparable to or below risk-based concentrations (RBCs) were achieved through this effort (**Table S-2**). This made it possible to determine if target chemicals were present at concentrations of ecological and human health concern.

Data on concentrations of target chemicals in produced water and ambient seawater were used to estimate the potential exposure of marine animals to elevated concentrations of target chemicals. Statistical comparisons of concentrations of target produced water chemicals in fishes and bivalves from the discharging/reference platform pairs were used to determine if animals from discharging platforms are bioaccumulating the target chemicals from the produced water discharges. When a statistically significant difference was detected, the tissue residues were compared with the tissue residue data for the same or closely related taxa in the scientific literature. The results of this evaluation for each species and target chemical were classified based on the criteria in **Table S-3** into one of four categories: 1) strong evidence for bioaccumulation; 2) weak or inconclusive evidence for bioaccumulation; 3) doubtful or contradictory evidence for bioaccumulation; and 4) no evidence for bioaccumulation.

Results

Bioaccumulation

All but two of the target chemicals were found at higher concentrations in produced water than in seawater. The first exception was mercury which was not present at

concentrations above the MDL. The second exception, BEHP, is not a natural or intentionally-added component of produced water and when detected in produced water probably is due to contamination of the sample during collection, processing, or analysis. Most of the volatile and semivolatile organic compounds except BAP were present in produced water at concentrations above their MDLs, while concentrations of the same compounds in seawater and tissues were nearly all below their MDLs (**Table S-4**).

The probability of bioaccumulation from produced water was assessed for arsenic, barium, cadmium, and mercury; ^{226}Ra and ^{228}Ra; phenol; BEHP; fluorene; BAP; and total polycyclic aromatic hydrocarbons (PAHs) (**Table S-5**). The volatile organics were excluded from this assessment since more than 96% of the tissue concentrations were less than the MDLs, indicating that bioaccumulation of volatile organics from produced water or any other source is not a significant concern for fishes and bivalves near offshore oil platforms.

There was no strong evidence for bioaccumulation (as defined by the criteria for Category 1 in **Table S-3**) for any of the chemicals assessed. There was no evidence at all for bioaccumulation (as defined by the criteria for Category 4 in **Table S-3**) for mercury, BEHP, fluorene, and BAP. Evidence for bioaccumulation of the other assessed chemicals was either Category 2 (weak or inconclusive) or Category 3 (doubtful and contradictory).

Evidence for bioaccumulation of arsenic in fishes was considered "weak or inconclusive" because tissue concentrations were statistically significantly higher at discharging than at reference platforms in only 3 out of 12 cases.

At one platform pair during one cruise thorny oyster from the discharging platform contained statistically significantly higher concentrations of several PAHs than thorny oyster from the paired reference site. The PAH assemblage in the thorny oyster tissues resembled that of a light refined product or produced water. Concentrations of individual PAHs generally were low and not unusual for soft tissues of bivalves. Therefore, thorny oyster was placed in Category 2 because bioaccumulation of petroleum-derived PAHs was demonstrated in only one instance, and the source(s) of the PAHs was unclear.

Ecological Risk

Based on a review of the published literature on relationships between toxic response and tissue residues of metals, radium isotopes, and organics in freshwater and marine organisms, none of the EPA-specified target chemicals were present at concentrations that might be harmful to the fishes and bivalves. The only possible exception is cadmium in thorny oysters. However, natural concentrations of cadmium are elevated in soft tissues of oysters and scallops from uncontaminated marine environments world-wide. These cadmium residues are tightly bound to solid concretions, mostly in the kidneys, and are not toxic to the bivalves. It is probable that thorny oysters also naturally sequester large amounts of cadmium in inert tissue granules.

Human Health Assessment

The method used to assess if fishes and bivalves harvested near offshore produced water discharges pose a health risk to human consumers was to compare tissue concentrations of the target chemicals in fishes and bivalves with RBCs. It should be noted that the bivalves and three of the fish species (creole-fish, yellow chub, and sergeant major) are not normally consumed by humans. Concentrations of most target chemicals in edible fish and bivalve tissues were substantially lower than the RBCs. Arsenic exceeded the RBC in all fish and bivalve species, and cadmium exceeded the RBC in the thorny oyster. However, the RBC for arsenic is believed to be overly conservative, because the arsenic present in marine organisms is present in non-toxic organic forms. As discussed above, several species of bivalves contain naturally high concentrations of cadmium (above RBC) in their tissues in inert granules; in this form it is not bioavailable to consumers of fishery products, including humans. It is therefore highly likely that the cadmium in thorny oysters is natural and does not pose a health hazard to human consumers of shellfish products. The other target chemical concentrations in fish and bivalve tissues were well below the applicable RBC values and do not pose any health risk to human consumers of fishery products harvested near produced water discharges.

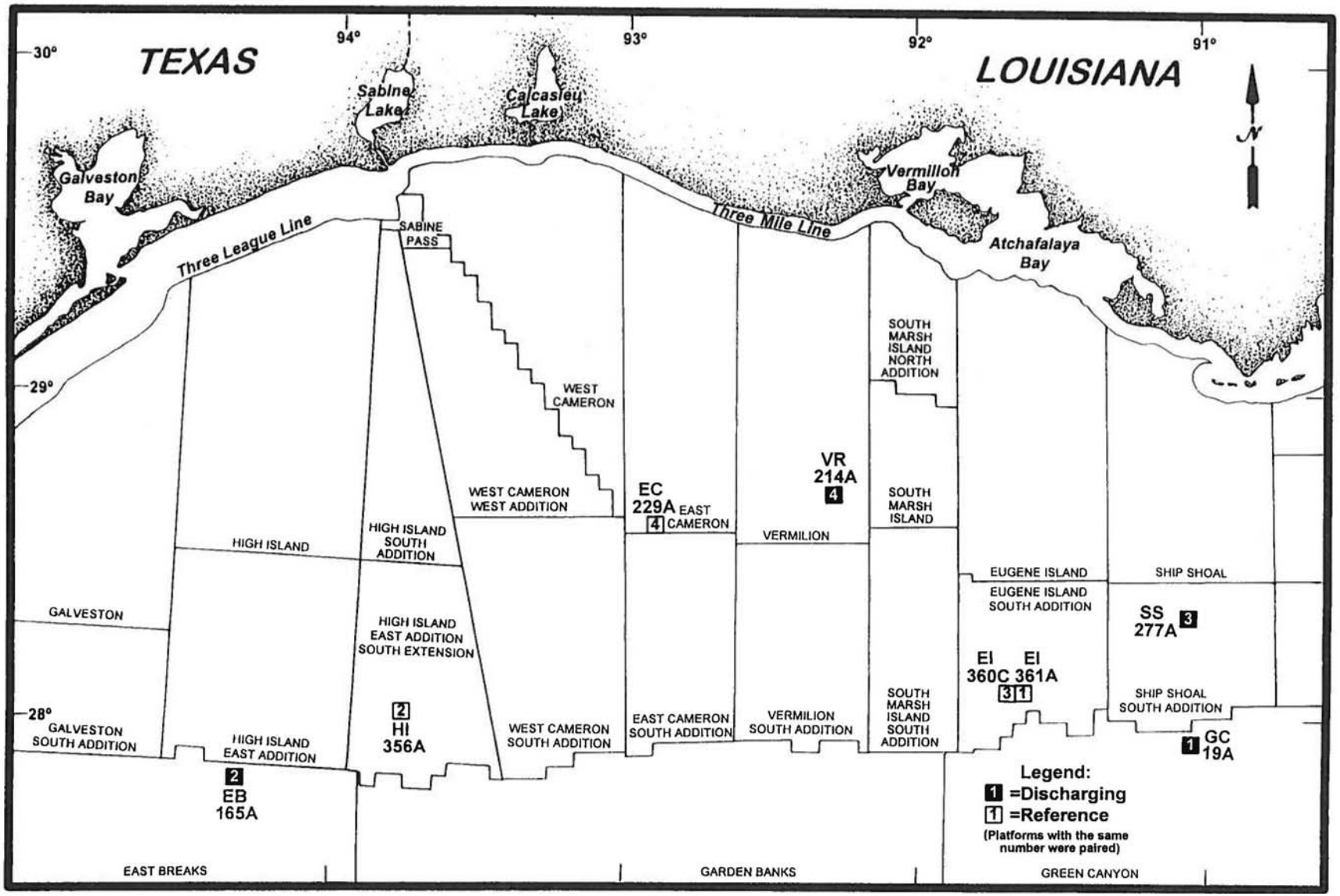

Figure S-1. Platforms sampled during Cruise 1 of the Definitive Component of the OOC Gulf of Mexico Produced Water Bioaccumulation Study.

Table S-1. Platforms sampled and species collected for the Definitive Component.

Platform Pair	Sampling Period	Species
East Breaks 165A High Island A 356A	Spring 1995	Jewel box (mollusk) Thorny oyster (mollusk) Yellow chub (fish) Creole-fish (fish) Rockhind (fish)
	Fall 1995	Jewel box (mollusk) Thorny oyster (mollusk) Yellow chub (fish) Creole-fish (fish) Sergeant major (fish)
Green Canyon 19A Eugene Island 361A	Spring 1995	Jewel box (mollusk) Thorny oyster (mollusk) Yellow chub (fish) Creole-fish (fish) Gray triggerfish (fish)
	Fall 1995	Jewel box (mollusk) Thorny oyster (mollusk) Yellow chub (fish) Creole-fish (fish) Gray triggerfish (fish)

Table S-2. Method detection limits for the Definitive Component Study.

Target Chemical Class	Produced Water (ng/L)	Ambient Seawater (ng/L)[d]	Tissue (ng/g - dry weight)
Volatile Organic Compounds	90 to 310	90 to 310	2.4 to 4.1
Semivolatile Organic Compounds [a]	1.0 to 11	1.0 to 11	1.3 to 16
Metals [b]	10 to 620	5 to 30	1 to 50
Radium Isotopes [c]	0.01 to 0.75	0.007 to 0.070	0.001 to 0.03

[a] Not included in range are bis(2-ethylhexyl)phthalate (90 ng/L in water and 140 ng/g in tissues) and phenol (38 ng/g in tissues).
[b] Not included in range is barium (240 µg/L in produced water and 140 ng/L in ambient seawater).
[c] pCi/L and pCi/g wet weight.
[d] ng/L and ng/g are approximately the same as parts per billion (ppb).

Table S-3. Criteria for produced water bioaccumulation classification for species and target chemicals.

Category 1: Strong evidence for bioaccumulation to biologically significant tissue concentrations.

A. Tissue concentrations significantly higher at the discharging platform of both platform pairs and both surveys; and

B. Tissue residues for chemical at discharging platforms exceed the "typical" range for the chemical in marine animals from uncontaminated environments.

Category 2: Weak or inconclusive evidence for bioaccumulation.

A. Tissue concentrations significantly greater at one discharging platform (compared to the paired reference platform) on both surveys, but no significant differences at the other platform pair; or

B. Tissue concentrations significantly greater at one or both discharging platforms in comparison to their paired reference platforms, but only on one survey; and

C. Differences in concentrations in tissues of marine animals from discharge and reference platforms are small and within the "typical" range for marine animals from uncontaminated marine environments.

Category 3: Doubtful or contradictory evidence for bioaccumulation.

A. Tissue concentrations significantly higher at one discharging platform on one occasion (compared to the paired reference platform); and

B. Tissue concentrations significantly higher at one or both reference platforms than at the paired discharging platform on one or both cruises; and

C. Differences in concentrations in tissues of marine animals from discharge and reference platforms are small and within the "typical" range for marine animals from uncontaminated marine environments.

Category 4: No evidence of bioaccumulation.

A. No significant differences between paired produced water discharging and reference platforms for either cruise or concentrations significantly higher more frequently in marine animals from the reference than from the discharging platform; and

B. All concentrations within the "typical" range for uncontaminated marine environments.

Table S-4. Percentage of analysis values (dry weight basis) below method detection limit (MDL) and practical quantitation level (PQL) (defined as five times MDL). There is a reduced confidence in the reported magnitude of a value that is below the PQL.

Target Chemical Class	Produced Water		Ambient Seawater		Tissues	
	MDL	PQL	MDL	PQL	MDL	PQL
Volatile Organic Compounds	5	5	98	100	96	99
Semivolatile Organic Compounds	30	34	88	97	87	98
Metals	40	43	33	36	1	12
Radium Isotopes	0	0	52	52	45[a]	45

[a] Includes values below PQL defined in this study.

Table S-5. Ranking of the evidence for bioaccumulation from produced water by marine bivalves and fish from the vicinity of offshore, high-volume produced water discharges. The ranking categories are 1) strong evidence for bioaccumulation; 2) weak or inconclusive evidence for bioaccumulation; 3) doubtful or contradictory evidence for bioaccumulation; and 4) no evidence for bioaccumulation. Volatile organic compounds were not included in this analysis because they were not detected in 96% of the samples and were therefore Category 4.

Chemical	Jewel Box	Thorny Oyster	Fish
Arsenic	4	3	2
Barium	3	4	4
Cadmium	4	3	4 (YC, CF, RH) 3 (GT, SM)
Mercury	4	4	4
Radium Isotopes	3	4	4
Phenol	3	3	3 (GT) 4 (YC, CF, RH, SM)
Bis(2-ethylhexyl)phthalate	4	4	4
Fluorene	4	4	4
Benzo(a)pyrene	4	4	4
Total Polycyclic Aromatic Hydrocarbons	3	2	4

CF = Creole-fish.
RH = Rockhind.
SM = Sergeant major.
GT = Gray triggerfish.
YC = Yellow chub.

GULF OF MEXICO PRODUCED WATER BIOACCUMULATION STUDY
PLATFORM SURVEY COMPONENT

EXECUTIVE SUMMARY

The National Pollutant Discharge Elimination System General Permit for the Western Gulf of Mexico Outer Continental Shelf (GMG 290000) requires bioaccumulation monitoring for facilities discharging more than 4,600 barrels/day (bbl/d) of treated produced water. The objective of the Platform Survey Component of the bioaccumulation study was to determine the concentrations of 12 U.S. Environmental Protection Agency (EPA)-specified target chemicals in edible tissues of fishes and invertebrates collected in the immediate vicinity of produced water discharging and non-discharging platforms from different regions of the western Gulf of Mexico. Two species of fish were sampled from 11 discharging/non-discharging platform pairs, and oysters, blue crabs, and 1 species of fish were collected for analysis from 1 discharging/non-discharging platform pair. The platform pairs consisted of Definitive Component Platforms and platforms located in four areas: high platform density; influenced by the Mississippi River; water depths less than 10 m; and off the Texas coast. Edible tissues of oysters, crabs, and fishes were analyzed by advanced, sensitive methods for arsenic, cadmium, mercury, ^{226}Ra and ^{228}Ra, benzene, toluene, ethylbenzene, phenol, bis(2-ethylhexyl)phthalate (BEHP), fluorene, and benzo(a)pyrene (BAP). The target metals were measured in 496 tissue samples; target volatile organic chemicals were measured in 494 tissue samples, target semivolatile organic chemicals were measured in 495 tissue samples; and target radionuclides were measured in 495 tissue samples. This represents the largest existing database of chemical residues in tissues of marine animals from the western Gulf of Mexico.

The analytical methods provided method detection limits (MDLs) well below screening level risk-based concentrations (RBCs) for protection of human consumers of fishery products. Nevertheless, most of the analytical results for organic chemicals in tissues were below the MDLs. The volatile aromatic hydrocarbons, benzene, toluene, and ethylbenzene were not detected in 97% of tissue samples. In the few samples in which a volatile aromatic hydrocarbon was detected, the concentration was orders of magnitude below the RBC. Fluorene was not detected in 89% of tissue samples. The highest measured concentration was 0.03% of the RBC. BAP was not detected in over 97% of 494 tissue samples. Phenol was not detected in 86% of tissue samples. Most of the other tissue samples in which phenol was detected were collected from non-discharging platforms and contained phenol concentrations 50% or less of the RBC. BEHP was not detected in 90% of tissue samples. It was found in some blank samples, indicating that, when present, it may be the result of sample contamination during collection, processing, and analysis. Tissues containing detectable concentrations of BEHP were collected about equally from discharging and non-discharging platforms. The tissue BEHP, if not an artifact, was derived from a source other than produced water, because BEHP is not a known component of produced water. Arsenic and mercury were detected in all tissue samples. Concentrations were typical of those in tissues of marine animals from clean marine

environments throughout the world. All tissue samples contained arsenic concentrations higher than the RBC. Arsenic is abundant in edible tissues of all marine animals and is present in non-toxic organic forms. There was no apparent difference in mercury and arsenic concentrations in tissues of marine animals from discharging and non-discharging platform sites. Cadmium was detected in 82% of 496 tissue samples. Cadmium concentrations were comparable in edible tissues of marine animals from discharging and non-discharging platforms. Total radium (sum of ^{226}Ra and ^{228}Ra) was detected in less than half of the tissue samples.

The results of this study indicate that there is no relationship between the proximity of marine animals to offshore produced water discharges and concentrations in their edible tissues of the 12 EPA-targeted chemicals. The concentrations of the chemicals in edible tissues of marine animals from the western Gulf of Mexico are below concentrations that might represent a hazard to the marine animals themselves or their consumers, including man.

GULF OF MEXICO PRODUCED WATER BIOACCUMULATION STUDY
PLATFORM SURVEY COMPONENT

SYNOPSIS

Introduction

The National Pollutant Discharge Elimination System General Permit for the Western Gulf of Mexico Outer Continental Shelf (GMG 290000) requires bioaccumulation monitoring for facilities discharging more than 4,600 barrels/day (bbl/d) of produced water. The monitoring required by the permit was to be carried out according to a U.S. Environmental Protection Agency (EPA) defined sampling plan. As an alternative to sampling at each facility discharging in excess of 4,600 bbl/d, the permit allowed operators to participate in an EPA-approved, industry-wide, bioaccumulation monitoring program. The EPA approved an industry-wide study design proposed by the Offshore Operators Committee (OOC). The study consisted of two parts: the OOC-designed Definitive Component, which involved intensive, statistically designed sampling at a limited number of sites, and the EPA-specified Platform Survey Component, which involved sampling at a broad cross-section of locations in the central and western Gulf of Mexico.

Objective

The objective of the Platform Survey Component was to determine the concentrations of EPA-specified target chemicals in the edible tissue of marine organisms collected in the immediate vicinity of discharging and non-discharging platforms from different regions in the Gulf of Mexico. To meet this objective, biological specimens were collected at 12 platform pairs (1 discharging platform and 1 non-discharging platform in each pair). The EPA required that two platform pairs be located in each of the following areas: high platform density; influenced by the Mississippi River; less than 10 m water depths; and off the Texas coast. To reach the required total of 12 platform pairs, the 4 platform pairs that were candidate study sites for the Definitive Component were also included. **Figure S-1** shows the geographic locations of the platforms.

Sampling Design

At 11 platform pairs two species of fish were to be collected, and at 1 platform pair fish, mollusk, and crustacean species were to be collected. Sampling was conducted during the fall and spring at each platform pair. The edible tissues were analyzed to determine the concentrations of selected volatile organic compounds (VOCs) (benzene, toluene, and ethylbenzene), semivolatile organic compounds (SVOCs) (phenol, fluorene, benzo[a]pyrene [BAP], and bis[2-ethylhexyl]phthalate [BEHP]), metals (arsenic, cadmium, and mercury), and radionuclides (^{226}Ra and ^{228}Ra).

Results

The results of this investigation represent the largest existing database on contaminant residues in tissues of marine animals, particularly fishes, from the northwestern Gulf of Mexico. The target metals were measured in 496 tissue samples; target volatile organic chemicals were measured in 494 tissue samples, target semivolatile organic chemicals were measured in 495 tissue samples; and target radionuclides were measured in 495 tissue samples.

One would expect that concentrations of the chemicals would be significantly higher in tissues of marine animals from platforms with large-volume produced water discharges than in tissues of marine animals from nearby offshore platforms with no produced water discharge. This was not found to be the case in this study. Highly specific and sensitive analytical methods were used in this investigation to quantify traces of the target chemicals in marine organisms. Method detection limits (MDLs) were well below risk-based concentrations (RBCs) (MDLs averaged 6.0% of corresponding RBCs) of the analytes in tissues of fishes consumed by man. Thus, very low tissue concentrations and small differences among sampling sites could be detected. Nevertheless, no consistent trends in concentrations of the different target chemicals were detected in tissues of marine mammals from different regions of the northwestern Gulf of Mexico and between produced water discharging and non-discharging sites.

The results for VOCs, SVOCs, metals, and radium are discussed below.

Volatiles

Benzene, toluene, and ethylbenzene were not detectable in 96.8% of the tissue samples analyzed for this study. The MDLs were orders of magnitude below RBCs for benzene and toluene. These results show that the concentrations of volatile aromatic hydrocarbons in Gulf of Mexico marine organisms living near offshore platforms are well below levels of environmental concern. The presence of benzene, toluene, and ethylbenzene from produced water or any other source in marine organisms living near offshore platforms is not a significant environmental problem.

Semivolatiles

Fluorene was not detectable in 89% of the samples analyzed for this study. The highest concentration measured in any sample was only 0.03% of the RBC. These results show that contamination of Gulf of Mexico organisms living near offshore platforms by fluorene from produced water or any other source is not a significant environmental problem.

Phenol was not detectable in 86% of the samples analyzed for this study. In the remaining samples, the highest concentrations (less than of the RBC) were found in samples collected near platforms that were not discharging produced water. These results show that phenol is not found at levels of concern in Gulf of Mexico marine organisms living near offshore platforms and that there is no indication

that the presence of phenol is correlated with the practice of discharging produced water.

BAP was not detectable in 97% of the 494 samples analyzed for this study. The results of this study show that BAP is not found at levels of concern in the Gulf of Mexico marine organisms living near offshore platforms. BAP usually is not detected in produced water; it is primarily from combustion sources. There is no indication that the presence of BAP is correlated with the practice of discharging produced water.

BEHP was not detectable in 90% of the samples analyzed for this study. The remaining 11% of samples in which BEHP was detectable were about equally divided between discharging and non-discharging sites. BEHP is not a natural or intentionally added component of produced water so one would not expect it to be present at elevated concentrations in tissues of marine animals near produced water discharges. It is recognized that BEHP is frequently present as an artifact in environmental samples. The results of this study were consistent with this view in that BEHP was found in concentrations exceeding the RBC in some samples at about the same number of discharging platforms and non-discharging platforms. There is no indication that the presence of BEHP is correlated with the practice of discharging produced water.

Metals

Mercury was detectable in all samples analyzed for this study. Mean mercury concentrations were equally likely to be higher in tissues of particular species from a produced water discharge site as from a non-discharging platform. This supports the results of this study that show fishes and invertebrates are not bioaccumulating mercury from offshore produced water discharges.

Arsenic was detectable in all tissue samples analyzed for this study. As is the case with essentially all seafood, average levels of arsenic in tissues analyzed for this study were in excess of the RBC at both discharging and non-discharging platforms. Arsenic concentrations in edible tissues of marine animals analyzed in this study are within the natural range for marine animals world-wide. Average levels of arsenic in the tissues of a given species were no more likely to be higher for organisms collected near discharging platforms than for organisms collected near non-discharging platforms. This suggests that factors other than proximity to a produced water discharge are the main determinants of tissue arsenic levels. Arsenic concentrations measured in tissues of marine fishes and invertebrates from the vicinity of platforms in the northwestern Gulf of Mexico are within the range typical for animals living in the Gulf of Mexico. Therefore, there is no indication that marine animals were bioaccumulating arsenic from produced water.

Cadmium was detectable in 82% of the 496 samples analyzed for this study. Oysters world-wide contain naturally high concentrations of cadmium in soft

tissues, mostly the kidneys. Mean cadmium concentrations in oyster tissues in this study were comparable at the nearshore produced water discharging and non-discharging platforms, but were higher in the fall than in the spring, possibly reflecting seasonal changes in cadmium concentrations in the ambient seawater.

There was no consistent trend of geographic, seasonal, or discharge/non-discharge differences in concentrations of cadmium in tissues of marine fishes and crabs. This study indicates that cadmium was not bioaccumulated from produced water by the marine fishes and crabs.

Radium

Radium was detectable in less than half of the samples analyzed for this study. The highest concentration was less than one-third the RBC. The results of this study do not indicate that contamination of organisms found near Gulf of Mexico platforms with radium from produced water or any other source is a significant environmental concern.

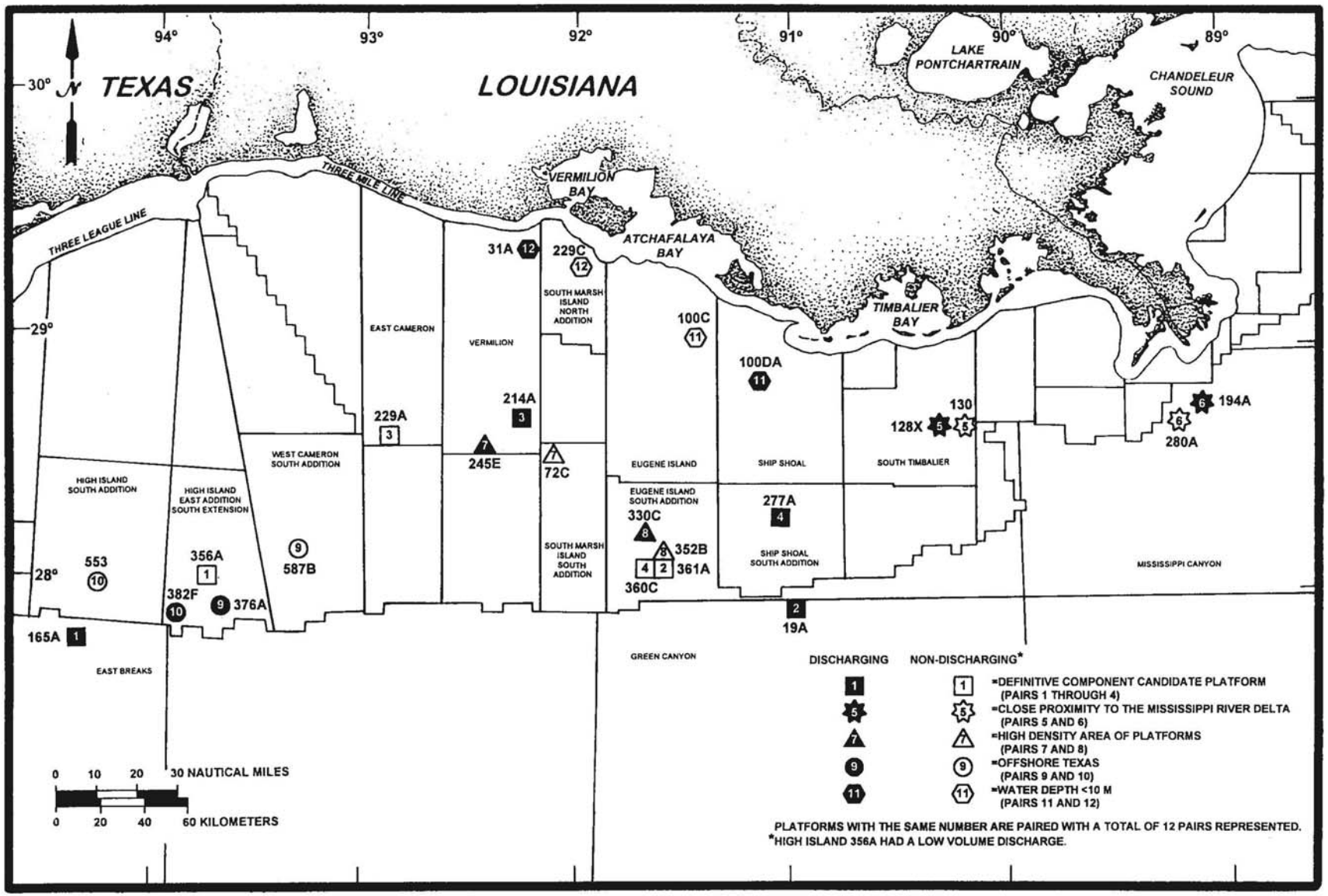

Figure S-1. Platforms sampled during the Platform Survey Component of the OOC Gulf of Mexico Produced Water Bioaccumulation Study.

Gulf of Mexico Produced Water Bioaccumulation Study

Definitive Component Technical Report

April 1997

(Reformatted for Microsoft Word in May 2009)

Prepared For:

Offshore Operators Committee
P.O. Box 50751
New Orleans, Louisiana 70150

Prepared By:

Continental Shelf Associates, Inc.
759 Parkway Street
Jupiter, Florida 33477

GULF OF MEXICO PRODUCED WATER BIOACCUMULATION STUDY
DEFINITIVE COMPONENT

EXECUTIVE SUMMARY

The objectives of the Definitive Component of the Gulf of Mexico Produced Water Bioaccumulation Study were to

- determine whether statistically significant bioaccumulation of target chemicals in produced water occurs in the edible tissues of resident fishes and invertebrates at representative Gulf of Mexico offshore platforms that discharge more than 4,600 barrels per day (bbl/d) of produced water relative to non-discharging platforms; and

- evaluate the ecological and human health implications of observed concentrations of target chemicals in edible tissues of fishes and invertebrates collected near offshore platforms in the Gulf of Mexico.

The study was performed in response to a U.S. Environmental Protection Agency (EPA) Region VI National Pollutant Discharge Elimination System General Permit requirement and was funded through the Offshore Operators Committee. The Definitive Component was designed to compare concentrations of 60 target chemicals (metals, radium isotopes, phenol, bis(2-ethylhexyl)phthalate [BEHP], monocyclic aromatic hydrocarbons, and polycyclic aromatic hydrocarbons [PAHs]) in edible tissues of fish and bivalve mollusk species from two discharging/non-discharging platform pairs. The two discharging platforms discharged approximately 7,000 and 11,000 bbl/d of treated produced water. Samples of produced water, ambient seawater, and the selected fish and mollusk species were collected from the two platform pairs during two cruises, one in the spring and one in the fall. The samples were analyzed with state-of-the-art methods that included a rigorous quality assurance/quality control program. Low detection limits for the target chemicals were achieved that made it possible to determine if the target chemicals were present in edible tissues at concentrations of ecological and human health concern. Despite the low detection limits, the target organic chemicals were not present in most tissue samples at concentrations above the method detection limits. Radium isotopes were detected in 55% of the tissue samples, but at concentrations below EPA risk-based concentrations (RBCs). The four target metals were present in tissues at concentrations typical for marine animals from clean marine environments.

There was no evidence of bioaccumulation from produced water of mercury, BEHP, fluorene, and benzo(a)pyrene. The evidence for bioaccumulation from produced water was weak, inconclusive, doubtful, or contradictory for arsenic, barium, cadmium, radium isotopes, phenol, and total PAHs. Based on a review of the published literature, none of the EPA-specified target chemicals were present in edible tissues at concentrations that might be harmful to the fishes and mollusks. Two of the target chemicals (arsenic and cadmium) were present in a few edible tissue samples, particularly mollusks, at

concentrations slightly higher than RBCs. However, these chemicals were present in tissues in nontoxic forms and do not pose a health hazard to consumers of bivalve fishes and mollusks from the northwestern Gulf of Mexico.

ACKNOWLEDGEMENTS
WE WOULD LIKE TO ACKNOWLEDGE THE OOC BIOACCUMULATION STUDY
CO-SPONSORS FOR THEIR SUPPORT OF THE PROJECT:

AEDC (USA), Inc.
Agip Petroleum Company, Inc.
Amerada Hess Corporation
American Exploration Company
Amoco Production Company
Anadarko Petroleum Company
ANR Production Company
Apache Corporation
(includes Aquila Energy Resources)
Ashland Exploration, Inc.
Ashlawn Energy, Inc.
Aviara Energy Corporation
(formerly Columbia Gas Development Corporation)
BHP Petroleum (Americas) Incorporated
Blue Dolphin Exploration Company
(includes Ivory Production Company)
BP Exploration
British-Borneo Exploration, Inc.
Chevron USA Prod. Company
CNG Producing Company, Inc.
Coastal Oil & Gas Corporation
Cockrell Oil Corporation
Conn Energy, Inc.
Conoco, Inc.
CXY Energy, Inc.
Elf Exploration Inc.
Enron Oil & Gas Company
Enserch Exploration Company
(includes DALEN Resources Oil & Gas
and EP Operating Ltd. Partnership)
Exxon Co., USA
Fina Oil & Chemical
Flores & Rucks, Inc.
Forcenergy Gas Exploration, Inc.
Forest Oil Corporation
Freeport-McMoran Oil & Gas Company
Greenhill Petroleum Corporation
Gulfstar Energy, Inc.
Gulfstream Resources, Inc.
Hall-Houston Oil Company
Houston Exploration Company
Howell Petroleum Company

Kerr-McGee Corporation
Louisiana Land & Exploration Company
Marathon Oil Company
Matrix Oil & Gas Company
Meridian Oil
Mesa Operating Ltd. Partnership
MidCon Offshore Corporation
Mitchell Energy Corporation
Mobil E & P Company
Murphy Exploration & Production Company
NCX Company, Inc.
Newfield Exploration Company
Nippon Oil Exploration USA (NOEX)
Norcen Explorer, Inc.
Oryx Energy Company
Oxy USA, Inc.
O.E.D.C. Partners
Panaco, Inc.
Pel Tex Oil Company
Pennzoil E & P Company
Phillips Petroleum Company
Pogo Producing Company
Samedan Oil Corporation
Santa Fe Energy Resources, Inc.
Seagull Energy Corporation
Shell Offshore Inc.
Sonat Exploration Company
Taylor Energy Company
Texaco Exploration & Production, Inc.
Torch Operating Company
Total Minatome Corporation
Trade & Development Corporation
UMC Petroleum Corporation
(includes General Atlantic Resources, Inc.)
Union Oil of California (UNOCAL)
Union Pacific Resources Company
Vastar Resources, Inc.
W & T Offshore
Zilkha Energy Company

THE CONTRACTORS FOR THIS STUDY WOULD LIKE TO ACKNOWLEDGE THE MEMBERS OF THE BIOACCUMULATION WORKING GROUP FOR THEIR SUPPORT AND COOPERATION DURING THIS PROJECT:

Dr. James P. Ray (Shell) - Chairman
Dr. R. C. Ayers (Robert Ayers & Associates)
Ms. Jan Farmer (BP Oil)
Mr. Brian E. Shannon (Arco)
Dr. Stanley Curtice (Texaco)
Dr. Andrew Glickman (Chevron)
Mr. Larry R. Henry (Chevron)
Dr. Bela M. James (Shell)
Mr. David J. LeBlanc (Texaco)
Dr. Lawrence A. Reitsema (Marathon)
Dr. Joseph P. Smith (Exxon Production Research Co.)
Dr. James E. O'Reilly (Exxon Production Research Co.)
Dr. Jerry Hall (Texaco)

THE CONTRACTOR WOULD ALSO LIKE TO ACKNOWLEDGE THE FOLLOWING INDIVIDUALS FOR THEIR CONTRIBUTION TO THIS PROJECT:

Dr. Woollcott Smith (Temple University)
Mr. Keith R. Parker (Data Analysis Group)
Dr. Dan D. Caudle (Sound Environmental Solutions, Inc.)

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

Section Page

TABLE OF CONTENTS
(Continued)

Section Page

TABLE OF CONTENTS
(Continued)

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES
(Continued)

LIST OF TABLES
(Continued)

LIST OF TABLES
(Continued)

LIST OF TABLES
(Continued)

LIST OF TABLES
(Continued)

LIST OF TABLES
(Continued)

LIST OF TABLES
(Continued)

LIST OF TABLES
(Continued)

GULF OF MEXICO PRODUCED WATER BIOACCUMULATION STUDY
DEFINITIVE COMPONENT

SYNOPSIS

Objectives

The objectives of the Definitive Component of the Gulf of Mexico Produced Water Bioaccumulation Study were to

- determine whether statistically significant bioaccumulation of target chemicals in produced water occurs in the edible tissues of resident fishes and invertebrates at representative Gulf of Mexico offshore platforms that discharge more than 4,600 barrels per day (bbl/d) of produced water relative to non-discharging platforms; and

- evaluate the ecological and human health significance of observed concentrations of target chemicals in edible tissues of fishes and invertebrates collected near offshore platforms in the Gulf of Mexico.

Background

In December 1993, the U.S. Environmental Protection Agency (EPA) Region VI published a modified version of the final National Pollutant Discharge Elimination System (NPDES) General Permit (GMG290000) for the Western Gulf of Mexico Outer Continental Shelf. The modified permit required that a site-specific bioaccumulation monitoring study be conducted by operators with existing facilities that discharge more than 4,600 bbl/d of produced water. The monitoring study design involved semiannual collections of tissues of mollusk, crustacean, and fish species at each platform discharging more than 4,600 bbl/d and analysis of these samples for volatile organic compounds (benzene, toluene, ethylbenzene), semivolatile organic compounds (phenol, fluorene, benzo[a]pyrene [BAP], bis(2-ethylhexyl)phthalate [BEHP]), metals (arsenic, cadmium, mercury), and radionuclides (^{226}Ra and ^{228}Ra). As an alternative to the preceding requirement, operators could participate in an EPA-approved, industry-wide, bioaccumulation monitoring study rather than conducting individual bioaccumulation monitoring studies. In response, the Offshore Operators Committee (OOC) proposed an industry-wide bioaccumulation study. After imposing additional requirements, EPA Region VI approved the industry-wide bioaccumulation study, which consisted of a Definitive Component and a Platform Survey Component. The Definitive Component involved intensive, statistically designed sampling to determine whether marine organisms at two locations, each representing a discharging and non-discharging platform pair, were bioaccumulating target chemicals from produced water. The Platform Survey Component met EPA requirements for sampling a broad geographic distribution of discharging and non-discharging platform sites to determine tissue concentrations of the target chemicals. Separate reports have been prepared for the Definitive and Platform Survey Components. In addition, a literature review on the

marine bioaccumulation, fate, and effects of produced water constituents has been prepared.

Study Design and Methods

The Definitive Component was designed to compare concentrations of target chemicals (12 NPDES permit chemicals plus 48 additional chemicals [barium, four monoaromatic hydrocarbons, and 43 polycyclic aromatic hydrocarbons] added to the study by the OOC) in the tissues of several fish and invertebrate species living at two platform pairs selected from four pairs that were initially sampled. The abundances of appropriate species and isolation of the platforms from other potential sources of the target chemicals (e.g., the Mississippi River) were the primary factors in the selection of the two platform pairs. One pair consisted of a platform discharging approximately 7,000 bbl/d of produced water and a reference platform and the other pair consisted of a platform discharging approximately 11,000 bbl/d and a reference platform.

The selected platforms (**Figure S-1**) were visited during May and October-December 1995. Three samples of produced water were collected at each discharging platform. Three samples of ambient seawater, and multiple specimens of two bivalve mollusks and three fish species (**Table S-1**) were collected at each platform. Fish tissue samples consisted of muscle (edible fillet) only, while bivalve samples included the whole soft tissue. The samples were analyzed using state-of-the-art instrumentation and methods following a rigorous quality assurance/quality control program to determine the concentrations of the target chemicals. Low method detection limits (MDLs) comparable to or below risk-based concentrations (RBCs) were achieved through this effort (**Table S-2**). This made it possible to determine if target chemicals were present at concentrations of ecological and human health concern.

Data on concentrations of target chemicals in produced water and ambient seawater were used to estimate the potential exposure of marine animals to elevated concentrations of target chemicals. Statistical comparisons of concentrations of target produced water chemicals in fishes and bivalves from the discharging/reference platform pairs were used to determine if animals from discharging platforms are bioaccumulating the target chemicals from the produced water discharges. When a statistically significant difference was detected, the tissue residues were compared with the tissue residue data for the same or closely related taxa in the scientific literature. The results of this evaluation for each species and target chemical were classified based on the criteria in **Table S-3** into one of four categories: 1) strong evidence for bioaccumulation; 2) weak or inconclusive evidence for bioaccumulation; 3) doubtful or contradictory evidence for bioaccumulation; and 4) no evidence for bioaccumulation.

Results

Bioaccumulation

All but two of the target chemicals were found at higher concentrations in produced water than in seawater. The first exception was mercury which was not present at

concentrations above the MDL. The second exception, BEHP, is not a natural or intentionally-added component of produced water and when detected in produced water probably is due to contamination of the sample during collection, processing, or analysis. Most of the volatile and semivolatile organic compounds except BAP were present in produced water at concentrations above their MDLs, while concentrations of the same compounds in seawater and tissues were nearly all below their MDLs (**Table S-4**).

The probability of bioaccumulation from produced water was assessed for arsenic, barium, cadmium, and mercury; ^{226}Ra and ^{228}Ra; phenol; BEHP; fluorene; BAP; and total polycyclic aromatic hydrocarbons (PAHs) (**Table S-5**). The volatile organics were excluded from this assessment since more than 96% of the tissue concentrations were less than the MDLs, indicating that bioaccumulation of volatile organics from produced water or any other source is not a significant concern for fishes and bivalves near offshore oil platforms.

There was no strong evidence for bioaccumulation (as defined by the criteria for Category 1 in **Table S-3**) for any of the chemicals assessed. There was no evidence at all for bioaccumulation (as defined by the criteria for Category 4 in **Table S-3**) for mercury, BEHP, fluorene, and BAP. Evidence for bioaccumulation of the other assessed chemicals was either Category 2 (weak or inconclusive) or Category 3 (doubtful and contradictory).

Evidence for bioaccumulation of arsenic in fishes was considered "weak or inconclusive" because tissue concentrations were statistically significantly higher at discharging than at reference platforms in only 3 out of 12 cases.

At one platform pair during one cruise thorny oyster from the discharging platform contained statistically significantly higher concentrations of several PAHs than thorny oyster from the paired reference site. The PAH assemblage in the thorny oyster tissues resembled that of a light refined product or produced water. Concentrations of individual PAHs generally were low and not unusual for soft tissues of bivalves. Therefore, thorny oyster was placed in Category 2 because bioaccumulation of petroleum-derived PAHs was demonstrated in only one instance, and the source(s) of the PAHs was unclear.

Ecological Risk

Based on a review of the published literature on relationships between toxic response and tissue residues of metals, radium isotopes, and organics in freshwater and marine organisms, none of the EPA-specified target chemicals were present at concentrations that might be harmful to the fishes and bivalves. The only possible exception is cadmium in thorny oysters. However, natural concentrations of cadmium are elevated in soft tissues of oysters and scallops from uncontaminated marine environments world-wide. These cadmium residues are tightly bound to solid concretions, mostly in the kidneys, and are not toxic to the bivalves. It is probable that thorny oysters also naturally sequester large amounts of cadmium in inert tissue granules.

Human Health Assessment

The method used to assess if fishes and bivalves harvested near offshore produced water discharges pose a health risk to human consumers was to compare tissue concentrations of the target chemicals in fishes and bivalves with RBCs. It should be noted that the bivalves and three of the fish species (creole-fish, yellow chub, and sergeant major) are not normally consumed by humans. Concentrations of most target chemicals in edible fish and bivalve tissues were substantially lower than the RBCs. Arsenic exceeded the RBC in all fish and bivalve species, and cadmium exceeded the RBC in the thorny oyster. However, the RBC for arsenic is believed to be overly conservative, because the arsenic present in marine organisms is present in non-toxic organic forms. As discussed above, several species of bivalves contain naturally high concentrations of cadmium (above RBC) in their tissues in inert granules; in this form it is not bioavailable to consumers of fishery products, including humans. It is therefore highly likely that the cadmium in thorny oysters is natural and does not pose a health hazard to human consumers of shellfish products. The other target chemical concentrations in fish and bivalve tissues were well below the applicable RBC values and do not pose any health risk to human consumers of fishery products harvested near produced water discharges.

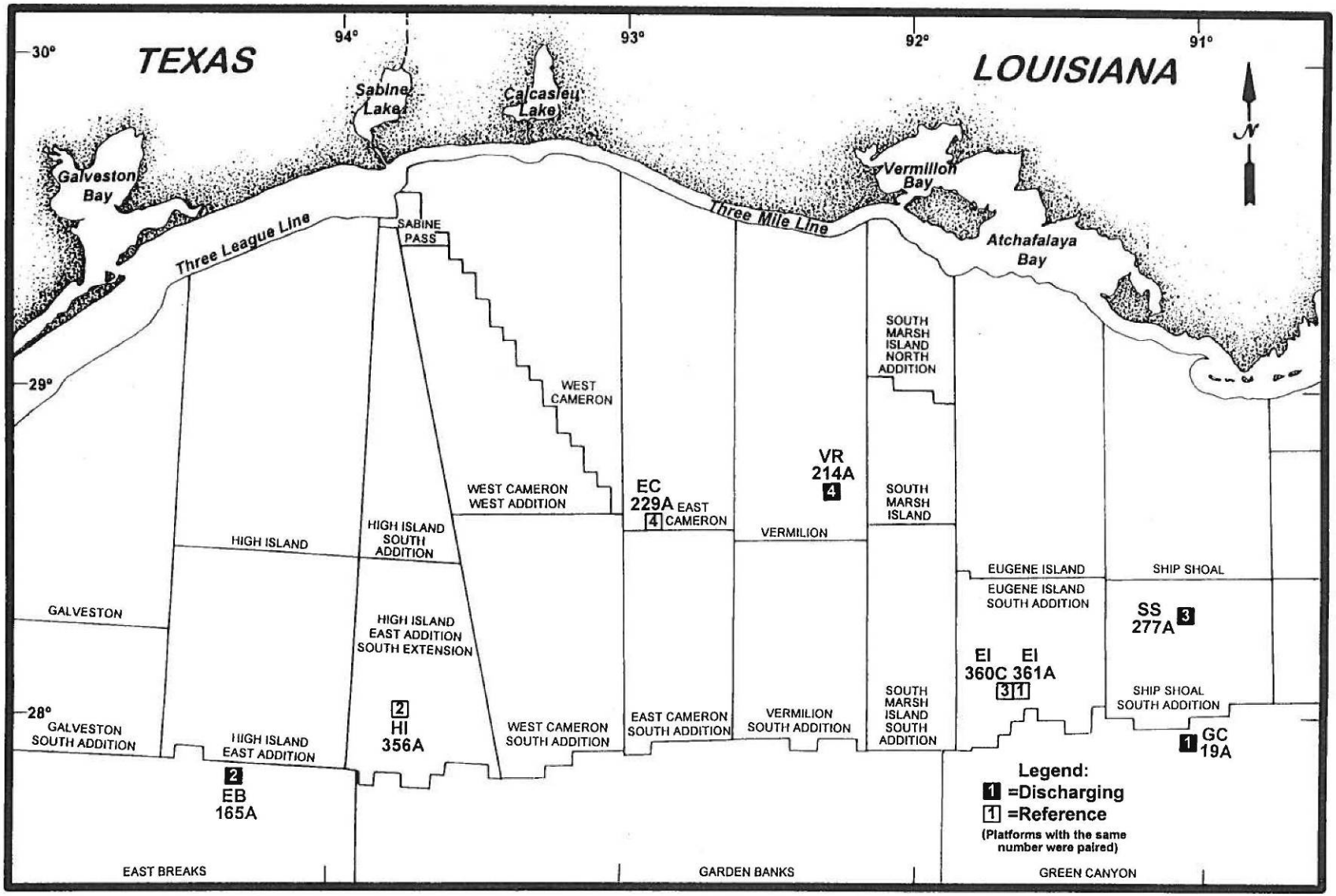

Figure S-1. Platforms sampled during Cruise 1 of the Definitive Component of the OOC Gulf of Mexico Produced Water Bioaccumulation Study.

Table S-1. Platforms sampled and species collected for the Definitive Component Study.

Platform Pair	Sampling Period	Species
East Breaks 165A High Island A 356A	Spring 1995	Jewel box (mollusk) Thorny oyster (mollusk) Yellow chub (fish) Creole-fish (fish) Rockhind (fish)
	Fall 1995	Jewel box (mollusk) Thorny oyster (mollusk) Yellow chub (fish) Creole-fish (fish) Sergeant major (fish)
Green Canyon 19A Eugene Island 361A	Spring 1995	Jewel box (mollusk) Thorny oyster (mollusk) Yellow chub (fish) Creole-fish (fish) Gray triggerfish (fish)
	Fall 1995	Jewel box (mollusk) Thorny oyster (mollusk) Yellow chub (fish) Creole-fish (fish) Gray triggerfish (fish)

Table S-2. Method detection limits for the Definitive Component Study.

Target Chemical Class	Produced Water (ng/L)	Ambient Seawater (ng/L)[d]	Tissue (ng/g - dry weight)
Volatile Organic Compounds	90 to 310	90 to 310	2.4 to 4.1
Semivolatile Organic Compounds [a]	1.0 to 11	1.0 to 11	1.3 to 16
Metals [b]	10 to 620	5 to 30	1 to 50
Radium Isotopes [c]	0.01 to 0.75	0.007 to 0.070	0.001 to 0.03

[a] Not included in range are bis(2-ethylhexyl)phthalate (90 ng/L in water and 140 ng/g in tissues) and phenol (38 ng/g in tissues).
[b] Not included in range is barium (240 µg/L in produced water and 140 ng/L in ambient seawater).
[c] pCi/L and pCi/g wet weight.
[d] ng/L and ng/g are approximately the same as parts per billion (ppb).

Table S-3. Criteria for produced water bioaccumulation classification for species and target chemicals.

Category 1: Strong evidence for bioaccumulation to biologically significant tissue concentrations.

A. Tissue concentrations significantly higher at the discharging platform of both platform pairs and both surveys; and
B. Tissue residues for chemical at discharging platforms exceed the "typical" range for the chemical in marine animals from uncontaminated environments.

Category 2: Weak or inconclusive evidence for bioaccumulation.

A. Tissue concentrations significantly greater at one discharging platform (compared to the paired reference platform) on both surveys, but no significant differences at the other platform pair; or
B. Tissue concentrations significantly greater at one or both discharging platforms in comparison to their paired reference platforms, but only on one survey; and
C. Differences in concentrations in tissues of marine animals from discharge and reference platforms are small and within the "typical" range for marine animals from uncontaminated marine environments.

Category 3: Doubtful or contradictory evidence for bioaccumulation.

A. Tissue concentrations significantly higher at one discharging platform on one occasion (compared to the paired reference platform); and
B. Tissue concentrations significantly higher at one or both reference platforms than at the paired discharging platform on one or both cruises; and
C. Differences in concentrations in tissues of marine animals from discharge and reference platforms are small and within the "typical" range for marine animals from uncontaminated marine environments.

Category 4: No evidence of bioaccumulation.

A. No significant differences between paired produced water discharging and reference platforms for either cruise or concentrations significantly higher more frequently in marine animals from the reference than from the discharging platform; and
B. All concentrations within the "typical" range for uncontaminated marine environments.

Table S-4. Percentage of analysis values (dry weight basis) below method detection limit (MDL) and practical quantitation level (PQL) (defined as five times MDL). There is a reduced confidence in the reported magnitude of a value that is below the PQL.

Target Chemical Class	Produced Water		Ambient Seawater		Tissues	
	MDL	PQL	MDL	PQL	MDL	PQL
Volatile Organic Compounds	5	5	98	100	96	99
Semivolatile Organic Compounds	30	34	88	97	87	98
Metals	40	43	33	36	1	12
Radium Isotopes	0	0	52	52	45[a]	45

[a] Includes values below PQL defined in this study.

Table S-5. Ranking of the evidence for bioaccumulation from produced water by marine bivalves and fish from the vicinity of offshore, high-volume produced water discharges. The ranking categories are 1) strong evidence for bioaccumulation; 2) weak or inconclusive evidence for bioaccumulation; 3) doubtful or contradictory evidence for bioaccumulation; and 4) no evidence for bioaccumulation. Volatile organic compounds were not included in this analysis because they were not detected in 96% of the samples and were therefore Category 4.

Chemical	Jewel Box	Thorny Oyster	Fish
Arsenic	4	3	2
Barium	3	4	4
Cadmium	4	3	4 (YC, CF, RH) 3 (GT, SM)
Mercury	4	4	4
Radium Isotopes	3	4	4
Phenol	3	3	3 (GT) 4 (YC, CF, RH, SM)
Bis(2-ethylhexyl)phthalate	4	4	4
Fluorene	4	4	4
Benzo(a)pyrene	4	4	4
Total Polycyclic Aromatic Hydrocarbons	3	2	4

CF = Creole-fish.
RH = Rockhind.
SM = Sergeant major.
GT = Gray triggerfish.
YC = Yellow chub.

Section 1
INTRODUCTION

1.1 BACKGROUND

Produced water is a major effluent associated with oil and gas production and contains organics and inorganics (hydrocarbons, metals, and radionuclides [^{226}Ra and ^{228}Ra]). The U.S. Environmental Protection Agency (EPA) is interested in gathering data on these constituents because of 1) potential impacts of produced water discharges to the indigenous species in the Gulf of Mexico; and 2) potential bioaccumulation of select effluent components in indigenous fish and shellfish species that are available for human consumption. EPA had determined that additional information was needed to determine if produced water discharges have bioaccumulative effects in the receiving waters which threaten human health (56 CFR 73:15353). This need for additional data led to a permit requirement for a bioaccumulation study.

In December 1993, the EPA Region VI published a modified version of the final National Pollutant Discharge Elimination System (NPDES) General Permit (GMG290000) for the Western Gulf of Mexico Outer Continental Shelf. The modified permit required that a site-specific bioaccumulation monitoring study be conducted by operators with existing facilities that discharge more than 4,600 bbl/d[1] of produced water. The monitoring study design involved semiannual collections of tissues of mollusk, crustacean, and fish species at each platform discharging more than 4,600 bbl/d and analysis of these samples for volatile organic compounds (benzene, toluene, ethylbenzene), semivolatile organic compounds (phenol, fluorene, benzo[a]pyrene [BAP], bis(2-ethylhexyl)phthalate [BEHP]), metals (arsenic, cadmium, mercury), and radionuclides (^{226}Ra and ^{228}Ra). As an alternative to the preceding requirement, operators could participate in an EPA-approved, industry-wide, bioaccumulation monitoring study rather than conducting individual bioaccumulation monitoring studies.

In response, the Offshore Operators Committee (OOC) proposed an industry-wide bioaccumulation study. The OOC is an industry organization consisting of some 107 member and associate member companies that collectively account for approximately 97% of Gulf of Mexico oil and gas production. After imposing additional requirements, EPA Region VI approved the industry-wide bioaccumulation study, which consisted of a Definitive Component and a Platform Survey Component. The Definitive Component involved intensive, statistically designed sampling to determine whether marine organisms at two locations, each representing a discharging and non-discharging platform pair, were bioaccumulating target chemicals from produced water. The Platform Survey Component met EPA requirements for sampling a broad geographic distribution of discharging and non-discharging platform sites to determine tissue concentrations of the target chemicals. Separate reports have been prepared for the Definitive and Platform Survey Components. This document is the final report for the Definitive Component of the Gulf of Mexico Produced Water Bioaccumulation Study.

---

[1] 1 barrel = 42 U.S. gallons = 0.16 cubic meters.

In addition, a literature review on the marine bioaccumulation, fate, and effects of produced water constituents has been prepared.

1.2 DEFINITIVE COMPONENT OBJECTIVES

The objectives of the Definitive Component of the Gulf of Mexico Produced Water Bioaccumulation Study were to

- determine whether statistically significant bioaccumulation of target chemicals in produced water occurs in the edible tissues of resident fishes and invertebrates at representative Gulf of Mexico offshore platforms that discharge more than 4,600 barrels[1] per day (bbl/d) of produced water relative to non-discharging platforms; and

- evaluate the ecological and human health significance of observed concentrations of target chemicals in edible tissues of fishes and invertebrates collected near offshore platforms in the Gulf of Mexico.

Section 2
METHODS

2.1 STUDY DESIGN

The Definitive Component was designed to compare levels of the various target chemicals in the tissues of several biological species living at two platform pairs; each platform pair consisted of a platform discharging more than 4,600 bbl/d and a corresponding reference platform with no produced water discharge. The study design consisted of three elements, which were conducted sequentially. The elements are summarized here and discussed in additional detail in the following sections.

- Select study sites. This effort consisted of the following:

  1) Potential candidate study sites were identified by evaluating a database of the platform structures in the Gulf of Mexico assembled using data from MMS and EPA.

  2) A Screening Survey (Cruise 1) was conducted to determine the appropriateness of the potential candidate platforms as study sites based on a preliminary reconnaissance and to sample candidate platforms (four platform pairs) under consideration as the final study sites.

  3) The data collected during the Screening Survey were evaluated with other pertinent information about the platforms to select the two final platform pair study sites. In addition, target species were selected for each study site and the number of specimens to be collected during the Definitive Cruises was determined.

- Conduct Definitive Cruises. Two definitive cruises, a Spring Definitive Cruise (Cruise 2) and a Fall Definitive Cruise (Cruise 3) were conducted to collect biological specimens, produced water samples, and ambient seawater samples; these samples were analyzed to determine the levels of the target chemicals.

- Perform statistical analysis and interpret results. The data were statistically analyzed and interpreted to address the Definitive Component objectives (**Section 1.2**).

2.1.1 Study Site Selection

2.1.1.1 Potential Candidate Study Sites. A thorough review was conducted to identify Gulf of Mexico discharging platforms and to locate nearby non-discharging reference platforms. Comprehensive databases that include detailed information on every structure in the Gulf of Mexico were obtained from the Minerals Management Service.

This information includes detailed location coordinates, types of production, and company contact information (phone numbers, etc.) for every oil and gas structure in the Gulf of Mexico. The Discharge Monitoring Report (DMR) database, which contains all information submitted annually to EPA on the required DMRs from every operator, was obtained from EPA Region VI. The information in the DMR database included maximum discharge volumes for produced water. Unfortunately, the EPA database did not contain detailed coordinates for each discharging structure. With the cooperation of EPA, an electronic copy of the DMR database was provided and appropriate database links created between the EPA and MMS databases so that all platform locations and their associated discharge volumes could be plotted using a Geographical Information System (GIS). Shell Offshore Inc.'s GIS group created multiple offshore maps showing all platforms, with produced water discharging platforms color coded relative to discharge volumes.

From these GIS maps, specific locations were selected that met the criteria for the Definitive Component study sites. This preliminary selection of the potential discharging sites was based on the following:

- the volume of discharged produced water exceeding 4,600 bbl/d;
- the distance between the platform and other discharging production sites; and
- the distance between the platform and other potential sources of contamination, e.g., the Mississippi River.

Selection of potential candidate reference sites for the platform pairs was based on the following:

- no active discharge of produced water for two years prior to the commencement of this study;
- not in proximity to produced water discharging sites other than the potential corresponding discharging site; and
- within the same oceanographic setting and anticipated to have the same biological assemblage as the corresponding discharge site.

After the platforms that appeared to meet the selection objectives were identified from the data available in the database, the OOC Bioaccumulation Work Group sent special questionnaires to each operator requesting specifics of their platforms' operations. After this information was reviewed, platform operators were contacted a second time to request additional detailed information related to the platforms' current and past operations. In many cases, platform owners had changed, and/or discharge volumes had increased or decreased, or discharges had been terminated. In some cases, the platforms no longer existed.

The final selection of potential candidate platforms was made after this verification process, and the final list of potential candidate platforms was reviewed with EPA. Alternate platform pairs were selected to provide options to the field team in cases when

field observations indicated that a platform was unsuitable as a candidate Definitive Component platform.

2.1.1.2 Screening Survey. A Screening Survey (Cruise 1) was conducted during Fall 1994 (19 October to 15 November) to gather data at candidate study sites (platform pairs). The objective of the screening survey was to select and investigate four platform pairs, each of which was composed of a discharging site and a reference (non-discharging) site, and gather data to determine their suitability for the Definitive Cruises.

Prior to the actual collection of samples at each platform during the Screening Survey, a decision concerning the suitability of the platform for the study was made based on a visual assessment of the platform and associated biota. During Cruise 1, the potential candidate platforms listed in **Table 2-1** were reconnoitered for suitability for the Definitive Component.

Platform age is an important factor determining the degree of development of the biofouling community on the platform structure; young platforms tend to have sparse development of the biofouling community and older platforms tend to have well developed biofouling communities. Based on a preliminary reconnaissance of the biota, a potential candidate site (High Island [HI] A 553A) was rejected for the study because the platform was young and the biofouling community had not developed sufficiently to support the specimen requirements for this program. Other reasons for rejecting a potential candidate site included lack of a suitable platform to form a platform pair (Ship Shoal [SS] 241A) and unusual placement of the discharge pipe very near the seafloor (SS 207A), which would limit exposure of the near-surface biofouling organisms to the discharge plume as well as complicate sample collection and data interpretation.

Based on the results of the reconnaissance of the potential candidate platforms (**Table 2-1**) to confirm the information obtained regarding discharges and operations of each platform and the availability of suitable, sufficient biota, Screening Survey sampling was conducted at four platform pair study sites (**Table 2-2**). These platform pairs were candidates for the two platform pair study sites to be sampled during the two Definitive Cruises. The geographic locations of these platforms are presented in **Figure 2-1**.

Samples of produced water, ambient seawater, and biological tissues were collected during the Screening Survey at each platform pair. These samples were analyzed for organic, metal, and radium target chemicals. Some of the target compounds were required by EPA, and others were constituents of produced water that were added to the study by the OOC.

Volatile Organic Compounds

Produced water may contain low levels of low molecular weight (generally less than 150 atomic mass units) volatile organic compounds (VOCs). Some of these VOCs

(particularly monocyclic aromatic hydrocarbons) are of potential environmental concern. In the permit, the EPA's proposed list of volatile organic compounds was

- benzene;
- ethylbenzene; and
- toluene.

These compounds were a subset of the volatile aromatic hydrocarbons that may be expected in produced water and possibly in tissues of target organisms. Because there are other VOCs that may be present in produced water at measurable levels, the OOC included the following additional VOC analytes to be determined in the collected samples:

- *m*-,*p*-xylenes;
- *o*-xylene;
- C_3 benzenes; and
- C_4 benzenes.

Semivolatile Analytes

Among the target analytes in the General Permit were the following four semivolatile organic compounds (SVOCs), which are either EPA priority pollutants or of environmental concern:

- phenol;
- fluorene;
- BAP; and
- BEHP.

Phenol and fluorene are both components of petroleum and have been documented in Gulf of Mexico produced waters by other investigations (Neff *et al*., 1992; Brown *et al*., 1992). BAP is generally associated with pyrogenic (combustion) sources and may be present in trace levels in petroleum. However, BAP is of particular concern because it is an identified carcinogen, bioconcentratable in tissues, and is an analyte of concern in fish advisories (EPA, 1993a). Phthalates are not naturally present in petroleum or intentionally added to produced water; the exact pathway of introduction into produced water (e.g., laboratory contamination or an artifact of produced water treatment chemicals or processes) has not been thoroughly identified. However, phthalates are listed as both acute and chronic marine toxicants in the EPA Water Quality Criteria Summary (EPA, 1987).

Due to the potential presence of other polycyclic aromatic hydrocarbons (PAHs) in produced water, the list of semivolatile analytes was expanded to include a suite of additional PAHs and alkyl PAH target compounds in addition to the four semivolatile target analytes required by the General Permit. The additional PAH target analytes include the 2- through 4-ring PAH and alkyl PAH compounds commonly found in petroleum, as well as the 5- and 6-ring PAH priority pollutant compounds (see **Section 2.4.3** for a listing of PAH target analytes). The rationale for the inclusion of

these PAH and alkyl PAH target analytes is based on the presence of these compounds in crude oils (the primary source of PAHs in produced water) and that some of the PAH compounds are of concern for environmental and human health effects (EPA, 1993a).

Metals

Three metals that are of potential environmental concern to EPA in produced water were included as EPA-required target compounds. These were arsenic, cadmium, and mercury. In addition, barium was included as a metal target compound because barium concentrations in produced water can be high (sometimes 300,000 ppb) compared to Gulf of Mexico seawater values (20 ppb or less).

Radionuclides

The radionuclides ^{226}Ra and ^{228}Ra were included as EPA-required analytes because there has been concern raised regarding these radionuclides relative to human health risks. The concern is that radium in offshore produced water discharges may accumulate in fish and shellfish. Radium can accumulate in bone, shell, and exoskeleton tissue in marine organisms, but radium in edible tissues is of primary concern for human health.

2.1.1.3 Screening Survey Data Evaluation. The primary objective of evaluating the screening survey data was to select two platform pairs to be sampled during the Definitive Cruises. The observations made during the survey and results of the laboratory analyses were also used to 1) confirm the availability of the appropriate target species from the platform pairs' biological assemblages; 2) validate the sampling techniques; 3) determine the level of sample replication needed to achieve acceptable statistical significance; and 4) confirm analytical procedures and their detection limits.

Final Platform Selection

After the Screening Survey was conducted and the analytical results were available, the platform pairs for the Definitive Cruises were selected. This selection process was based on the information gathered during the Screening Survey and information gathered from the operators directly and through the OOC. Factors that were considered included the following:

- Target chemicals present in produced water. The target chemicals were present in the produced water discharges, and the loadings were representative for produced water discharges in the Gulf of Mexico;

- Sufficient biota present. Appropriate species were present in sufficient quantity to perform reliable analyses at the selected platform pairs for the evaluation of ecological- and human-health related effects. Appropriate species were platform residents and living in the portion of the water column consistently exposed to the produced water plume. The same species had to be present at the discharging and reference platforms;

- Platforms isolated. Platforms were distant from potential contamination sources that could introduce bias into the results. The objective of the project was to examine bioaccumulation from produced water discharges and not from other factors (e.g., riverine interferences could influence these results).

After evaluation of these criteria, it was apparent that the availability of appropriate organisms was the deciding factor in study site selection (see discussion of available species in following section). Two platform pairs were selected for sampling during the two Definitive Cruises:

- East Breaks 165A (EB165A) (discharging [D]) - HI 356A (reference [R]) and
- Green Canyon 19A (GC19A) (D) - Eugene Island 361A (EI361A) (R).

Selection of Target Species

Data collected during the Screening Survey were used to select the appropriate species for the succeeding Definitive Cruises. The following criteria were considered in selecting the target species:

- Sufficient specimens of a species present at the two sites in a platform pair (discharging and reference sites) to provide statistically valid sample sizes required for target chemical analyses;

- Species either exposed directly to the discharge plume or that would eat other organisms that were exposed to the plume; and

- Size and type of the species normally consumed by humans.

The intent during the Screening Survey was to collect a bivalve species, a crustacean species, and three fish species that would be used as potential target species for the two Definitive Cruises. It was found during the Screening Survey that insufficient crustacean specimens were available at the offshore platforms to support the analytical requirements for the Definitive Cruises. In consultation with EPA, a second bivalve species was substituted for the crustacean species in the sample collection and subsequent analysis. This was thought to be a reasonable substitution because a bivalve attached to the platform structure and near the discharge point may be more consistently exposed to the discharge plume than a more mobile crustacean.

Numbers of Specimens

In addition, the appropriate numbers of specimens for each species to be collected during the Definitive Cruises was determined based on contaminant concentrations in specimens collected during the Screening Survey. The statistical methodology for this determination is described in **Section 2.1.3.5**. For a power (probability to reject a null hypothesis when it is false -- detect a real difference) of 95%, a minimum, of seven specimens was required for each of the three composite samples.

2.1.2 Definitive Cruises

The Spring Definitive Cruise (Cruise 2) was conducted 12 to 31 May 1995, and the Fall Definitive Cruise (Cruise 3) was conducted 26 October to 14 December 1995. During each Definitive Cruise, produced water samples were collected at the two platforms discharging more than 4,600 bbl/d, and ambient seawater samples were collected 2,000 m upcurrent of both platforms in each platform pair. These samples were analyzed for the produced water constituents and the other target chemicals discussed previously.

Biological specimens were collected for chemical analysis at each of the four platforms during the two cruises (**Table 2-3**). For an individual cruise, the same species were collected at both platforms in a particular platform pair. The number of specimens collected was based on the determinations made using the Screening Survey data (discussed previously) and the tissue requirements for each analytical laboratory.

Samples for chemical analysis were composites from individuals of a species collected at a single platform during a particular cruise. The scheme of compositing and analysis is presented in **Figure 2-2**. From the pool of individuals of a species collected at a platform during a cruise, three groups of specimens were constituted. All three groups had an equal number of individual specimens. The laboratory methodology for preparing the composite samples is described in **Section 2.4.1.** At each analytical laboratory, individual composite samples were subsampled twice, and each subsample was analyzed for the target chemicals.

2.1.3 Statistical Analysis

As stated in **Section 1**, the first objective of the Definitive Component was to determine whether statistically significant bioaccumulation of produced water-related constituents occurred in edible tissue of fishes and invertebrates near representative offshore platforms that discharge more than 4,600 bbl/d of produced water. The purpose of statistical analysis was to address this objective by comparing mean concentrations of the target chemicals in tissues from species living near discharging and non-discharging platforms. The reasons for and kinds of statistical analyses used to accomplish this are discussed in this section. Statistical details on hypotheses, levels of replication, and treatment of data are given in **Appendix A**.

Originally, the equality of mean tissue concentrations for two sets of paired discharging and non-discharging platforms were to be tested separately for each pair. However, during the Definitive Component, two problems arose that required revision of this approach. The first problem was discovered during conversations with personnel on board the HI356A platform which was to be used as a non-discharging reference platform. These conversations revealed that low rate/low volume discharges (<300 bbl/d) had occurred during the study period. The discharges began prior to the Cruise 2 sampling, which was conducted in Spring 1995, and ceased immediately prior to the Cruise 3 sampling, which was conducted in Fall 1995. Consequently, platform pairs were treated in two separate analyses: EB165A (high discharge) vs. HI356A

(reference - low discharge); GC19A (high discharge) vs. EI361A (reference - no discharge).

The second problem that affected statistical analysis became apparent after the data for the two Definitive Cruises (Cruises 2 and 3) were available from the analytical laboratories. Many of the target chemicals were below the method detection limit (MDL), see **Section 2.4**. The number of non-detected (ND) values varied depending on the analyte and taxon analyzed. A summary of the number of ND values is presented in **Table 2-4**. In some cases the high frequency of ND values precluded using analysis of variance (ANOVA). Consequently, a revised statistical analysis strategy, which tailored the statistical test to the quantity of detectable data (>MDL), was developed based on the analytical strategy presented by EPA (1989). To determine the appropriate statistical testing procedure, the number of ND values were tabulated for each platform pair, taxon, and target chemical. These tabulations were used to assign the appropriate statistical testing methods (**Table 2-5**). The results of this effort are summarized in **Table 2-6**. A brief discussion of the testing methods follows and details of testing are given in **Appendix A**.

2.1.3.1 Case 1 - Percentage of Non-detected Values Less Than 15%. If the number of ND values contributed less than 15% to the total data for a taxon and target chemical at a platform pair, ANOVA was used to test for differences between mean concentrations for discharging and reference platforms. ANOVA included cruises as a blocking factor which reduced the error due to seasonal variability between the two cruises and increased the sensitivity of the statistical tests.

Comparisons between the discharging and reference platforms were made for individual cruises with contrasts. Where ANOVA tested for equality in means that was consistent over the two cruises, contrasts tested for equality of mean concentrations between platform pairs within each cruise.

There were two exceptions to this strategy, rockhind and sergeant major. At the western platform pair (EB165A [D] and HI356A [R]), rockhind were collected and analyzed only for Cruise 2. Sergeant major were collected and analyzed only for Cruise 3 because sufficient specimens of rockhind could not be collected during Cruise 3. In ANOVA for these two species, cruise could not be included as a blocking factor to account for seasonal variation.

2.1.3.2 Case 2 - Percentage of Non-detected Values Greater Than 14% and Less Than 50%. Data were transformed to ranks and the Friedman test (Conover, 1980) was used to test for equality of concentrations between platform pairs. Cruise was used as a blocking factor as in ANOVA. Because there were three observations for each platform/cruise combination, the form of the Friedman test that incorporates multiple observations was used (Conover, 1980).

The Mann-Whitney test (Conover, 1980) was used to test for differences between the platforms pairs for each cruise. Mann-Whitney tests were also used to test rockhind and

sergeant major, which were collected and analyzed for individual cruises as discussed previously for Case 1.

2.1.3.3 Case 3 - Percentage of Non-detected Values Between 50% and Less Than 90%. For cases with high frequency of occurrence of ND values the analytical methods of the previous sections were inappropriate. These data were transformed to binary values, either ND or not ND, and Fisher's exact test (Conover, 1980) of proportions was used. Data from each cruise were tested separately.

2.1.3.4 Case 4 - Percentage of Non-detected Values 90% or Greater. If the percentage of ND values for a taxon and target chemical at a platform pair was 90% or more, then no statistical testing was performed because too few data were available to make a reliable comparison.

2.1.3.5 Numbers of Specimens in Composite Samples. One of the objectives of the Screening Survey was to collect data to determine the appropriate number of specimens to be collected for each taxon during the Definitive Cruises. As previously discussed, the original statistical analysis strategy utilized composite means of subsamples to estimate the variance. The number of specimens in each composite sample would determine the number of degrees of freedom for the statistical analysis. To determine the appropriate number of specimens, the methodology described in **Appendix A** was followed.

2.1.3.6 Power Analysis. Power is defined as the probability of finding an effect when one actually exists. It is useful to examine power to determine if the statistical analysis was sufficiently sensitive to detect the magnitude of differences that are of interest (i.e., were sufficient samples collected to detect a difference that is biologically significant?). The power of the analysis is an indication of the confidence that the null hypothesis is indeed correct. The methodology for performing the power analysis is presented in **Appendix A**.

2.2 QUALITY ASSURANCE

2.2.1 Quality Assurance Program Description

The study was conducted under a comprehensive Quality Assurance (QA) Program that encompassed all aspects of planning, sample and data collection, sample processing, analysis, and management. This section describes the role, components, and characteristics of the QA Program within the context of the entire study.

2.2.1.1 Purpose and Objectives. The primary purpose of the QA Program was to document the sample and data collection process, provide statistically valid measures of uncertainty, maintain data integrity, and ensure that the Program operated as required. Because there were a number of participating organizations, a comprehensive QA Plan was developed to supplement and integrate existing QA Project Plans (QAPjPs) and Standard Operating Procedures (SOPs) from each participating organization into a single document. This document specified Data Quality Objectives (DQOs), a QA management structure, specific field and analytical

techniques and methodologies (SOPs), guidelines for resolution of methodological problems, and documentation of corrective actions.

2.2.1.2 Components and Characteristics. Integral to the QA Program are the definitions of specific parameters used to assess the data produced in the study. The parameters used to specify the quality of the data were as follows:

- Accuracy;
- Precision;
- Comparability;
- Representativeness; and
- Completeness.

These parameters are established by documented methods and procedures, analysis of QC samples, conducting data reviews, and laboratory audits.

Accuracy is defined as the degree of agreement between a measurement and an accepted reference or known (certified true) value (Kinnetic Laboratories, Inc. 1996). Analytical instruments and methods are calibrated with known samples (standards) or reference materials for each sample run to ensure accuracy. Accuracy may be documented using procedural blanks, matrix spikes/matrix spike duplicates, surrogate compounds, internal standards and Standard Reference Materials (SRMs). Consistent differences between a set of measurements and a reference standard due to instrumental or analytical problems or limitations is known as bias.

Precision is a measure of the variability of two measurements taken under similar conditions and usually expressed in terms of either the relative standard deviation (RSD), the relative percent difference (RPD), or as a range (Kinnetic Laboratories, Inc., 1996). Analytical laboratory precision may be evaluated through the use of analytical duplicates. Comparison of matrix spike and spike duplicates, and reference analyses/laboratory control values can also be calculated to provide an estimate of laboratory precision.

Comparability is a qualitative characteristic expressing the confidence with which one set of data can be compared with another (Kinnetic Laboratories, Inc., 1996). Assurance of the comparability of two or more sets of data can be achieved through the use of standard techniques to collect and analyze representative samples, and by reporting analytical results in appropriate units. Comparability may be assessed through the use of matrix spike/spike duplicates, surrogate compounds, duplicates, SRMs, equipment rinsate blanks, and field blanks. Interlaboratory calibration of methods also assure comparability of data and results.

Representativeness is a qualitative expression of how well a sample or group of samples reflect the characteristics of the media at the sampling point (Kinnetic Laboratories, Inc., 1996). Representativeness is ensured by following proper sample collection, preservation, and analytical procedures. Procedural blanks are used to evaluate representativeness by providing information on potential contamination

introduced by analytical methodology; field and equipment blanks provide information on potential contamination resulting from field collection and handling procedures.

Completeness is a measure of the amount of data obtained from a measurement system compared to the amount that was expected from the sampling design (Kinnetic Laboratories, Inc., 1996). Completeness is evaluated by comparing the number of measurements obtained with the intended number of measurements.

This QA Program was developed and implemented with defined DQOs and documented methods and procedures through the comprehensive laboratory QAPjPs and SOPs. Methods and techniques for sample collection, handling, storage, and processing were developed to minimize environmental and analytical contamination. Diligent care was taken by the field crew and laboratory personnel to ensure that the very low detection limits achieved by the participating laboratories were not compromised by contamination. A clear QA management structure was established to ensure that study participants adhered to documented procedures and that necessary deviations and corrective actions were properly recorded.

The QA Program was implemented through a management structure composed of a Project QA Officer from Continental Shelf Associates, Inc. (CSA), an OOC QA Coordinator, and QA Officers from each of the participating laboratories. The QA Officers coordinated QA activities and ensured that all activities and procedures adhered to documented plans and that data quality was properly assessed and documented. The QA Officers also ensured that deviations from the QA Plans and SOPs were documented, analytical problems resolved, corrective actions were documented, and that reported data were accurate, and if necessary, properly qualified. The CSA QA Officer closely coordinated with the Laboratory QA Officers to ensure that data reports provided to CSA had undergone an internal QA review prior to release. Copies of the Field and Laboratory QA Reviews and Statements were maintained by the Project QA Officer. The QA Statement or case narratives submitted by the participating laboratories along with data packages was the primary mode of reporting QA results to management. These were supplemented by communications by phone, fax or e-mail between QA Officers as needed. QA Statements summarized techniques, steps, and procedures undertaken for documenting QA/QC activities and attested to the adherence to the QA Plan and SOPs.

To further ensure accuracy and comparability, individual MDLs were developed for all analytical procedures conducted by participating laboratories using the 7-point (replicate) method developed by EPA (49 FR 209:198). These MDLs were important for quantifying and documenting the very low detection limits achieved by the participating laboratories and were used to qualify very low values. The specific MDLs coupled with the documented procedures will allow comparison of the data from this study with past and future studies.

QC samples were collected or prepared, processed, and analyzed to provide quantitative measures of data quality. During each cruise, field blanks, equipment rinsates, and sample duplicates were prepared or collected for selected media. In

addition, blanks were also used to assess sources of contamination in the laboratory during processing and subsampling of tissue samples. As further described in other sections, QC samples, such as procedural blanks, sample duplicates and matrix spikes/matrix spike duplicates were also analyzed with each batch of samples to provide measures of accuracy, precision, and comparability.

To further provide a quantitative measure of data quality and to assure that the analytical results from the laboratories were comparable to results from other good laboratories, an interlaboratory comparison exercise was conducted for VOCs, SVOCs, metals, and radionuclides. Selected samples of produced water, ambient seawater, and tissue were prepared and analyzed by the primary and comparison laboratories and resulting data reviewed and compared. The various analytes and corresponding primary and comparison laboratories are presented in **Table 2-7**.

Subsequent to the first cruise, a Laboratory QA Audit was conducted by an OOC QA Audit Team (Drs. S. Curtice, A. Glickman, and G. Stanko) which was accompanied by the Project QA Officer. The day-long QA Audits were conducted in Battelle Ocean Sciences (Battelle) laboratories in Duxbury, Massachusetts; Arthur D. Little (ADL) laboratories in Cambridge, Massachusetts; and the Florida Institute of Technology (FIT) laboratories in Melbourne, Florida in May 1995. Due to the specialized nature of radionuclide analyses, a separate QA audit of Core Laboratories and Paragon Analytics was not conducted. Prior to the audit, members of the audit team were provided copies of the relevant SOPs from each participating laboratory. During the laboratory audits, sample processing and analytical procedures, methods, equipment, QC, and data processing and analysis procedures were examined and reviewed. The QA Audit team interviewed project managers, principal investigators, QA officers, and laboratory managers and technicians; observed actual and simulated sample processing and analytical runs; examined laboratory records; and reviewed preliminary data reports. At each laboratory, the reported observations were manually validated and established that randomly selected values were correct based on the raw data. Exit meetings were held to review the initial findings and discuss recommendations with study personnel. Upon completing the laboratory audits at Battelle and ADL, a conference call was held with relevant laboratory personnel to discuss findings and recommendations and resolve any inconsistencies in the methodology.

2.2.2 Overview of Laboratory QA Programs

The following sections provide a review of the QA Program as implemented by CSA and each analytical laboratory. The following general criteria were used to review the individual laboratory QA programs:

- adherence to work plans, QAPjPs, and SOPs;
- proximity to DQOs and QC targets;
- significant exceptions and corrective actions; and
- proper documentation of results.

2.2.2.1 Continental Shelf Associates, Inc. It was CSA's responsibility to properly collect, store, and transport or ship the required produced water, ambient seawater, and marine organisms and prepare field QC samples for all of the analytical laboratories. Examination of records and documents and the results of the sample analyses show that CSA personnel were consistent in adhering to SOPs prepared for sample collection, handling, and tracking. Except for minor deviations or exceptions during the initial cruise that were subsequently corrected, proper sample collection procedures were observed. CSA personnel adhered to the methodology described in cruise-specific Sampling and Analysis Plans and specific SOPs, followed pre-cruise listings of required samples and data and maintained thorough documentation of their activities in the Chief Scientist Field Logbook.

Strict sample chain-of-custody procedures were observed from sample collection to analysis, tissue sample collections were properly documented in Field Logging Sheets, and a Daily QA/QC Field Checklist was properly completed by the responsible individuals (QA Officer's Field Representative) to document field QA activities.

The QA Officer's Field Representative ensured that each produced water sample, ambient seawater sample, and marine organism specimen was properly labeled and recorded along with ancillary data in a cruise-specific Sample Inventory Log or Field Logging Sheets to ensure that each data point produced in the study could be tracked back to a specific field sample. Sample Custody Sheets were signed during each exchange of samples between individuals that were responsible for them. Sample Custody Sheets were completed for each batch of samples allowing accurate sample tracking and custody. Sample composites and composite subsamples were similarly labeled, documented, and tracked. EPA sample storage, holding times, and handling requirements were observed, where applicable, and documented (EPA, 1991).

The records and documents relevant to the field sample and data collection are available at CSA in project files. Field data have been completely backed-up and archived on optical disk. The majority of the data analyses and reports prepared for this study were entered on desktop computers at CSA which are backed-up daily on tape with copies stored on magneto-optical disks. CSA has a copy of all of the processed data prepared and submitted by each participating laboratory. QA in each participating laboratory was documented through communications between the CSA QA Officer and each laboratory QA officer.

CSA has obtained copies of all of the relevant QA related documents from each participating laboratory. These include the QAPjPs, along with DQOs, SOPs, QA Statements, and case narratives. Case narratives and QC summaries described the QC samples that were analyzed with each sample batch and QC issues that were encountered. QA Statements from each laboratory provided a summary of the significant QA issues involved in data packages submitted for each cruise, particularly deviations from SOPs and corrective actions undertaken to address any issues. These will be archived along with other project files.

2.2.2.2 Battelle Ocean Sciences. Battelle was responsible for tissue processing and tissue and water sample analysis for target VOCs. Battelle was also the comparison laboratory for analysis of SVOCs and metals. Documents and data results show that a rigorous QA Program was observed to ensure the accuracy, precision, and validity of all analytical data generated by Battelle. Prior to the start of the study, a QAPjP and SOPs were prepared and distributed to the Battelle study team, outlining study objectives and sample preparation and analysis methods. The QAPjP and SOPs outlining sample receipt, storage, processing, and analysis and record keeping and auditing were followed by trained laboratory personnel. Chain-of-custody forms were properly completed and filed. A Sample Custodian inspected, logged-in, and stored the samples in accordance with SOPs. Strict procedures were observed to prevent contamination of samples. Instruments were calibrated and maintained and QC samples such as procedural blanks, matrix spikes/matrix spike duplicates, SRMs, and duplicates were prepared and analyzed with each sample batch according to the SOPs. Records were kept of equipment maintenance, repair, and calibration, preparation of solvents, standard stock solutions, and surrogate compounds. Complete QC sample results were provided in each data package submitted to CSA. Battelle submitted thorough QA reports for each batch of samples ensuring and documenting data quality of each data package submitted. Descriptions of deviations from the QAPjP and SOPs were provided along with corrective actions taken. Data reports were qualified as appropriate and outliers flagged with clarifications. Following proper QA approaches, the study was monitored by Battelle's Quality Assurance Unit which undertook the following activities:

- maintained a copy of the QAPjP and relevant SOPs;
- performed Battelle laboratory inspections to ensure that the work conformed to Approved procedures;
- conducted audits of reported data to ensure completeness, accuracy, and traceability; and
- reviewed data reports.

All QA issues were administered by the Battelle QA Officer in coordination with the CSA QA Officer. Battelle provided CSA with hardcopy and electronic versions of their data reports and QA summaries. Original documents, raw data files, and data reports will be stored and archived at Battelle according to their SOP.

2.2.2.3 Arthur D. Little, Inc. ADL was responsible for the analysis of samples for SVOCs. ADL was also the comparison laboratory for analysis of VOCs. A review of the QA Program at ADL indicated that ADL implemented a comprehensive QA Program that documented its adherence to a QAPjP and SOPs and any deviations and corrective actions. Trained personnel were provided specific guidance on the analytical methods and procedures to be used through the QAPjP that defined the level of effort and frequency for QC parameters and provided acceptance criteria for these parameters. Samples were properly logged and stored upon receipt and the exchange of custody was documented. Instruments were calibrated and QC samples were collected and analyzed using appropriate analytical techniques to ensure data of the highest quality. Instruments were calibrated and monitored daily using standards containing all analytes of interest. If a particular instrument did not meet the data quality objective for the

analysis, appropriate corrective action was taken. All maintenance performed was recorded in detailed log books kept for each instrument. Corrective action, including re-analysis of samples, was performed if continuing calibration checks did not meet acceptance criteria.

Control samples were used to help determine the accuracy, precision, and potential contamination of the analytical methods. SRMs were analyzed to evaluate the accuracy and precision of environmental data. A procedural blank was processed and analyzed and surrogate internal standards (SISs) and recovery internal standards were added to the blanks in the same manner as field samples and other QC samples. A matrix spike and matrix spike duplicate were analyzed with each batch of field samples to monitor the accuracy and precision of the procedure. Prior to spiking or analyzing samples, all SISs and calibration solution concentrations were verified by instrumental analysis. Prior to sample analysis, each reagent used for the extraction and analysis of samples was analyzed in duplicate by gas chromatography/mass spectrometry (GC/MS) to determine potential contamination. MDLs were determined as defined by EPA regulations (49 FR 209:198). MDLs were calculated for each target analyte in each matrix analyzed (tissue and water).

Phthalate esters are commonly found in plastics and are often ubiquitous as contaminants in the laboratory environment. Special attention to trace level techniques and controlled laboratory conditions prove to be effective measures in minimizing background phthalate contamination.

All chemistry data generated by ADL were assembled into data packages and validated by the Laboratory Manager and/or the respective facility supervisor. Data validation involved a review of all procedures used to accept or reject data after collection and prior to use. This included ensuring that the DQOs for accuracy and precision had been met, the data had been generated in accordance with the QAPjP, and the data were both traceable and defensible. Data packages were reviewed to assure compliance with procedures and DQOs specified in the QAPjP and SOPs.

After completion of the data package review and approval by the Laboratory Manager, each data package was audited by ADL's QA staff. Each data package was reviewed for completeness, and approximately 20% of reported data was independently calculated by the auditor to ensure the accuracy of reported results. After completion of the QA data audit, a formal audit report was issued summarizing the findings of the audit. Prior to submission of analytical data to the CSA database, all analytical data were reviewed by the Principal Investigator. After the analytical data were found to be accurate and complete they were submitted to the CSA database. The data packages, laboratory notebooks, and associated electronic files will be archived at ADL for a period of at least five years after the completion of the study.

2.2.2.4 Florida Institute of Technology. FIT was responsible for the analysis of metals in produced water, ambient seawater, and tissue samples. A review of the QA Program at FIT indicated that FIT established a sound QA Program based on a comprehensive work plan and SOPs. Trained personnel were instructed on the

analytical methods and procedures to be followed with specific emphasis on frequency of QC measurements and acceptance criteria for these determinations. Upon receipt, all samples were examined for sample container integrity and then carefully logged-in, stored, and chain-of-custody documentation completed. Instruments were calibrated and QC data were collected and analyzed to ensure the highest data quality standards. Prior to every group of sample analyses, each instrument was calibrated for the target analyte(s), with continuing calibration checks performed throughout the sample run. If the instrument calibration failed to pass the acceptance criteria at any point, appropriate corrective action was taken and documented.

Quality control samples were prepared and analyzed with each group of samples to determine and evaluate accuracy, precision, and contamination control. These samples included SRMs certified for the elements of interest, procedural blanks, matrix spike checks, duplicate sample analyses and method-of-standard-addition analyses. MDLs as defined by EPA regulations (49 FR 209:198) were determined for each element of interest and calculated for each matrix analyzed (produced water, ambient water, and tissue).

Prior to submission, the FIT Project Manager reviewed each data package for accuracy, completeness and adherence to DQOs. The data packages contained a summary of the QC sample data and complete SRM analysis results. Documentation of any problems, data exceptions and deviations from SOPs were provided. All raw and processed data records are archived at FIT with copies provided to CSA.

2.2.2.5 Core Laboratories, Inc. Core Laboratories was responsible for the analysis of radium in produced water, ambient seawater, and tissue samples. As documented in data packages, case narratives, and correspondence with CSA, Core Laboratories implemented a laboratory QA Program with SOPs developed from EPA-approved methods. Samples were received and logged into the in-house sample tracking system and stored according to SOPs. Core Laboratories conducted analysis for ^{226}Ra and ^{228}Ra in ambient seawater, produced water, and tissue samples according to SOPs. All sample analyses incorporated QC samples to document accuracy and precision, including procedural blanks, laboratory control samples, matrix spikes and method duplicates, in each analytical batch.

All data packages underwent review by the Core Laboratories QA Officer prior to release to CSA. The data packages include a summary of results from QC samples and also provide documentation of procedures and any significant deviations from SOPs. Problems and exceptions that were encountered were described in accompanying case narratives. All raw and processed data results, which have also been provided to CSA, are archived in electronic and hardcopy form per Core Laboratories SOP.

2.2.2.6 Paragon Analytics. Paragon Analytics was responsible for radium analysis as a comparison laboratory. Gamma spectroscopy, a different analytical method than that used by Core Laboratories (proportional counters) was used. Data quality was ensured through Paragon's existing QA Program that is documented in SOPs. Paragon adhered

to their relevant SOPs for the analytical work including sample receipt and storage. The main methodological deviation from Paragon's SOPs was in the sample volume required for radionuclides analysis of tissues. CSA provided Paragon with a substantially larger volume for analysis to meet the required detection limits compared to Core Laboratories. QC samples were analyzed in each analytical batch, including procedural blanks, laboratory control samples, and method duplicates. Data packages were submitted which provide complete documentation of procedures and significant deviations from SOPs and identified problems and exceptions that were encountered. Data packages underwent QA review prior to release to CSA and data packages were submitted to CSA with case narratives that documented procedures and described deviations or exceptions encountered during analysis.

2.3 FIELD METHODS

2.3.1 Field Logistics

2.3.1.1 Survey Vessel and Navigation. The M/V FLING, a 100-ft crew/dive boat, was used to conduct all field surveys. The boat provided air compressors, dive platform, and ample deck space for equipment storage and was able to travel at a speed of 17 knots allowing for rapid transit between survey sites. Navigation was performed with the use of a differential global positioning system (DGPS). The DGPS received position correction data from the United States Coast Guard, New Orleans, Louisiana DGPS reference beacon.

2.3.1.2 Dive Operations. Dive operations were performed by CSA divers, who are certified by internationally recognized dive associations, have Red Cross CPR and first aid certifications, and have years of experience performing underwater sampling tasks.

2.3.1.3 Coordination With Operators. Lease holders and platform operators were notified of the study prior to field operations. A telefax concerning the scope of work, the approximate starting date, and duration of on-site survey operations was sent to an OOC representative approximately one month prior to survey commencement. The OOC representative, in turn, notified the platform operators of the pertinent information concerning each pending field survey. In addition, each on-site platform operator was contacted directly from the survey vessel prior to operations to ensure the safe coordination of field survey operations with platform oil and gas operations.

2.3.1.4 Summary of Survey Effort. Sampling for the Definitive Component was conducted on three cruises. The sampling effort for these cruises is summarized in **Table 2-8**. Total time for the entire Definitive Component Sampling effort was 85 field days, 31% of which was weather downtime.

2.3.2 Documentation of Biological Community

During the Screening Survey (Cruise 1), the first task at each platform was to conduct a reconnaissance dive of the biota on and around the platform. Based on the results of this dive, the Field Chief Scientist evaluated the platform for its ability to provide sufficient specimens of appropriate species to satisfy the requirements of the Definitive Component. This evaluation was discussed with additional study personnel in the CSA, Jupiter, Florida office. If the site was found to be suitable, sampling was continued. If the site was unsuitable for the Definitive Component, the OOC Project Manager was contacted and alternative actions were discussed, including identifying and reconnoitering additional platforms. The first potential candidate platform was rejected because there was an insufficient number of specimens and biomass to support the requirements of the sampling program as the platform had not been in place long enough for a mature biological community to become established on and around the platform structure.

During the Definitive Cruises (Cruises 2 and 3), a visual assessment of the biological communities was conducted at each platform during the initial dive. The Field Chief Scientist visually assessed the composition of the biological communities and availability of proposed target species. Based on the results of this dive, the Field Chief Scientist evaluated the platform for its ability to provide sufficient specimens of appropriate species to satisfy the requirements of the Definitive Component. Adjustments to sampling were made as necessary after this assessment.

The biological communities of the survey sites were visually assessed using a diver-held underwater video system. The video system was used to record the composition of the biological communities during the survey. Video data were used as an aid to validate availability of proposed target species and document any changes which may have occurred between cruises. Video records and underwater still photographs were collected at each platform where Definitive Component sampling was conducted. Representative photographs are presented in **Appendix B**.

2.3.3 Tissue Sampling Procedures and Equipment

All biological specimen collections were performed under a 21 October 1994 letter of authorization from Andrew Kemmer, Regional Director, Southeast Regional Office, National Marine Fisheries Service, NOAA, St. Petersburg, Florida. All activities under this authorization were limited to research programs. An extension to this letter of authorization was granted in a 1 December 1995 letter from the same agency.

2.3.3.1 Biofouling Assemblage. The biofouling assemblage consisted of the organisms attached to the platform structure or living among the organisms attached to the platform structure. Bivalve specimens were collected by divers from each platform structure in water depths ranging from 0 to 22 m. The range of water depth from which bivalves were collected was within the plume as predicted by site-specific plume discharge models in conjunction with field observations (see **Section 3.2.1**). Divers collected whole specimens of the bivalve target species from the platform structure

using a metal pry-bar. The number of specimens per target species collected was based on 1) statistical requirements as determined from data collected during Cruise 1; 2) the amount of tissue needed for analyses; and 3) availability. Specimens were taken intact to prevent incidental contamination during collection and subsequent processing. Once removed from the platform structure, specimens of bivalve target species were placed in a nylon dive bag and brought to the boat for processing. Bivalve samples were sorted by species, and the shells were brushed and rinsed to remove external debris prior to storage. All efforts were made to minimize time between collection and storage.

The collection of crustacean target species was only attempted during Cruise 1, as insufficient numbers were available to select a target species for the Definitive Cruises. Divers and traps were used to collect crustacean target species in water depths of less than 20 m. When present, crab target species were collected by divers concurrently with bivalve target species. The two trap types utilized to potentially capture crab target species were placed at a water depth of approximately 15 to 20 m on platform cross-members. A modified Thiel-Turkay trap was baited and then deployed by divers to capture target species of xanthid crab, which does not have a wide mobility range within the biofouling community. Six to twelve modified Thiel-Turkay traps were deployed at each sampling location. Baited standard low profile crab traps were deployed on the platform cross-members to potentially capture the more mobile portunid crabs. Four standard low-profile crab traps were deployed at each sampling location. All traps were deployed during the first day of occupation at each sampling location to maximize the deployment time. The number of days at a particular sampling location and subsequent deployment time for the traps varied depending on weather conditions and the local logistic schedule. Traps were recovered during the last day of occupation at a sampling location. Deployment times at individual platforms ranged from three to five days. Crustaceans were observed at some platforms but these specimens were too small and too sparse to fulfill the requirements of the program.

Bivalve tissue samples do not have specified holding times (EPA, 1991). All bivalve specimens were retained frozen in chest freezers on board until the vessel entered port. A maximum/minimum thermometer was placed in each chest freezer to document temperature variation of the tissue samples. Frozen samples were sent to the laboratory for further processing. Laboratory tissue sample processing is presented in **Section 2.4.1** (Compositing and Subsampling).

2.3.3.2 Platform-Associated Fish Assemblage. Platform-associated fish were collected by hook-and-line, spearfishing, and traps. Collection of platform-associated fish was conducted in the upper water column within a 100-m radius of the platform. Hook-and-line fishing was conducted from the survey vessel and from underwater by divers. Hook-and-line fishing conducted from the survey vessel was one of the primary methodologies utilized to collect platform-associated fish during each of the three surveys. Diver hook-and-line fishing was conducted only during Cruise 1 because it was not as selective or as time-efficient as spearfishing. Fish caught by either method of hook-and-line were immediately placed in a clean dykor-coated fish box once on

board the vessel until the fish were immobile. Dykor is a polyvinylidene fluoride coating that is unaffected by most chemicals and is non-contaminating.

Spearfishing with spear guns and pole spears was conducted by two-man dive teams and was the other primary method for collecting platform-associated fish during each survey. Spears were equipped with stainless steel tips to reduce the possibility of tissue contamination. Fish caught by spearing were placed in a nylon-mesh dive bag, brought back to the survey vessel, and then placed in a clean dykor-coated fish box until the fish were immobile.

Traps were utilized for the collection of platform-associated fish only during Cruise 1 because traps were not selective and were relatively unsuccessful. Traps were baited with dead fish and deployed by divers at platform structure cross-members. To prevent possible contamination, only target species of fish in good condition (no open abrasions) following capture were taken for possible analyses. Fish traps were deployed and recovered by divers. One to four fish traps were deployed at each sampling location during the first day of occupation to maximize the deployment time. The number of days at a particular sampling location and subsequent deployment time for the traps varied depending on weather conditions and the local logistic schedule. Traps were recovered by divers during the last day of occupation at a sampling location. Fish caught in the traps and selected for possible analyses were placed in a clean dykor-coated fish box until the fish were immobile.

After the fish were immobile, they were examined for conspicuous external abnormalities (e.g., abrasions, lesions, shark bites), and wounds associated with sampling (spearing). These were noted as comments for each specimen in the Field Logging Sheets. Only 3 of 1,866 fish specimens collected during the three cruises had lesions; specimens with lesions or other external abnormalities were not culled for analysis.

Fish specimens were rinsed in seawater, weighed, measured (standard length), and wrapped in purified aluminum foil (foil was baked at 400°C for at least 4 h). Wrapped specimens were labeled on the outside of the aluminum foil wrapping (**Section 2.3.4**, Tissue Sample Labeling and Tracking System) and stored frozen in a chest freezer. All efforts were made to minimize time between collection and storage.

Fish tissue samples do not have specified holding times (EPA, 1991); all fish tissue samples were retained frozen in chest freezers on board until the vessel entered port. A maximum/minimum thermometer was placed in each chest freezer to document temperature variation of the tissue samples. Frozen samples were sent to the laboratory for further processing.

2.3.3.3 Tissue-handling Equipment Blanks. Equipment blanks for SVOCs were collected during each field survey for tissue-handling equipment. Equipment included the sorting tray, the fish holding box, and the aluminum foil used during the processing of tissue samples. Equipment blanks for the sorting tray and the fish holding box were

preserved and handled following the procedure outlined in **Section 2.3.6** (Produced Water Sample Collection).

The equipment blank for the aluminum foil was collected by triple wrapping a piece (approximately 0.5 m^2) of purified aluminum foil in purified aluminum foil. The equipment blank for the aluminum foil was externally labeled (**Section 2.3.4**, Tissue Sample Labeling and Tracking System) and stored frozen in a chest freezer.

2.3.4 Tissue Sample Labeling and Tracking System

Each biological specimen collected was tracked by a serial number encoded and printed on a barcode label attached to a pre-cleaned container or sample foil wrapping. Labels were photocomposed and printed on approximately 4.0 x 1.5 cm white polyester barcode labels available from Data Composition, Inc. The barcode labels contained the following header text: "OOC BIOACCUMULATION STUDY." The labels were coded in sequence from OOC-00001 to OOC-02500. All labels were printed in pairs. One barcode label of a pair was attached to the Field Logging Sheets. The second barcode label of the pair was attached to the aluminum foil wrap or sample container.

A Percon Series 10 barcode system was interfaced with a desktop computer and was utilized to enter field sample data into a spreadsheet template to produce a computer file duplicate of the hand-written Field Logging Sheets. As each biological sample was collected, the sample descriptive information was entered into the spreadsheet file containing the same data fields as the Field Logging Sheets. Sample descriptive information, each entered as a distinct data field, included the following:

- sample ID (barcode label designation);
- cruise number;
- platform location (Oil and Gas Area Lease Block designation);
- date of sample collection;
- sample type;
- species;
- collection method;
- fish weight (g);
- fish standard length (cm);
- responsible individual; and
- comments/external abnormalities.

After a sample was placed in aluminum foil or a pre-cleaned container, the barcode label on the Field Logging Sheets was scanned into the appropriate fields of the spreadsheet sample logging template. Other data fields were completed with the sample information outlined on the template. Upon completing in-field data entry, the spreadsheet file was saved and three copies were electronically generated. One copy was stored in the computer hard drive, and two backup copies were saved on separate floppy disks.

2.3.5 Tissue Sample Storage and Shipping

Whole bivalves wEre stored in I-CHEM® pre-cleaned certified sample containers and/or purified aluminum foil. Fish specimens were triple wrapped with purified aluminum foil as single individuals.

Frozen samples were sent to Battelle for further processing. After returning to the demobilization dock, the chest freezers containing the frozen biological specimens were removed from the survey vessel and loaded onto a truck with an enclosed cargo area. The top portion of each chest freezer was packed with dry ice and sealed. A maximum/minimum thermometer was placed in each chest freezer during shipment to document temperature variation of the tissue samples. Study personnel drove the truck with the chest freezers directly from the demobilization dock to the laboratory. When stopping for the night, the chest freezers were plugged in to insure that the samples remained frozen and to preserve the dry ice. The method of transport successfully delivered all frozen biological specimens to the Battelle laboratory.

2.3.6 Produced Water Sample Collection

Three replicate samples of produced water for analyses of VOCs, SVOCs, metals, and radionuclides were collected at each discharging platform during each survey. Produced water samples were collected by the field team from the platform in-line sampling spigot along the produced water discharge pipe directly into the appropriate sample container. A company representative directed the sampling personnel to the location of the spigot. The sampling spigot was located at the furthest point along the produced water discharging system, prior to the descending discharge pipe. The in-line spigot was wiped clean of any loose particles using a lint-free laboratory towel and the spigot was turned to flush the pipe for approximately 1 min prior to collecting water samples. The mouths of the sample containers were prevented from coming in contact with the spigot during sample collection.

Radionuclide samples were collected in 2-L polyethylene bottles that were pre-cleaned by the supplier following EPA recommended wash procedures. The sample bottles were not completely filled with produced water; an air space was left for the addition of nitric acid (HNO_3) preservative. The partially filled sample bottles were capped, labeled, and placed in a plastic cooler with blue ice for transport to the survey vessel.

Radionuclide samples were preserved at a pH of $\leq$2 with approximately 4 ml of HNO_3 on board the survey vessel. The cap was secured, the sample shaken to ensure thorough mixing of the acid, and the sample pH checked by pH paper. Following acidification to a pH of $\leq$2, the sample bottle was capped, a custody seal was attached, and the sample was placed in a refrigeration unit. Temperature of the refrigeration unit was monitored with a maximum/minimum thermometer.

VOC samples were collected in triplicate; samples were collected in 40-ml pre-cleaned amber open top glass VOC vials with a Teflon®/silicone septa. All vials had a "Certificate of Analysis" certifying absence of possible VOC contamination as part of the

QC process. Samples were collected from a slow flowing source to prevent aeration of the sample, and sample containers were completely filled to eliminate any air space. VOC samples were preserved immediately at a pH of ≤2 with reagent-grade hydrochloric acid (HCl) (approximately 37%). After a VOC sample was capped and the air space eliminated, the vial was not opened until analysis. Following collection and preservation, the sample vials were labeled and placed in a plastic cooler with blue ice for transport to the survey vessel. On board the survey vessel, a custody seal was attached to each of the VOC samples, and the samples were stored upside down at 4°C in a refrigeration unit. Temperature of the refrigeration unit was monitored with a maximum/minimum thermometer.

SVOC samples were collected in 2.5-L pre-cleaned amber glass (I-CHEM®) bottles with Teflon®-lined lids with inserts of purified aluminum foil. All bottles had a "Certificate of Analysis" certifying absence of possible SVOC contamination as part of the QC process. The sample bottles were not completely filled with produced water; an air space was left for the addition of methylene chloride preservative. The partially filled sample bottles were capped, labeled, and placed in a plastic cooler with blue ice for transport to the survey vessel. On board the survey vessel, samples were preserved with approximately 150 ml of pre-analyzed methylene chloride, the sample bottles were capped, sample custody seals were attached, and the samples were stored at 4°C in a refrigeration unit. Temperature of the refrigeration unit was monitored with a maximum/minimum thermometer.

Samples for metals, with the exception of mercury, were collected directly into 1-L pre-cleaned polyethylene bottles. As part of the QC process, all bottles were pre-cleaned by the analytical laboratory to insure the absence of possible inorganic contaminants. The bottles were washed in concentrated HNO_3 at 60°C, treated with pH 2 HNO_3, and finally filled with distilled, deionized water. Each bottle was stored in an acid-washed Ziploc® bag before and after sampling. Produced water samples to be analyzed for mercury were collected in 500-ml acid-washed Teflon® bottles. Once the sample bottles were full, they were capped, labeled, and placed in a plastic cooler with blue ice for transport to the survey vessel.

On board the survey vessel, HNO_3 was used to preserve the water samples collected for metals. Two milliliters of high purity HNO_3 (Ultrex II®) per 1 L of sample was added to each sample using a 1-ml calibrated pipette with disposable tip. Before HNO_3 was added to the samples, the disposable tip was filled with HNO_3, and the HNO_3 discarded to clean the tip and prevent possibly contaminating the water samples. The tips were discarded following the preservation of the samples. After the samples were preserved, the sample bottles were capped, sample custody seals were attached, and the samples were stored at 4°C in a refrigeration unit. Temperature of the refrigeration unit was monitored with a maximum/minimum thermometer.

2.3.7 Ambient Seawater Sample Collection

During each cruise, three replicate samples and appropriate blanks of ambient seawater for determining concentrations of VOCs, SVOCs, metals, and radionuclides, were

collected at both the primary and reference sites of each platform pair. Ambient seawater samples were collected at a station located 2,000 m upcurrent of the survey platform structure and at a water depth of approximately 5 m. If the current direction was not readily apparent, rhodamine dye was put into the water in proximity to the platform to determine current direction.

Radionuclide, VOC, and metal samples were collected using a clean 5-L Teflon®-lined Go-Flo water bottle (Model 1080 Series) with pressure-activated opening mechanism to ensure the instrument was not internally contaminated during deployment through the air/water interface. Samples for SVOCs were collected by a Marble® water sampler, which minimized the possibility of phthalate contamination during sampling. The Marble® water sampler employed the sample container (i.e., a pre-cleaned 2.5-L amber glass jar) during collection and had a spring-loaded stopper to ensure the sample was not contaminated during deployment through the air/water interface. Ambient seawater sampling was conducted from an inflatable rubber boat to avoid possible contamination from the survey vessel.

Radionuclide samples were stored in 4-L pre-cleaned polyethylene bottles. The sample bottles were not completely filled with produced water; an air space was left for the addition of HNO_3 preservative. The partially filled sample bottles were capped, labeled, and placed in a plastic cooler with blue ice for transport to the survey vessel. On board the survey vessel, radionuclide samples were preserved at a pH of $\leq$2 with reagent-grade HNO_3 following the procedure described for the produced water samples in **Section 2.3.6** (Produced Water Sample Collection).

VOC samples were collected in triplicate and were stored in 40-ml pre-cleaned amber open top glass VOC vials with a Teflon®/silicone septa. All vials had a "Certificate of Analysis" certifying absence of possible VOC contamination as part of the QC process. Samples were collected slowly from the Go-Flow water bottle to prevent aeration of the sample, and the vials were completely filled to eliminate any air space. VOC samples were preserved immediately at a pH of $\leq$2 with reagent-grade concentrated HCl. After VOC samples were capped and the air space eliminated, the vial was not opened until analysis. Further processing of the ambient seawater samples was the same as the produced water samples described in **Section 2.3.6** (Produced Water Sample Collection). During Cruises 2 and 3, samples for a matrix spike and a matrix spike duplicate analysis were collected at each of the two platform pairs for intra-laboratory QC following the previously described procedure.

Sample containers for SVOCs collected by the Marble® water sampler were completely filled following collection. A portion of the sample was discarded to provide an air space for the addition of methylene chloride preservative. The partially filled sample bottles were capped, labeled, and placed in a plastic cooler with blue ice for transport to the survey vessel. On board the survey vessel, the water samples for SVOC analyses were processed and stored in the same manner as the produced water samples described in **Section 2.3.6** (Produced Water Sample Collection).

During Cruises 2 and 3, samples for a matrix spike and a matrix spike duplicate analysis were collected at each of the two platform pairs for intralaboratory QC. Each of these samples was collected in a 4-L pre-cleaned amber glass bottle with the Marble® water sampler, capped with a Teflon®-lined lid with an insert of purified aluminum foil immediately after collection, and transported to the survey vessel. All bottles had a "Certificate of Analysis" certifying absence of possible SVOC contamination as part of the QC process. On board the survey vessel, the contents of each 4-L amber glass bottle were divided between two 2.5-L amber glass bottles, preserved, and stored following the procedure described in **Section 2.3.6** (Produced Water Sample Collection).

Samples for metals were contained in 2-L polyethylene bottles, which had been pre-cleaned by the analytical laboratory to insure absence of possible inorganic contaminants for QC. After the sample bottles were full, they were capped, labeled, and placed in a plastic cooler with blue ice for transport back to the survey vessel. On board the survey vessel, ambient seawater samples for metals were filtered with pre-cleaned filtration units (COSTAR 1,000-ml Bottle Filter System II); these filtration units were equipped with a 0.45-µ pore size filter, 400-ml funnel, and 1-L polystyrene collection bottles, which were attached by Tygon® tubing to a vacuum pump to filter the water samples. The samples were filtered to isolate the dissolved fraction from particle-bound metals. Two filtration units were used to filter each 2-L water sample which provided 1.5 L of water for analyses of arsenic, barium, and cadmium and an additional 500 ml of water for mercury analyses. The water for analysis of arsenic, barium, and cadmium was stored in the filtration unit collection bottles. The water for analysis of mercury was stored in pre-cleaned Teflon® bottles. Ambient seawater samples for metals analyses were preserved and stored following the procedure described in **Section 2.3.6** (Produced Water Sample Collection), except 1 ml of high purity HNO_3 (Ultrex II®) per 1 L of sample was used to preserve each sample at pH<2.

2.3.8 Water Sample Shipment Procedures

Water samples were shipped to the appropriate laboratory by one of two ways. If the survey vessel was scheduled to return to shore within a period that assured the sample would reach the laboratory within the EPA-specified holding times, the samples were shipped directly from the dock to the laboratory via overnight courier service. Otherwise, the samples were shipped to a shorebase via platform helicopter service and then to the laboratory via overnight courier service; this was accomplished through close coordination between study personnel and the shorebase and between study personnel and the overnight courier service. All water samples were shipped with chain-of-custody.

Water samples to be analyzed for VOCs were shipped to the laboratory within one week of sample collection. Trip blanks for VOC samples were sent with each shipment. Shipment coolers of water samples to be analyzed for VOCs, SVOCs, and metals contained a water-filled bottle (temperature blank) so the laboratory could check the temperature of the samples upon arrival.

2.3.9 Hydrography

Water column profiles were conducted daily while the ship was present at each study site to characterize the vertical structure of the water column. For each profile, temperature, salinity, conductivity, and depth were recorded from the sea surface to a water depth of 50 m (164 ft) at 5-m (16-ft) intervals. Water quality parameters were measured by a manufacturer-calibrated Seacat SBE 19 Profiler. These data were recorded directly by computer. Two backup copies of each profile were maintained on separate floppy disks. The Seacat SBE 19 Profiler was used in conjunction with an in-field calibrated Hydrolab Surveyor III H_20 to verify calibrations between the two instruments.

2.4 LABORATORY

2.4.1 Compositing and Subsampling

Prior to tissue processing, the chemical laboratory at Battelle was examined and precautions taken to ensure that potential sources of target analyte contamination (especially phthalate and phenol) were minimized. Precautions taken were as follows:

- carbon filters were placed over heating and air conditioning vents in the laboratory;
- tissue processing tasks were completed within the shelter of a cardboard box lined with purified aluminum foil;
- solvents and aqueous solutions were checked for contamination prior to use;
- stainless steel laboratory utensils (e.g., knives, tissuemizer probes) were solvent rinsed prior to use; and
- miscellaneous laboratory supplies (e.g., aluminum foil) were baked at 400°C for 4-h prior to use.

An overview of the compositing, subsampling, and analysis strategy is presented in **Figure 2-2**. Bivalve specimens collected during a cruise at an individual platform were processed to prepare individual samples for chemical analysis. Initially, each specimen collected at a platform during a cruise was assigned a number. The order of these specimen numbers was randomized to assign each specimen into a sample group or into an excess specimen group, which was returned to the freezer. Each sample group consisted of 15 to 30 specimens. Soft tissue from the specimens in a single sample group was removed from the shell with a stainless steel knife. The composite of soft tissues was then refrozen and frozen tissue homogenized in a Tekmar Tissumizer equipped with a stainless steel probe. After homogenization, each bivalve sample was subsampled for VOC, SVOC, metal, and radionuclide analyses. A VOC sub-sample was taken first from the homogenate and immediately returned to the freezer to minimize handling time. Although there may be potential for loss of volatiles during homogenization of bivalves or crustacean samples, analysis of individual specimens or groups of specimens would not have been appropriate to represent the entire sample.

Fish specimens collected during Cruise 1 were treated individually. Composite samples of individual specimens were constructed for Cruises 2 and 3 by randomly assigning specimens to composite sample groups. Whole fish samples were filleted with a stainless steel knife. A piece of a fillet was diced into approximately 0.6 cm cubes and placed immediately into a volatile organic analysis (VOA) vial which was placed in the freezer until analysis for VOCs. For composite samples, cubes from each specimen in the composite sample group were placed into a VOA vial and stored frozen until analysis. To minimize the potential loss of volatile compounds, fish fillets for analysis of VOCs were not homogenized.

The rest of the fillet (or fillets for composite samples) was homogenized in a Tekmar Tissumizer equipped with a stainless steel probe. The fish tissue homogenate was then subsampled for SVOC, metals, and radionuclides analyses. The SVOC subsample was taken before sub-sampling for metals and radionuclides, to minimize potential phthalate contamination. A portion of each sample was retained for determination of the wet weight:dry weight ratio.

Tissue sub-samples were stored frozen at -20°C and shipped frozen on blue ice to the appropriate laboratories by overnight courier with chain-of-custody for all samples. Each analytical laboratory homogenized each composite sample and analyzed two subsamples from each composite sample. Composite samples were designated as A, B, and C and subsamples (analyses) as 1 and 2 (**Figure 2-2**).

2.4.2 Volatile Organic Compounds

Analyses of water and tissue samples for VOCs were performed by the chemical laboratory at Battelle. VOCs were measured in water and tissue samples using purge and trap GC/MS. Target VOCs were

- benzene;
- toluene;
- ethylbenzene;
- *m*-,*p*-xylenes;
- *o*-xylene;
- C_3-benzenes; and
- C_4-benzenes.

Water and tissue samples were analyzed in separate analytical batches in the laboratory. Each analytical batch contained 15 or fewer field samples and the following QC samples:

- procedural blank;
- matrix spike/matrix spike duplicate; and
- sample duplicate.

Water sample sizes were generally 25 ml, and tissue sample sizes were 3 to 5 g. Water samples were transferred to the sparge vessel, fortified with SIS compounds and

recovery internal standards (RISs), and analyzed. The method of preparation of tissue samples for VOC analysis is based on the EPA published method of Hiatt (1981) and Easley *et al.* (1981). Frozen tissue samples were quickly crushed, placed into a sparge vessel, weighed, and fortified with SIS and anti-foam agent. Water was then added to the container to eliminate headspace. The container was sealed and sonicated in a cold water bath for approximately 15 min, fortified with RIS, and analyzed.

Prior to instrumental analysis, the mass spectrometer was tuned with perfluorotributylamine to maximize peak shape and intensity. After tuning, a multi-level calibration curve was analyzed to demonstrate the linear range of analysis. Continuing calibration check standards were analyzed with every 10 samples.

Water and tissue samples were purged and trapped on a Tekmar purge and trap/desorption unit (purge temperature: 40°C). Target compound separation and identification was achieved using a Hewlett-Packard Model 5890 gas chromatograph equipped with a 30 m x 0.25 mm i.d. DB-624 column (or equivalent) and a Hewlett-Packard Model 5970 Mass Selective Detector. Samples were quantified for VOCs by the method of internal standards, using SIS.

DQOs for VOC analyses are presented in **Table 2-9**. MDLs for water and tissue sample analyses are presented in **Table 2-10**.

2.4.3 Semivolatile Organic Compounds

Analyses of water and tissue samples for SVOCs were performed by ADL. Water and tissue samples were extracted and analyzed for the target analytes listed in **Table 2-11**. Prior to extraction, samples were spiked with surrogate compounds, naphthalene-d_8, fluorene-d_{10}, phenanthrene-d_{10}, benzo(a)pyrene-d_{12}, phenol-d_6, and bis(2-ethylhexyl)phthalate-d_4. After extraction, seawater samples were directly analyzed by GC/MS for all target analytes; produced water extracts were fractionated by high pressure liquid chromatography (HPLC) and then analyzed by GC/MS for all target analytes. Tissue sample extracts were run though silica gel cleanup columns, fractionated by HPLC, and split in half: one half was analyzed for phenols, and the other half was further cleaned up through alumina before being analyzed for PAHs and phthalate.

Extraction. Two-liter water samples were extracted for SVOCs using separatory funnel liquid-liquid extraction. The water samples were acidified with clean 6N HCl prior to sample processing to enable the extraction of phenol along with the PAH and phthalate analytes. The acidified water samples were spiked with between 0.4 and 10 µg of PAH, phenol, and phthalate surrogate compounds. It was determined during the analysis of the Cruise 1 samples that phenol was present at such high concentrations in the produced water samples that it interfered with the surrogate phenol-d_6. As a result, phenol was quantified using an alternate compound in the Cruise 1 produced water samples. To prevent this in the Cruise 2 and 3 samples, the samples were spiked with an additional 50 µg of phenol-d_6.

The water samples from Cruise 1 were spiked with the surrogates after the addition of the first extraction solvent. For the samples from Cruises 2 and 3, the surrogates were spiked into 1 ml of acetone, quantitatively transferred to the water sample, and mixed with the water for one minute. The first extraction solvent was then added. This was performed to ensure that the surrogates dissolved in the water prior to being extracted.

All samples were extracted with three 120-ml volumes of methylene chloride. The three solvent extracts were combined and dried by adding sodium sulfate to the extract. The extracts were then concentrated to approximately 1 ml, using Kuderna-Danish concentrators and under a stream of purified nitrogen gas.

The ambient seawater extracts were spiked with the appropriate internal standards in preparation for instrumental analysis. The produced water extracts were brought to 1 ml in preparation for fractionation by HPLC to further clean the extracts.

The processed tissue samples received from Battelle were further homogenized and subsampled (25 g wet weight) for chemical analysis. Sodium sulfate was added to each sample which was then spiked with between 0.4 and 1 µg of PAH, phenol, and phthalate surrogate compounds. For the Cruise 1 samples, the surrogates were spiked into the first extraction solvent. For the Cruise 2 and 3 samples, the surrogates were mixed directly into the tissue/sodium sulfate mixture before the addition of solvent. The samples were then extracted three times by maceration using 100 ml volumes of methylene chloride as the extraction solvent. The three solvent extracts were combined and concentrated to approximately 1 ml using Kuderna-Danish concentrators and under a stream of purified nitrogen gas.

The lipid weight was determined for each sample by weighing a 20 µl subsample of the extract. The extracts were processed through silica gel cleanup columns, concentrated, and fractionated by HPLC. The post-HPLC extracts were concentrated under nitrogen and submitted for phenol, phthalate, and PAH analysis by GC/MS. If interferences were encountered after HPLC fractionation (during the GC/MS analysis), the sample extract was split in half; one half was submitted to GC/MS for phenol analysis; the other half was run through alumina cleanup columns and submitted for phthalate and PAH analysis.

Sample Cleanup. Prior to HPLC fractionation, all tissue extracts were passed through a silica gel cleanup column in order to remove any highly polar interfering compounds. The extracts were eluted with 9:1 methylene chloride:ethyl ether through a chromatography column packed with sodium sulfate and 5% deactivated silica gel in a slurry of 9:1 methylene chloride:ethyl ether. The eluate was collected and concentrated under nitrogen to the appropriate HPLC injection volume.

The extracts were fractionated by HPLC using a size exclusion chromatography column (Envirosep Gel Permeation Column [GPC]). The HPLC procedure involved the automated injection of the sample extract and a methylene chloride elution through an Envirosep GPC column. The HPLC fraction collection windows were calibrated with a solution containing phenol, 4,4'-dibromo-octafluorobiphenyl (DBOFB), BEHP,

benzo(g,h,i)perylene, and the primary sample interferences, lipid (as corn oil) and sulfur, prior to the analysis of a sample sequence. The PAH, phenol, and phthalate fraction of the extract was collected by an automated fraction collector programmed to collect the specified fraction based on the HPLC calibration solution.

As previously indicated, if interferences were encountered, the extract was split in half after concentration. One half of the sample extract was spiked with phenol recovery standard and analyzed by GC/MS for phenol. The other half of sample extract was processed through an alumina clean-up column packed with 7% deactivated alumina, and eluted with methylene chloride. The eluate was collected, concentrated under a stream of purified nitrogen gas, spiked with recovery standards, and analyzed for PAHs and phthalate by GC/MS.

The final sample extract was concentrated to between 0.25 and 0.5 ml, spiked with recovery standards (acenaphthene-d_{10} and chrysene-d_{12} at 1 µg/ml), and analyzed for the target analytes by GC/MS in the selected ion monitoring (SIM) mode. The GC/MS was tuned and calibrated with a minimum of a five-point PAH/phenol/phthalate calibration spanning the linear range of the mass spectrometer prior to the analysis of a sample set. The Cruise 1 samples were quantified using a 5-point calibration ranging from 25 to 5,000 ng/ml. The Cruise 2 and 3 samples were quantified using a 6-point calibration ranging from 10 to 5,000 ng/ml. The PAH, phenol, and phthalate target analytes were quantified versus the surrogate compounds added to the samples prior to extraction. The analyte concentrations were corrected for instrumental response based on average response factors generated from the calibration. The recoveries of the surrogate compounds were determined versus the internal standards added to the samples just prior to instrumental analysis.

The sample concentrations were reported in ng/L for water samples and ng/g (wet and dry weight) for tissue samples. DQOs for SVOC analyses are presented in **Table 2-12**. MDLs for water and tissue samples are presented in **Table 2-13**.

2.4.4 Metals

Concentrations of arsenic, barium, cadmium, and mercury were determined in samples of ambient seawater, produced water, and tissues at FIT. Water samples were received directly from the field and tissue samples from Battelle. All samples were recorded upon receipt as part of the chain-of-custody process.

Ambient Seawater. The salinity of each water sample was determined with a refractometer. Concentrations of arsenic and cadmium were determined following pre-concentration using iron-palladium reductive precipitation (Nakashima *et al*., 1988). Metals in 400-ml samples were co-precipitated with iron, palladium, and sodium borohydride. This was accomplished by adjusting the pH of the water sample to 8.5 with Ultrex® ammonium hydroxide and then adding 1 ml of iron and 1 ml of palladium carrier along with 2.5 ml of 6% sodium borohydride. The precipitation was allowed to proceed overnight in a laminar flow hood. Then, the precipitate was filtered and dissolved in HCl and HNO_3 to a final volume of about 4 ml, thereby achieving a

100-fold enrichment of metal levels and eliminating potential analytical interferences from sea salts.

The pre-concentrated samples were then analyzed by graphite furnace atomic absorption spectrometry (GFAAS) for arsenic and inductively coupled plasma-mass spectrometry (ICP-MS) for cadmium. A Perkin-Elmer (P-E) Model 5100 GFAAS with Zeeman background correction was used for arsenic analyses and a P-E ELAN 5000 ICP-MS was used for cadmium analysis. Calibration curves ($r>0.999$) were generated and maintained during the analysis. Procedural blanks, replicate digested samples, and SRMs were also analyzed.

Concentrations of barium in ambient seawater samples were determined directly in the water samples using the method of standard additions with ICP-MS. Mercury analyses for water were carried out directly using a cold-vapor AAS system using a Laboratory Data Control Mercury Monitor.

All plasticware used in these procedures was acid-washed and rinsed with distilled deionized water (DDW). Procedural blanks and replicate samples were prepared with each set of samples. SRM, NASS-4, a sample of clean seawater provided by the National Research Council of Canada (NRC), was analyzed to check the accuracy of the analyses.

Produced Water. Concentrations of arsenic, barium, cadmium, and mercury were determined by direct analysis of the produced water. Concentrations of arsenic were determined by hydride generation with flame AAS using a P-E MHS-10 hydride system in tandem with a P-E Model 4000 AAS. Concentrations of barium and cadmium were determined by ICP-MS using a P-E ELAN 5000 instrument and the method of standard additions. Mercury analyses for water were carried out using a cold-vapor AAS system using a Laboratory Data Control Mercury Monitor.

Tissue Samples. The samples were thawed just prior to analysis and one subsample was removed and placed into an acid-washed 180-ml, boiling flask and freeze-dried. A second subsample (approximately 2 g of wet tissue sample) was placed in a 50 ml centrifuge tube for mercury analysis.

Complete digestion of about 1 g samples of dry tissue was carried out using H_2O_2, HNO_3, and HCl with gentle refluxing. The samples were heated with a watch glass in place until a clear solution formed. The final solution was diluted to 20 ml using DDW. Concentrations of arsenic in the samples, standards, procedural blanks, and reagent blanks were determined by GFAAS using a P-E 5100 PC equipped with Zeeman background correction. Analysis of samples for barium and cadmium was carried out by ICP-MS using a P-E ELAN 5000 instrument. Matrix interferences were carefully monitored for all elements using the method of standard additions.

All glassware used in the procedure were acid-washed and rinsed with DDW. Procedural blanks and triplicate samples were prepared with each set of samples. The SRMs TORT-1, a sample of lobster hepatopancreas provided by the NRC, and 1566A,

a sample of oyster tissue provided by the U.S. National Institute of Standards and Technology (NIST), were prepared and analyzed by the methods described above to check the accuracy of the technique.

Mercury concentrations were determined by heating separate subsamples of wet tissue in acid-washed, polypropylene centrifuge tubes with HNO_3 and H_2SO_4. Sample tubes were heated for 2 h in a 80-90°C water bath and allowed to cool. Each tube was centrifuged at 2,000 rpm and the supernate decanted into a 25 ml graduated cylinder. Any residual material in the centrifuge tube was rinsed twice with 5 ml of DDW, centrifuged, and decanted into the graduated cylinder before diluting to a final volume of 20 ml with DDW. Mercury concentration in the samples, standards, and blanks (procedural and reagent) were determined using the Laboratory Data Control Mercury system.

DQOs including MDLs are presented in **Table 2-14**.

2.4.5 Radionuclides

The activities of the two radioisotopes ^{226}Ra and ^{228}Ra in water and biological tissue samples were expected to be low. Unfiltered water samples were analyzed. A procedure was developed in order to achieve lower detection limits for these isotopes and to reduce the error range of the numbers generated at these lower detection limits. The basic premise was to increase the efficiency in counting of both ^{226}Ra and ^{228}Ra. Both of these isotopes decay to shorter lived alpha and beta emitters and the classic methodologies often utilize these higher specific activity isotopes to identify and quantify the parent isotopes. In the past, it has been difficult to separate the many different decay products and identify them as to the parent responsible for their production. In this method, the approach to this problem was simplified by making an assumption that at low levels of activity there would be a relative constant contribution from both ^{226}Ra and ^{228}Ra if the materials were allowed to reach equilibrium. This assumption was tested by running a series of low level standards for ^{226}Ra and ^{228}Ra separately and combined. A very accurate estimate of percentage contribution to both alpha and beta was developed when the samples were allowed to equilibrate for 3 weeks.

This approach allows the ^{228}Ra activity to be estimated utilizing an unlimited counting time without the need to consider decay of the ^{228}Ac (6 h half life) decay product. The classic method utilizes the isolation of this decay product and immediate counting. The rate of decay is so rapid that extended counting times are not feasible. The results of these calibration experiments demonstrated that there is a very constant contribution of decay products from each isotope at low activity levels.

Following initial preparation, all sample materials were treated identically with this method. Tissue samples were thoroughly homogenized and then dissolved in concentrated HNO_3. This solution was extracted with an equal volume of heptane to remove the long-chain fat molecules. The nitric fraction was then solubilized with consecutive digestions using dilute HNO_3, then HNO_3-H_2O_2, and finally HNO_3-$HClO_4$ digestion. A $PbSO_4$ precipitation was performed by the addition of $Pb(NO_3)_2$ to a

solution that contained a high concentration of sulfate. This precipitate was dissolved in diethylenetriaminepentaacetic acid (DTPA) and the radium was coprecipitated with $BaSO_4$. The resulting barium precipitate was isolated on a planchet and the planchet was set aside for a 3-week period to allow the in-growth and equilibration of the decay products from both ^{226}Ra and ^{228}Ra on the same planchet. A Berthold LB-770-L2 10 Detector Gas Flow Proportional Counter was used for counting the samples. The samples were counted for up to 600 min and the activity of the ^{226}Ra and ^{228}Ra determined by the original calibration curve, which was developed by utilizing low level standards. The resulting data demonstrated much lower detection limits as well as reduced uncertainty in the counting error.

DQOs for radionuclide analysis are presented in **Table 2-15**. Detection limits achieved during the analysis for the two radium isotopes are presented in **Table 2-16**. Detection limits for the radium isotopes were determined for each analysis because the detection limit is a function of the quantity of sample and the gross background counts.

2.5 DATA REPORTING CONVENTIONS

In this report, tissue data are reported on a dry weight basis. The wet weight:dry weight ratio was used to convert concentrations on a wet weight basis to concentrations on a dry weight basis (concentration on dry weight basis = concentration on wet weight basis $\times$ wet weight:dry weight ratio). Arsenic, barium, and cadmium were reported on a dry weight basis.

Within the text and tables of this report, values below the MDL are reported as ND. The practical quantitation level (PQL), which is the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions (50 FR 46902), is defined for the data presented in this report as five times the MDL. Levels between the MDL and the PQL are designated with a "J" qualifier. For example, a value of 4.0 ng/g dry weight of benzene in a tissue sample is reported as 4.0J ng/g dry weight because it is between the MDL (3.2 ng/g dry weight) and the PQL (16 ng/g dry weight). The purpose of the “J” qualifier is to identify values that are above the MDL for which there is reduced confidence in the reported magnitude of the value because the value is close to the MDL. Other investigators using data from this report should maintain the “J” and other data qualifiers with the numeric values to properly convey the appropriate level of confidence with the numeric value.

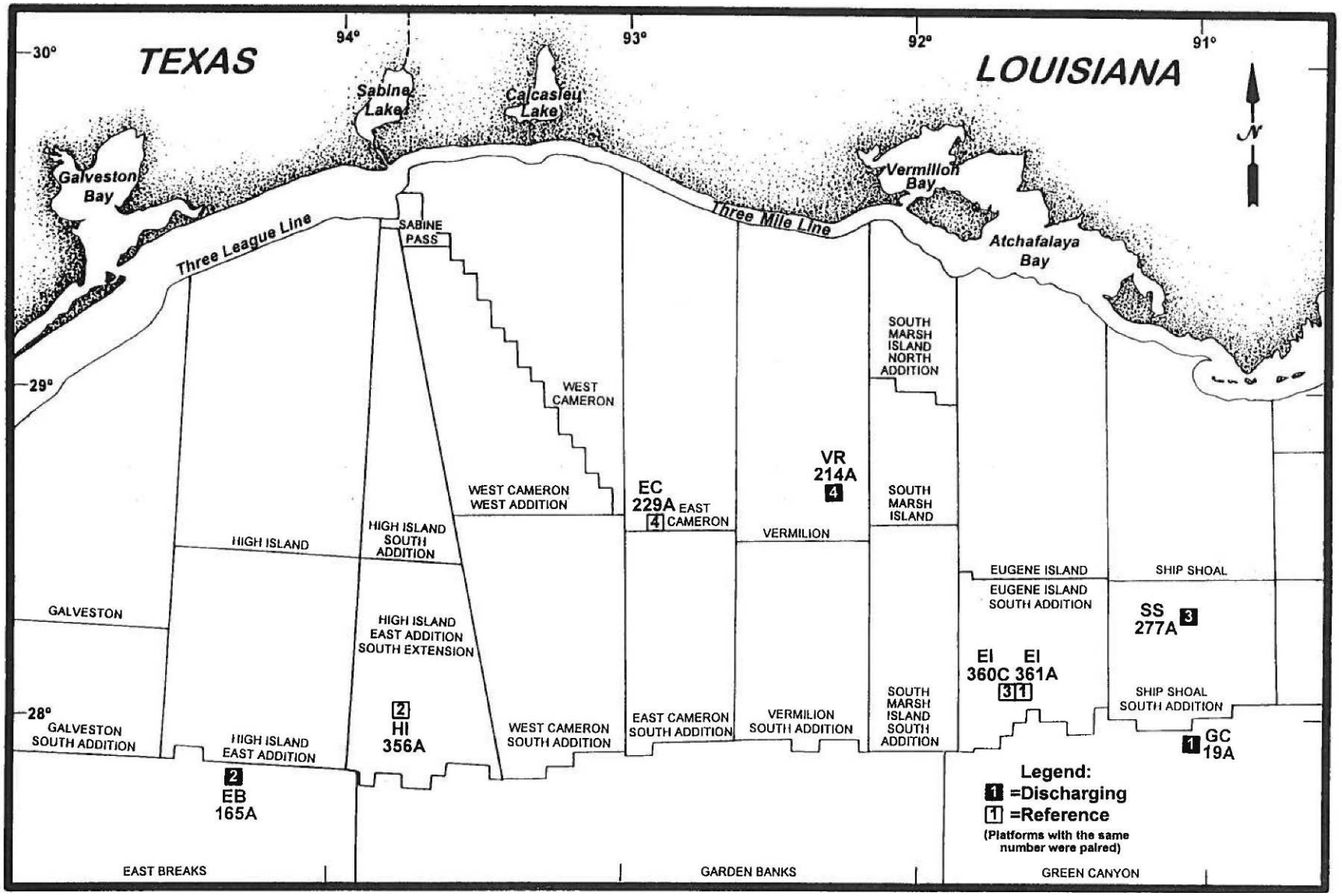

Figure 2-1. Platforms sampled during Cruise 1 of the Definitive Component of the OOC Gulf of Mexico Produced Water Bioaccumulation Study.

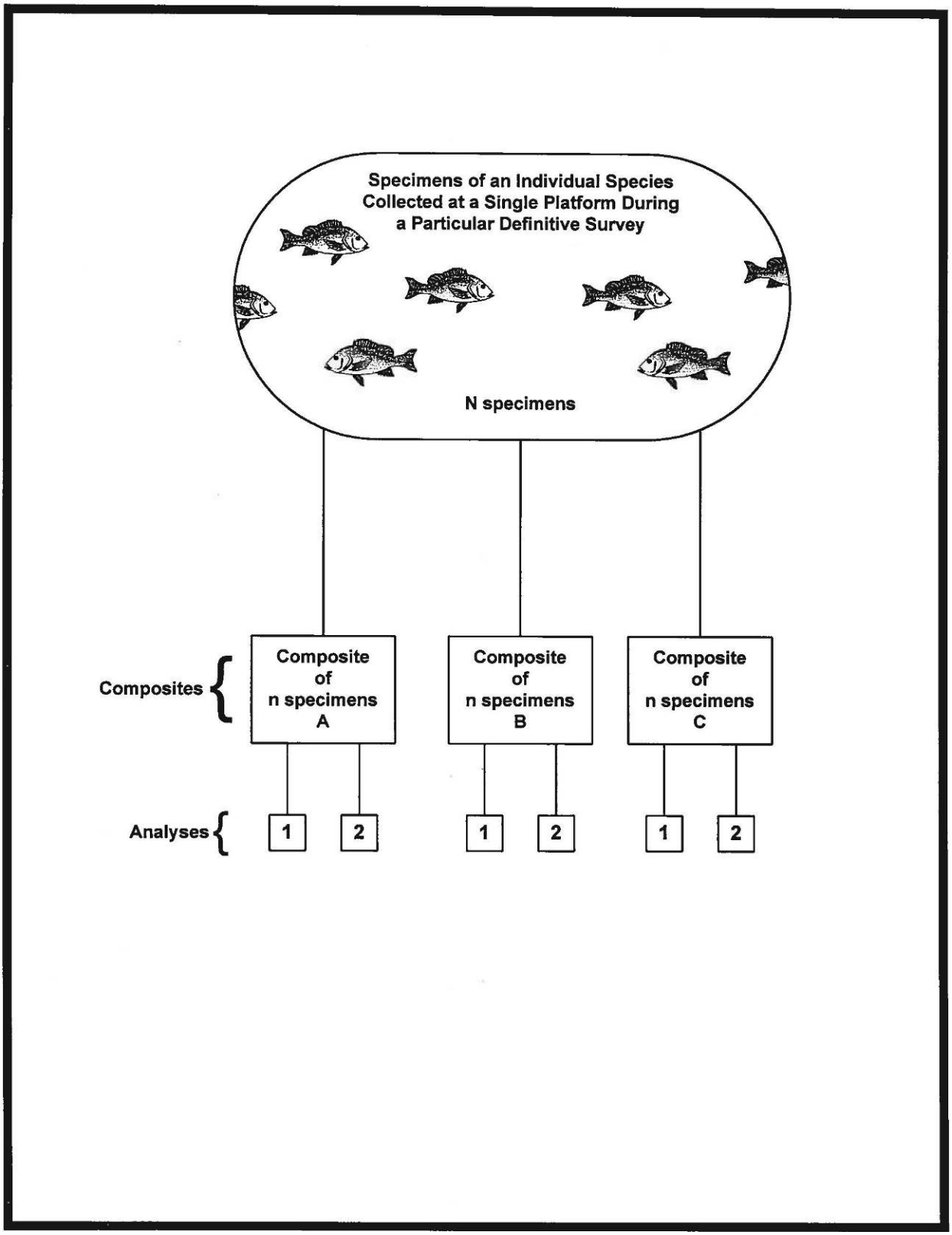

Figure 2-2. Diagram of compositing scheme for laboratory anslyses.

Table 2-1. Potential candidate platforms reconnoitered during Cruise 1.

Platform	Type
East Breaks 165A	Discharging
Green Canyon 19A	Discharging
Ship Shoal 207A	Discharging
Ship Shoal 277A	Discharging
Vermilion 214A	Discharging
East Cameron 229A	Non-discharging
Eugene Island 360C	Non-discharging
Eugene Island 361A	Non-discharging
High Island A 356A	Non-discharging
High Island A 553A	Non-discharging
Ship Shoal 241A	Non-discharging

Table 2-2. Candidate platform pairs sampled during Cruise 1.

Discharging Platform			Reference Platform	
Platform	Location	Discharge Rate (bbl/d)	Platform	Location
East Breaks 165A	27° 49' 07" N 94° 19' 22" W	11,000	High Island 356A	28° 02' 48"N 93° 45' 55"W
Vermilion 214A	28° 41' 05" N 92° 15' 44" W	6,800	East Cameron 229A	28° 37' 31"N 92° 53' 32"W
Ship Shoal 277A	28° 17' 59" N 91° 05' 15" W	5,200	Eugene Island 360C	28° 07' 02"N 91° 40' 09"W
Green Canyon 19A	27° 56' 45" N 90° 59' 45" W	7,100	Eugene Island 361A	28° 07' 00"N 91° 39' 26"W

Table 2-3. Species collected at each platform pair during the two definitive cruises.

Platform Pair	Sampling Period	Species	
		Common Name	Scientific Name
East Breaks 165A (D) High Island 356A (R)	Spring 1995	Jewel box (bivalve) Thorny oyster (bivalve) Yellow chub (fish) Creole-fish (fish) Rockhind (fish)	*Chama macerophylla* *Spondylus americanus* *Kyphosus incisor* *Paranthias furcifer* *Epinephelus adscensionis*
	Fall 1995	Jewel box Thorny oyster Yellow chub Creole-fish Sergeant major* (fish)	*Chama macerophylla* *Spondylus americanus* *Kyphosus incisor* *Paranthias furcifer* *Abudefduf saxatilis*
Green Canyon 19A (D) Eugene Island 361A (R)	Spring 1995	Jewel box Thorny oyster Yellow chub Creole-fish Gray triggerfish (fish)	*Chama macerophylla* *Spondylus americanus* *Kyphosus incisor* *Paranthias furcifer* *Balistes capriscus*
	Fall 1995	Jewel box Thorny oyster Yellow chub Creole-fish Gray triggerfish	*Chama macerophylla* *Spondylus americanus* *Kyphosus incisor* *Paranthias furcifer* *Balistes capriscus*

* Specimens of sergeant major were collected and analyzed instead of rockhind because insufficient specimens of rockhind were available at High Island 356A (R) during the Fall 1995 sampling period.

D = Discharge; R = Reference.

Table 2-4. Summary of the number of non-detected (ND) values by class of target chemicals. Data are tabulated for analyses on a dry weight basis.

Target Chemical Class	Total ND Values	Number of Chemical Analyses	Percentage of NDs
Volatile organic compounds	1,618	1,680	96%
Semivolatile organic compounds	9,791	11,280	87%
Metals	14	960	1%
^{226}Ra and ^{228}Ra	217	480	45%

Table 2-5. Summary of the revised statistical analysis strategy.

Percentage of Non-detected (ND) Values	USEPA (1989) Recommendation for Statistical Analysis Method	Statistical Test
NDs <15%	Replace ND values with ½ method detection limits and proceed with parametric procedure	Two way analysis of variance with subsampling and contrasts to compare platforms within cruises
15% ≤NDs<50%	Use ND values as ties (two or more observations with the same value) and proceed with nonparametric analysis of variance	Friedman's Test with a correction for ties; Mann-Whitney test to determine within cruise differences
50% ≤NDs<90%	Test of proportions	Fisher's Exact Test
90% ≤NDs	No statistical analysis	No statistical test

Table 2-6. Summary of the number of statistical tests performed for each case by class of target chemicals.

Target Chemical Class	Statistical Analysis Case			
	NDs* <15% (Case 1)	15% ≤ NDs <50% (Case 2)	50% ≤ NDs <90% (Case 3)	NDs ≥ 90% (Case 4)
Volatile organic compounds	0	3	3	71
Semivolatile organic compounds	20	38	127	332
Metals	42	2	0	0
^{226}Ra and ^{228}Ra	4	6	22	0

* NDs = Contribution of number of non-detected (ND) values to the total data for a taxon and target chemical at a platform pair.

Table 2-7. Primary laboratories and corresponding comparison laboratories for the interlaboratory comparison exercise.

Analyte Class	Primary Laboratory	Comparison Laboratory
VOCs	Battelle Ocean Sciences	Arthur D. Little, Inc.
SVOCs	Arthur D. Little, Inc.	Battelle Ocean Sciences
Metals	Florida Institute of Technology	Battelle Ocean Sciences
Radionuclides (^{226}Ra and ^{228}Ra)	CORE Laboratories	Paragon Analytics Inc.

Table 2-8. Field days to obtain the required samples.

Cruise (Sampling Period)		Work Days	Weather Downtime Days	Total Field Days
1	(Fall 1994)	23	5	28
2	(Spring 1995)	17	7	24
3	(Fall 1995)	19	14	33

Table 2-9. Data quality objectives for volatile organic compound analyses.

QC Measurement	Frequency	Acceptance Criteria	Corrective Action
Procedural Blank	1 per 15 samples	<5 x MDL	Reanalysis or justification documented
Matrix Spike/ Matrix Spike Duplicate	1 per 15 samples	50%-120% recovery; 30% RPD[a]	Reanalysis or justification documented
Sample Replicate	1 per 15 samples	30% RPD for analytes >MDL	Reanalysis or justification documented
Surrogate Recovery	3 per sample	50%-120% recovery	Reanalysis or justification documented
Instrument Calibration	Initial	±25% RSD[b]	Recalibration or justification documented
	Continuing checks	±25% PD[c]	Remedial maintenance, new initial calibration or justification documented

[a] RPD = relative percent difference = [(replicate 1 - replicate 2) ÷ ((replicate 1 + replicate 2)/2)] * 100.
[b] RSD = relative standard deviation = [(standard deviation ÷ mean value)] * 100.
[c] PD = percent difference = [(average response factor (RF), initial calibration - daily RF) ÷ (average RF, initial calibration)] * 100.

Table 2-10. Method detection limits for volatile organic compound analyses of tissue and water samples.

Analyte	Tissue (ng/g dry weight)*	Water (µg/L)
Benzene	3.2	0.13
Toluene	3.8	0.09
Ethylbenzene	2.5	0.20
m-,*p*-xylenes	4.1	0.31
o-xylene	2.4	0.14
C_3 benzenes	2.5	0.20
C_4 benzenes	2.5	0.20

* Method detection limits for tissue samples were determined on a wet weight basis and converted to dry weight basis with the wet weight:dry weight ratio (method detection limit on dry weight basis = method detection limit on wet weight basis × wet weight:dry weight ratio).

Table 2-11. Semivolatile analytes for the Definitive Component of the Gulf of Mexico Produced Water Bioaccumulation Study.

POLYCYCLIC AROMATIC HYDROCARBONS	
Naphthalene	C_1-Phenanthrenes/Anthracenes
2-Methylnaphthalene	C_2-Phenanthrenes/Anthracenes
1-Methylnaphthalene	C_3-Phenanthrenes/Anthracenes
2,6-Dimethylnaphthalene	C_4-Phenanthrenes/Anthracenes
2,3,5-Trimethylnaphthalene	Fluoranthene
C_1-Naphthalenes	Pyrene
C_2-Naphthalenes	C_1-Fluoranthenes/Pyrenes
C_3-Naphthalenes	C_2-Fluoranthenes/Pyrenes
C_4-Naphthalenes	Benzo[a]anthracene
Acenaphthene	Chrysene
Acenaphthylene	C_1-Chrysenes
Biphenyl	C_2-Chrysenes
Fluorene*	C_3-Chrysenes
C_1-Fluorenes	C_4-Chrysenes
C_2-Fluorenes	Benzo[b]fluoranthene
C_3-Fluorenes	Benzo[k]fluoranthene
Dibenzothiophene	Benzo[a]pyrene*
C_1-Dibenzothiophenes	Benzo[e]pyrene
C_2-Dibenzothiophenes	Perylene
C_3-Dibenzothiophenes	Indeno[1,2,3-c,d]pyrene
Phenanthrene	Dibenzo[a,h]anthracene
Anthracene	Benzo[g,h,i]perylene
1-Methylphenanthrene	
OTHER SEMIVOLATILE ORGANIC COMPOUNDS	
Phenol*	Bis(2-ethylhexyl)phthalate*

* EPA-specified target chemical per NPDES permit.

Table 2-12. Data quality objectives and criteria for semivolatile organic compounds.

Element or Sample Type	Minimum Frequency	Data Quality Objective/Acceptance Criteria
Initial Calibration	Prior to every batch sequence	6 point curve; %RSD[a] ± 25%
Continuing Calibration	Must end analytical sequence at every 12 samples or 16 h, whichever is more frequent	%Difference ± 30% for all analytes
SRM 1491	One per GC/MS sequence	%Difference ± 15% for all certified values
Matrix Spike	Two per batch of 15-20 tissue/water	%Recovery for all spiked analytes 45%-150%. RPD[b] ± 30%
Procedural Blank	One per batch of 15-20 field samples	No more than 2 analytes to exceed 5 x method detection limits (MDL) unless analyte not detected in associated sample(s) or analyte concentration >10 x blank; bis(2-ethylhexyl) phthalate and phenol not to exceed 10 x MDL
Duplicate Sample Analysis	Every 45 samples	RPD ± 30% for all analytes >10 x MDL
Surrogate Standards	Every sample	%R 35%-125% for d_8-N and D_{12}-BAP, 45%-125% for d_{10}-Fl, D_{10}-Ph, and d_4-bis, and 15%-125% for d_6-Phenol.

[a] RSD = relative standard deviation.
[b] RPD = relative percent difference.

Table 2-13. Method detection limits for semivolatile compound analyses of water and tissue samples.

Analyte	Water (ng/L)	Tissue[a] (ng/g dry weight)
Phenol[b]	1.8	38
Naphthalene	3.9	8.6
2-Methylnaphthalene	3.3	2.3
1-Methylnaphthalene	2.3	2.9
2,6-dimethylnaphthalene	2.3	2.1
2,3,5-trimethylnaphthalene	1.0	2.1
C_1-Naphthalenes	4.2	2.7
C_2-Naphthalenes	3.6	5.1
C_3-Naphthalenes	3.0	5.1
C_4-Naphthalenes	3.0	5.1
Acenaphthylene	2.2	3.8
Acenaphthene	3.0	3.8
Biphenyl	1.9	2.3
Fluorene[b]	2.8	3.6
C_1-Fluorenes	2.8	3.6
C_2-Fluorenes	2.8	3.6
C_3-Fluorenes	2.8	3.6
Anthracene	2.2	2.3
Phenanthrene	11	3.5
1-C_1-Phenanthrene	2.5	2.3
C_1-Phenanthrenes/anthracenes	3.0	6.3
C_2-Phenanthrenes/anthracenes	3.0	16
C_3-Phenanthrenes/anthracenes	3.0	16
C_4-Phenanthrenes/anthracenes	3.0	16
Dibenzothiophene	2.1	1.3
C_1-Dibenzothiophenes	2.1	1.3
C_2-Dibenzothiophenes	2.1	1.3
C_3-Dibenzothiophenes	2.1	1.3
Fluoranthene	2.1	2.6
Pyrene	2.2	3.3
C_1-Fluoranthenes/pyrenes	2.2	3.3
C_2-Fluoranthenes/pyrenes	2.2	3.3
Benzo[a]anthracene	3.0	2.5
Chrysene	3.3	2.2
C_1-Chrysenes	3.3	2.2
C_2-Chrysenes	3.3	2.2
C_3-Chrysenes	3.3	2.2
C_4-Chrysenes	3.3	2.2
Benzo[b]fluoranthene	1.6	2.2
Benzo[k]fluoranthene	3.0	3.6

Table 2-13. (Continued).

Analyte	Water (ng/L)	Tissue[a] (ng/g dry weight)
Bis(ethylhexyl)phthalate[b]	90	140
Benzo[e]pyrene	2.3	2.3
Benzo[a]pyrene[b]	1.4	2.8
Perylene	6.0	3.3
Indeno[1,2,3,-c,d]pyrene	3.3	2.3
Dibenzo[a,h]anthracene	3.6	2.0
Benzo[g,h,i]perylene	3.3	2.9

[a] Method detection limits for tissue samples in dry weight were calculated by correcting the wet weight method detection limits for the average moisture content of the tissue used in the method detection limit study.

[b] EPA-specified target chemical per NPDES permit.

Table 2-14. Data quality objectives for metal analyses.

Analyte	Matrix	Reporting Unit	Method Detection Limits*	Precision** (±%)	Accuracy*** (%)	Completeness (%)	QC Samples	Acceptance Criteria	Corrective Action
Arsenic	Produced Water	µg/L	0.62	20	80-120	98	Standard and solvent check: every batch IC: every batch CC: every 5-10 samples PB: @ 5% or 1 per batch SRM: @ 5% or 1 per batch MS: @ 5% or 1 per batch DS: @ 5% or 1 per batch	Analytes in acids <MDL IC: 3 to 5 point curve RSD <25% CC: RPD <30% for all analyses PB: <5x MDL SRM: ±20% RPD vs. Certified value MS: recovery 80-120% DS: %RPD within 20%	Project Manager review to determine appropriate action (recalibrate, reextract, reanalyze, quantify). All actions and rationale documented.
	Ambient Seawater	µg/L	0.03	20	80-120	98			
	Tissue	µg/g dry wt	0.05	20	80-120	98			
Barium	Produced Water	µg/L	240	20	80-120	98			
	Ambient Seawater	µg/L	0.14	20	80-120	98			
	Tissue	µg/g dry wt	0.02	20	80-120	98			
Cadmium	Produced Water	µg/L	0.55	20	80-120	98			
	Ambient Seawater	µg/L	0.005	20	80-120	98			
	Tissue	µg/g dry wt	0.002	20	80-120	98			
Mercury	Produced Water	µg/L	0.01	20	80-120	98			
	Ambient Seawater	µg/L	0.008	20	80-120	98			
	Tissue	µg/g dry wt	0.001	20	80-120	98			

* Achieved method detection limits.
** Relative percent difference.
*** Based on percent recovery and SRM analyses.
CC = Continuing calibration.
DS = Duplicate sample/analytical replicate.
IC = Initial calibration.
MDL = Method detection limit.
MS = Matrix spike.
PB = Procedural or method blank.
QC = Quality control.
RPD = Relative percent difference.
RSD = Relative standard deviation.
SRM = Standard reference material.

Table 2-15. Data quality objectives for ^{226}Ra and ^{228}Ra analyses.

Measurement	Matrix	Reporting Units	Precision (±%)	Accuracy (±%)	Completeness (%)	QC Samples @ % freq	Acceptance Criteria	Corrective Action
^{226}Ra	Produced Water	pCi/L	20	20	95	IC: Calibration verification for each batch; PB @ 5% or 1 per batch; MS @ 5% or 1 per batch; DS @ 5% or 1 per batch; Sample data check @ 10%	IC: ±10 of calibration value; PB < MDL; MS recovery: 75-125%; DS: % RPD within ± 20%; Manual calculation within ± 0.01% of program calculation	IC: Adjust and recalibrate; PB: reanalyze all samples; MS: Recalibration, reanalysis documented; DS: Recalibration, reanalysis documented; Data check and correction documented
	Ambient Seawater	pCi/L	20	20	95			
	Tissue	pCi/g wet weight	20	20	95			
^{228}Ra	Produced Water	pCi/L	20	20	95	IC: Calibration verification for each batch; PB @ 5% or 1 per batch; LCS one per batch; MS @ 5% or 1 per batch; DS @ 5% or 1 per batch; Sample data check @ 10%	IC: ± 10 of calibration value; PB < MDL; LCS recovery: 80-120% MS recovery: 75-125%; DS: %RPD within ±20% Manual calculation within ± 0.01% of program calculation	Adjust and recalibrate; PB: reanalyze all samples; LCS: Recalibration, reanalysis documented; MS: Recalibration, reanalysis documented; DS: Recalibration, reanalysis documented; Data check and correction documented
	Ambient Seawater	pCi/L	20	20	95			
	Tissue	pCi/g wet weight	20	20	95			

DS = Duplicate sample/analytical replicate.
IC = Initial calibration.
LCS = Laboratory control standard.
MDL = Method detection limit.
MS = Matrix spike.
MSD = Matrix spike duplicate.
PB = Procedural or method blank.
QC = Quality control.
RPD = Relative percent difference.

Table 2-16. Method detection limits for the radium isotopes ^{226}Ra and ^{228}Ra.

Analyte	Produced Water (pCi/L)	Ambient Seawater (pCi/L)	Tissue[a] (pCi/g dry weight)
^{226}Ra	0.010 - 0.13	0.007 - 0.030	0.002 - 0.010
^{228}Ra	0.030 - 0.75	0.010 - 0.070	0.0008 - 0.03

[a] Method detection limits (MDLs) for tissue samples were determined on a wet weight basis and converted to dry weight basis with the wet weight:dry weight ratio (MDL on dry weight basis = MDL on wet weight basis × wet weight:dry weight ratio).

Section 3
RESULTS

3.1 SCREENING SURVEY (CRUISE 1)

3.1.1 Descriptions of the Candidate Study Sites

A Screening Survey (Cruise 1) was conducted during Fall 1994 (19 October to 15 November) to gather data at candidate study sites (platform pairs). Four platform pairs were sampled during Cruise 1 as candidate study sites for the two Definitive Cruises (Cruises 2 and 3). These platform pairs are described in the following discussion.

EB165A (D) and HI356A (R) (**Figure 2-1**) are located approximately 70 km apart. EB165A (D) is in a water depth of approximately 262 m and HI356A (R) is in a water depth of approximately 91 m. Produced water from EB165A (D) was discharged approximately 2.4 m above the sea surface. Biofouling communities were similar and well established at each site. Bivalve mollusk specimens of the jewel box (*Chama macerophylla*) and the thorny oyster (*Spondylus americanus*) were present at both platforms in sufficient quantities to fulfill the overall requirements of the study. The thorny oyster was most commonly found in a water depth of greater than 14 m. Crested oysters (*Ostrea equestris*) were also present at each platform, but this bivalve target species was judged to not be present in sufficient quantities to fulfill tissue requirements for the bivalve portion of the study. No crustacean species was observed in sufficient quantities for this study. The platform-associated fish assemblage was similar at each site except there were very few gray triggerfish (*Balistes capriscus*) at HI356A (R) and no red snapper (*Lutjanus campechanus*) were observed or caught at EB165A (D). There were numerous carcharhinid sharks in and around the platform structure of EB165A (D), which posed sampling difficulties. Occasionally, the sharks became aggressive when the divers were spearing specimens of target fish species around the platform.

VR214A (D) and EC229A (R) (**Figure 2-1**) are located approximately 63 km apart in similar water depths of 34 and 37 m. Produced water from VR214A (D) was discharged approximately 7.6 m below the sea surface. Biofouling communities were well established with similar biological components at each site. The bivalves jewel box, thorny oyster, turkey wing (*Arca zebra*), and ark (*Barbatia candida*) were present at each platform, but only the jewel box was present in sufficient quantities at both platforms to fulfill the tissue requirements for the bivalve portion of the study. No crustacean species were observed at either platform that could potentially fulfill study tissue requirements, although the stone crab (*Menippe adina*) was present at VR214A (D). The platform-associated fish assemblage was quite similar at both platforms.

SS277A (D) and EI360C (R) (**Figure 2-1**) are located approximately 59 km apart in water depths of 67 and 91 m, respectively. Produced water from SS277A (D) was

discharged approximately 4.5 m below the sea surface. The discharge pipe was equipped with a rubber extension tube that created the subsurface discharge. Biofouling communities were well established at each site, but the only bivalve present in sufficient quantities at both platforms to fulfill the bivalve tissue requirements of the study was the jewel box. The thorny oyster was present in sufficient numbers only at EI360C (R). No crustacean species were observed at either platform that could potentially fulfill crustacean tissue requirements of the study, although the stone crab was present in very limited quantities at SS277A (D). The platform-associated fish assemblage was quite similar at both platforms. There were numerous carcharhinid sharks in and around the platform structure of SS277A (D), which posed the same sampling difficulties experienced at EB165A (D).

GC19A (D) and EI361A (R) (**Figure 2-1**) are located approximately 69 km apart in water depths of 229 and 91 m, respectively. Produced water from GC19A (D) was discharged approximately 1.8 m below the sea surface. Biofouling communities were well established at each site with bivalve specimens of the jewel box and thorny oyster present at both platforms in sufficient quantities to fulfill the bivalve tissue requirements of the study. Crested oysters were also present at each platform, but this bivalve species was not plentiful enough to fulfill the bivalve tissue requirements. A crustacean species was not observed at either platform that could potentially fulfill crustacean tissue requirements. The swimming crab (*Portunus* sp.) and an unidentified xanthid crab were observed at EI361A (R). The platform-associated fish assemblage was similar at both platforms.

3.1.2 Summary of Data Collected During Cruise 1

Produced water data from the four discharging platforms are summarized in **Appendix C**, **Tables C-1** through **C-3**. The target chemicals were present in the produced water samples, which indicated that the candidate platforms were suitable study sites for the Definitive Cruises from this aspect. Ambient seawater data from the eight platforms are summarized in **Appendix C**, **Tables C-4** through **C-6**. Summaries of the concentrations of the analytes in the edible tissues of biota from the platform pairs are presented in **Appendix C**, **Tables C-7** through **C-38**.

3.2 DEFINITIVE CRUISES

The two definitive cruises were conducted in Spring 1995 and Fall 1995. Each of the two platform pairs was sampled for produced water, ambient seawater, and biological tissues. Species collected and analyzed during these cruises are presented in **Table 2-3**. During Cruise 3, sufficient rockhind were not available at the EB165A (D)/HI356A (R) platform pair to support the quantity of tissue necessary for the chemical analyses. The sergeant major (*Abudefduf saxatilis*) was therefore substituted for the rockhind for Cruise 3.

It was discovered that a low volume produced water discharge occurred at HI356A (R) between the Cruise 1 sampling and the Cruise 3 sampling (**Figure 3-1**). This platform therefore could not be strictly considered as a non-discharging reference platform. As

discussed in **Section 2.1**, a revised null hypothesis was tested for the EB165A (D) and HI356A (R) platform pair. During Cruise 3, a low-volume secondary produced water discharge was found at GC19A (D). This discharge was sampled, and the results are reported.

3.2.1 Discharge Modeling

One of the most important considerations in designing the sampling program was to ensure that collections occurred in that part of the water column directly influenced by the produced water plume. To define this vertical zone, the OOC used two dispersion models, the OOC Mud and Produced Water Discharge Model and the EPA General Permit-required CORMIX1 model. Based on the predicted vertical descent of the produced water plume within the first 100 m downstream of the platform, it was determined the collections of biota would be limited to the upper 50 m of the water column. This depth interval was selected based on the results of dispersion modeling studies that simulate the physical processes that control the transport and dispersion of discharged produced water. These processes both rapidly dilute the effluent and act to limit the depth of penetration of the produced water plume into the water column to the first few tens of meters below the discharge pipe. Limitation of the depth of plume penetration restricts the portion of the water column in which organisms have the maximum potential for bioaccumulation of produced water components. Rapid dilution further limits the potential for bioaccumulation by reducing the concentrations of produced water components to which organisms can be exposed.

Gulf of Mexico produced waters are typically more dense than seawater, and most produced water discharges are above the sea surface. The effluent enters the sea as a turbulent plume which sinks initially due to its momentum after leaving the discharge pipe and its higher density than the surrounding seawater. The turbulent plume entrains ambient seawater; this entrainment of ambient seawater thus reduces the plume's density. Since the density of seawater typically increases with depth, the entrainment process results in the average density of the fluid within the plume eventually matching that of the surrounding seawater. The plume at this point is at a condition of neutral buoyancy and it then begins to collapse and disperse at a constant average depth. This behavior has been observed in field studies of produced water plumes (Smith *et al*., 1994) and in numerous laboratory studies of plume behavior (e.g., Fan, 1967; Albright *et al.*, 1986; Pierre and Violett, 1979).

Dispersion modeling was used to obtain site-specific predictions of plume trajectory and dilution for EB165A (D) and GC19A (D). The discharges were modeled as 7,054 bbl/d (GC19A [D]) and 11,200 bbl/d (EB165A [D]) from 15 cm diameter pipes located at the sea surface (EB165A [D]) and 1.8 m below the sea surface (GC19A [D]). A receiving water current speed of 0.1 m/s was chosen to match the conditions used for the critical dilution modeling for the Gulf of Mexico OCS NPDES General Permit (Avanti Corporation, 1993). A density gradient of 0.01 kg-m^{-4} was chosen as being representative of the Gulf of Mexico density stratification conditions for the fall season (Levitus, 1982).

Plume trajectory and dilution was predicted with the CORMIX1 model (Doneker and Jirka, 1993), which was used for the critical dilution modeling for the Gulf of Mexico OCS NPDES General Permit. Predictions were also calculated for comparison purposes with the OOC Model (Brandsma *et al*., 1992).

Model predicted plume trajectories for GC19A (D) indicate that the effluent plume penetrates to a total depth of about 30 m (**Figure 3-2**). CORMIX1 and the OOC Model predict essentially the same trajectory for these conditions. The somewhat higher discharge rate from EB165A (D) penetrates about 5 m deeper into the water column than does the GC19A (D) discharge. Gulf of Mexico density stratification is stronger in the spring than in the fall (Science Applications International Corporation, 1989). A stronger density gradient (e.g, 0.15 kg-m^{-4}) reduces the depth of plume penetration to about 10 m. Weaker density gradients than 0.01 kg-m^{-4} could occur under some conditions and could lead to deeper penetration of the plume into the water column. Receiving water current speed has a weaker effect than density gradient on the depth of plume penetration. Overall, due to the net effects of constantly shifting stratification and current speed conditions, it seems reasonable to define the upper 50 m of the water column as the region where organisms may have an opportunity to encounter elevated concentrations of produced water.

Rapid dilution of produced water discharges limits the opportunities for organisms to encounter elevated effluent concentrations and thus acts to limit the potential for exposure to produced water components. Modeling indicates that produced water is rapidly diluted after it leaves the discharge pipe (**Figure 3-3**). For the fall density stratification conditions, both CORMIX1 and the OOC Model predict that the GC19A discharge will be diluted by a factor of 100 within a few meters of the outfall. A further ten-fold dilution is accomplished by the time that the plume has reached 100 m from the outfall. Model predictions of produced water dilution have been confirmed by observations of dilution in the field (Smith *et al.*, 1994; Smith, 1993; Continental Shelf Associates, Inc., 1993; Riksheim and Johnsen, 1993; EPA, 1993b). OOC Model and CORMIX1 predictions agree for the conditions examined in this study. Other models have been applied to the study of produced water discharges (Somerville *et al*., 1987; Strømgren *et al*., 1995) and their predictions agree in general with those presented here. All models predict rapid initial dilution of marine produced water discharges.

3.2.2 Volatile Organic Compounds

The volatile organic compounds--benzene, toluene, ethylbenzene, xylenes, C_3-benzenes, and C_4-benzenes--were determined in produced water/ambient seawater samples and tissues of bivalves and fish collected during Cruises 2 and 3 at the two discharge/reference platform pairs, EB 165A (D)/HI 356A(R) and GC19A (D)/EI361A (R). Benzene, toluene, and ethylbenzene are the EPA bioaccumulation target compounds. Two bivalve species and three fish species were collected from each cruise at each platform pair. The fish species were not, however, the same for each cruise or platform pair. Analyses were conducted on jewel box, thorny oyster, yellow chub, and creole-fish from both cruises and both discharge/reference pairs; rockhind from the EB/HI pair of Cruise 2 only; sergeant major

from the EB/HI pair of Cruise 3 only; and gray triggerfish from both cruises, but only the GC/EI pair.

The results of the VOC analyses are presented in **Appendix D** (**Tables D-1** to **D-53**). In general, the fish dry weights were 18% to 22% of wet weights; jewel box weights were 10% to 13%, and thorny oyster weights were 15% to 20%.

3.2.2.1 Produced Water and Ambient Seawater. During each cruise, three replicate samples were collected at each discharge and analyzed for the target VOCs. Mean concentrations of the three replicates are presented in **Table 3-1**. Total VOC concentrations ranged from 1,300 to 2,600 µg/L for the primary discharges and 1,000 µg/L for the GC19A secondary discharge. Unlike the PAHs, the total VOC concentration at the secondary discharge is the lowest of all discharges. As discussed later, PAH concentrations of the secondary discharge at GC19A were three times higher than the other discharges.

The concentrations of the target compounds reflected their respective solubilities; the compound with the highest concentration was benzene and concentrations decreased with increased alkylation. Benzene, toluene, ethylbenzene, and xylenes (BTEX compounds), the most commonly measured VOCs, ranged from 1,200 to 2,600 µg/L. The distribution of the target volatile aromatic compounds was typical of other produced water. BTEX concentrations in produced water discharged into the central Gulf of Mexico range from 68 to 38,000 µg/L (Neff, 1997a).

Ambient seawater was essentially devoid of VOCs. A summary of the replicate analyses is shown in **Table 3-2**. Toluene was detected at the reference sites only in Cruise 2 at concentrations from <0.09 to 0.16J µg/L. In Cruise 3, only benzene at concentrations from <0.13 to 0.62 µg/L and toluene at concentrations from <0.09 to 0.13J µg/L were found in ambient seawater from EB165A (D). These ambient concentrations are typical of Gulf of Mexico open water (Sauer, 1980).

3.2.2.2 Tissues. Most (96%) of the tissue samples did not contain any target VOCs above the MDLs. Samples that did contain VOCs are listed in **Table 3-3**. Benzene and toluene were the only analytes detected. They were at very low concentrations and were associated mostly with the bivalves. Reference site concentrations were higher than discharge site concentrations. The produced water VOC distribution was not evident in any tissue sample.

Only six samples (bivalves and yellow chub in Cruise 2 only, both discharge and reference sites) had detectable benzene and the concentrations were less than 10 ng/g dry weight.

Toluene was detected mostly in Cruise 3 at the reference sites. At EI361A (R), 60% of the fish contained toluene but at concentrations no greater than 15J ng/g dry weight. Bivalve (jewel box and thorny oyster) toluene concentrations ranged from 20 to 68 ng/g dry weight. One hundred percent of the bivalves (no fish) from the other reference site HI356A in Cruise 3 contained toluene ranging from 8.3 to 43 ng/g dry weight.

Toluene was detected in all bivalves at GC19A (D) ranging from 5.8J to 46 ng/g dry weight, and 60% of the bivalves at EB165A (D) ranging from <3.8 to 11J ng/g dry weight. Toluene was detected in only 33% of the gray triggerfish at GC19A (D) at concentrations no greater than 11 ng/g dry weight. No volatile organic compounds were detected in other fish at either discharge site during Cruise 3.

3.2.3 Semivolatile Organic Compounds

The semivolatile organic compounds--phenol, BEHP, and the extended set of PAHs (**Table 2-11**) that included fluorene and BAP were determined in produced water/ambient seawater samples and tissues of bivalves and fish collected during Cruises 2 and 3 at the two discharge/reference platform pairs, EB165A (D)/HI356A (R) and GC19A (D)/EI361A (R). Phenol, BEHP, fluorene, and BAP are the EPA bioaccumulation target chemicals. Identical to the VOC analysis, two bivalve species and three fish species were collected from each cruise at each platform pair. The fish species were not, however, the same for each cruise or platform pair. Analyses were conducted on jewel box, thorny oyster, yellow chub, and creole-fish from both cruises and both discharge/reference pairs; rockhind from the EB165A (D)/HI356A (R) pair of Cruise 2 only; the sergeant major from the EB165A (D)/HI356A (R) pair of Cruise 3 only; and gray triggerfish from both cruises, but only the GC19A (D)/EI361A (R) pair.

The data results of the semivolatile analyses are presented in **Appendix D** (**Tables D-54** to **D-106**). In general, the fish dry weights were 18% to 22% of wet weights; jewel box weights were 10% to 13%; and thorny oyster weights were 15% to 20%.

3.2.3.1 Summary of Major Findings.

Phenol. Phenol concentrations in produced waters ranged from 320,000 to 610,000 ng/L at both discharge sites, and in ambient seawater samples from 25 to 90 ng/L at all sites. Ambient seawater phenol concentrations were not different between discharge and reference sites and were within the range measured in the procedural blanks.

Phenol was present in almost every tissue sample from both discharge and reference sites. Phenol concentration in bivalves showed a slightly higher range (at most twice as high) at the discharge sites than at the reference sites. Bivalve phenol concentrations were no higher than 500 ng/g dry weight. There was no obvious differences in phenol concentrations between fish sampled from the discharge and reference platforms in both cruises. The phenol concentrations generally ranged from <38 to 280 ng/g dry weight. Ninety percent of the fish samples were within the range of values determined in the procedural blanks (<38 to 170 ng/g dry weight) and below PQL (190 ng/g dry weight). The consistent presence of phenol in tissues at these low levels could be due to the analytical procedure (low-level contamination or formation from the tissue matrix during extraction) or the result of natural bioaccumulation of phenol from the marine environment.

BEHP. Concentrations of produced water BEHP, which is not a natural organic compound produced with oil and gas, were 110 to 570 ng/L for EB165A and <90 to 150 ng/L GC19A for both cruises. BEHP concentrations of triplicate ambient seawater samples ranged from <90 to 190 ng/L at the two discharge sites and 110 to 680 ng/L at the two reference sites. The reference site BEHP concentrations were higher than those from the discharge site. Because BEHP was often detected in the laboratory procedural blanks at concentrations comparable to those found in the water samples, sample BEHP concentrations below five times the MDL should be considered suspect, and BEHP was probably not present in the ambient seawater.

Fish and bivalves showed no obvious trend or differences in BEHP concentrations between discharge and reference sites in both cruises. In 70% of the tissue samples BEHP was not detected above the MDL. Of those detected, only 25% were above the PQL. The sporadic presence of BEHP in the samples is probably due to field/lab contamination, not bioaccumulation.

PAHs.

Produced Water and Ambient Seawater

Fluorene concentrations ranged from 100 to 280 ng/L in all produced water discharges. BAP was not detected at an MDL of 1.4 ng/L in the produced waters from EB165A and the primary discharge of GC19A, but was detected in the low-volume discharge from GC19A ranging from 14 to 36 ng/L.

No fluorene or BAP was detected in any ambient seawater samples from discharge or reference sites.

All produced water samples contained the full suite of the 2- and 3-ringed alkyl PAHs (naphthalenes, fluorenes, phenanthrenes, and dibenzothiophenes), typical of produced waters. Total PAH concentrations ranged from 40,000 to 44,000 ng/L at EB165A and from 47,000 to 55,000 ng/L at GC19A, primary discharge. Although the discharge rate was lower at the secondary discharge of GC19A, the total PAHs were higher at a mean concentration of 150,000 ng/L. Eighty to ninety percent (concentration) of the PAHs in the produced water samples consisted of the more water soluble naphthalenes. PAH distributions in the produced waters reflected the respective solubilities of the individual hydrocarbon compounds. The concentrations of the 4- through 6-ring PAHs were negligible or non-detectable because of the low-level presence of these compounds in produced oil and the low solubilities in water.

Ambient seawater samples were essentially devoid of PAHs except in two samples at HI356A (R). The source of these PAHs in these HI356A (R) samples was probably tarball particles as discussed later.

Tissues

Fluorene was not detected in any bivalve or fish samples (MDL of 3.6 ng/g dry weight). BAP was, however, detected in the bivalves at both the discharge sites and reference sites, but not in any of the fish (MDL of 2.8 ng/g). For Cruise 2, BAP was not detected in the jewel box but was detected in two-thirds of the thorny oyster samples. For Cruise 3, BAP was found in two-thirds of the jewel box samples but not in any thorny oyster samples. Higher concentrations of BAP were associated with the discharge sites but no higher than 21 ng/g dry weight. These higher concentrations did not correlate with the presence of petrogenic PAH signatures, which is discussed later. BAP is associated mainly with pyrogenic sources.

For other PAHs that include the alkyl PAHs, the fish species contained only trace amounts (below PQL) of C_1-naphthalenes, C_1-fluorenes, and occasionally C_2-naphthalenes and biphenyl. Total PAHs were no higher than 20 ng/g dry weight in both cruises. More individual PAHs were detected and higher PAH concentrations were associated with the reference sites of both platform pairs. The produced water PAH signature was not evident in these fish samples.

The bivalve species, especially the thorny oyster, bioaccumulated more PAHs (additional C_2- and C_3-dibenzothiophenes) at higher concentrations than the fish species. Unlike the fish, a petrogenic signature was observed in bivalve samples from both discharge and reference sites. The PAH distributions in the tissues, however, did not show the dominance of naphthalenes observed in the produced water PAH distributions.

- For the EB165A (D)/HI356A (R) platform pair, a petrogenic signature of alkyl naphthalenes, phenanthrenes, and dibenzothiophenes was observed in half of the bivalves at the reference site in Cruise 3. Individual PAH concentrations ranged from 6 to 170 ng/g dry weight.

- For the GC19A (D)/EI361A (R) platform pair, a petrogenic signature was evident only at GC19A (D) in both cruises, especially in the thorny oyster, at individual PAH concentrations as high as 180 ng/g dry weight. All the GC19A (D) thorny oyster samples in Cruise 2, half the oyster samples in Cruise 3, half the GC19A (D) jewel box samples in Cruise 2, and none of the jewel box samples in Cruise 3 had the petroleum signature. There were, however, alkyl naphthalenes and dibenzothiophenes (not phenanthrenes) in bivalves at the reference site at concentrations of 25 ng/g dry weight. The presence of anthracene and some of the 5- and 6-ring PAH (benzo(e)pyrene) in half of the bivalves indicate that there is a pyrogenic source of PAHs in the samples.

The consistent low-level presence (<5 ng/g) of 2-methylnaphthalene (C_1-naphthalenes) in almost all samples independent of species, platform or

cruise suggests low-level laboratory contamination of this compound, sometimes found in procedural blanks. Only concentrations above the PQL should be considered as representative of actual tissue concentrations.

3.2.3.2 Detailed Information and General Observations.

Phenol.

Produced Water/Ambient Seawater

Phenol was determined in produced waters at concentrations that ranged from 370,000 to 610,000 ng/L at EB165A (D) and from 320,000 to 580,000 ng/L at GC19A (D). To determine if there were elevated phenol concentrations in the receiving waters near the discharging platforms as compared to reference platforms, triplicate samples of ambient seawater were collected upcurrent at each of the four sites during each cruise. For Cruise 2, phenol concentrations at the discharge sites ranged from 57 to 62 ng/L and from 46 to 89 ng/L at the reference sites, and for Cruise 3, phenol concentrations at the discharge sites ranged from 24 to 54 ng/L and at the reference sites from 26 to 76 ng/L. Five replicate samples from both discharge and reference sites had phenol concentrations in the 100 to 250 ng/L range, but these higher concentrations were associated with phenol in the laboratory procedural blanks indicating laboratory contamination of the samples. Obvious differences in phenol concentrations were not evident in the ambient seawater samples from discharge and reference sites.

Tissues

Phenol was present in almost every tissue sample from both discharge and reference sites. A summary of the phenol concentration ranges for each of the bivalve and fish species is presented in **Table 3-4** for Cruise 2 and in **Table 3-5** for Cruise 3. The percentage of samples which contained amounts of phenol above the MDL and fraction of samples detected above the PQL for particular species are also provided in these tables.

Because of the methodology used in the analysis for phenol in tissue samples, an extremely low MDL of 38 ng/g dry weight for tissue was achieved for this study. Review of laboratory procedural blank (PB) results for phenol showed that phenol was present in the procedural blanks above the MDL at concentrations as high as 170 ng/g dry weight for fish species and 320 ng/g dry weight for bivalves. The reason for the frequent presence of phenol in tissue samples (over 90%), irrespective of whether samples are from the discharge site or the reference site, is unclear because data on the concentration of phenol in tissues of marine species is very limited in the literature. The consistent presence of phenol in tissues at these low levels could be due to the analytical procedure (low-level contamination or formation

from the tissue matrix during extraction) or the result of natural bioaccumulation of phenol from the marine environment.

For both the bivalves and fish, there was no preference in the bioaccumulation of phenol by any species. Phenol was detected in all bivalve samples from both discharge and reference sites. Bivalve phenol concentrations were no higher than 500 ng/g dry weight. In the fish, except gray triggerfish, there were no obvious differences in phenol concentrations between discharge platform and reference platform fish samples in both cruises. The phenol concentrations ranged from <38 to 280 ng/g dry weight, 90% of the fish samples were within the range of values determined in the procedural blanks (<38 to 170 ng/g dry weight) and below the PQL (190 ng/g dry weight). Only the gray triggerfish from GC19A (D) contained phenol at concentrations above the PQL, 330 to 640 ng/g dry weight for Cruise 2 and 310 to 1,000 ng/g dry weight for Cruise 3.

BEHP.

Produced Water/Ambient Seawater

BEHP, which is not a natural organic compound produced with oil and gas, was determined in the produced water samples from EB165A (D) and GC19A (D) at concentrations from 110 to 570 ng/L and from <90 to 150 ng/L for Cruises 2 and 3, respectively. BEHP concentrations of triplicate ambient seawater samples ranged from <90 to 190 ng/L at the two discharge sites and 110 to 680 ng/L at the two reference sites. The reference sites' BEHP concentrations were higher than those from the discharge sites. Similar to phenol, BEHP was often detected in the laboratory procedural blanks at concentrations comparable to that which was found in the water samples.

From the literature, BEHP is ubiquitous at the concentration levels determined in this study. Even though strict precautions were taken in preventing BEHP contamination in processing and analysis of samples, laboratory procedure blanks contained BEHP above the very low detection limits of the methods for water and tissue. The BEHP MDL for water was 90 ng/L, and the MDL for tissue was 140 ng/g dry weight (PQL=680 ng/g dry weight). The BEHP contamination was evident in both the water and tissue procedural blanks as high as 350 ng/L for water and 300 to 670 ng/g dry weight for tissue depending on the species. Sample BEHP concentrations below the PQL should not be considered as representative of actual tissue concentrations or at least qualified in its use in assessing bioaccumulation.

Tissues

In both the fish and bivalve samples from both cruises, there was no obvious trend or differences in BEHP concentrations between discharge and reference sites. A summary of the BEHP concentration ranges for each of

the bivalve and fish species is presented in **Table 3-4** for Cruise 2 and in **Table 3-5** for Cruise 3. The percentage of samples which contained detectable amounts of BEHP concentrations above the MDL and fraction of samples detected above the PQL for particular species are also provided in these tables.

In 70% of the samples, BEHP was not detected above the MDL. In those samples where BEHP was detected, only 25% were above the PQL. Except for the yellow chub at EB165A (D), the highest concentrations of BEHP were associated with the reference sites and the bivalves. The highest concentration of BEHP was 1,900 ng/g dry weight in the jewel box at EI361A (R). The sporadic presence of BEHP in the samples at these low detection limits suggests that the presence of BEHP is probably due to field/lab contamination, not bioaccumulation.

PAHs. An additional set of PAH compounds (**Table 2-11**), besides the EPA target PAHs fluorene and BAP, were determined in produced water, ambient seawater, and tissues of bivalves and fish. These PAHs were selected because they have been found to be associated with produced water (Neff *et al*., 1989), and are valuable indicators or tracers of the source(s) of hydrocarbons in environmental samples contaminated by petroleum. The presence of fluorene and BAP alone in environmental samples such as tissues does not necessarily mean that these compounds originated from petroleum or produced water. There are a number of other natural and anthropogenic sources of these compounds such as forest fires, combustion of fossil fuels, and anthropogenic pyrolytic processes (e.g., coal tars) that would contribute to concentrations in environmental samples. Determining PAHs that include the alkyl homologues of the 2-, 3-, and 4-ring PAHs provides essential information on the likely sources of the EPA target and other PAHs in environmental samples (Sauer and Uhler, 1994). In the following discussion, the EPA target PAHs will be presented first for each of the environmental types.

Produced Water/Ambient Seawater

Produced water and ambient seawater samples collected at the two discharge and two reference sites had very low or non-detectable concentrations of the two EPA target PAHs, fluorene and BAP. At GC19A there were two discharges, a high-volume primary discharge and a low-volume secondary discharge. Fluorene concentrations ranged from 100 to 280 ng/L in all discharges. BAP was not detected at an MDL of 1.4 ng/L in the produced waters from EB165A and the primary discharge of GC19A, but was detected in the low-volume discharge of GC19A ranging from 14 to 36 ng/L. No fluorene or BAP were detected in any ambient seawater samples.

At the discharging platforms, produced water contained the full suite of the 2- and 3-ringed alkyl PAHs (naphthalenes, fluorenes, phenanthrenes, and dibenzothiophenes), typical of produced waters (**Table 3-6**). Total PAH concentrations ranged from 40,000 to 44,000 ng/L at EB165A and from 47,000 to 55,000 ng/L at GC19A, primary discharge. Although the discharge rate was lower at the secondary discharge of GC19A, the total PAH concentration was higher at a mean concentration of 150,000 ng/L. The total PAH concentrations in the produced waters are within the range of PAH concentrations in other produced waters in the Gulf of Mexico (Rabalais *et al.*, 1991; Neff *et al.*, 1989).

PAH distributions in the produced waters reflected the respective solubilities of the individual hydrocarbon compounds and the composition of the produced crude oil in contact with the produced water. The PAH composition of crude oils have a petrogenic signature. The PAHs of petrogenic origin (e.g., crude oil, refined oils, natural seeps) have a characteristic "bell shape" in the homologous series distribution where the C_2 or C_3-alkyl PAH abundance predominates within a PAH family. For fossil fuels, especially petroleum, the relative abundances of each family of PAHs are highly influenced by the source of the hydrocarbons. For instance, crude oil from Saudi Arabia has two to three times more dibenzothiophenes than phenanthrenes whereas crude oil from the North Slope of Alaska has almost equal amounts of dibenzothiophenes and phenanthrenes. Also, petrogenic hydrocarbons usually contain relatively low amounts of five and 6-ringed PAHs, such as benz(a)anthracene and BAP, unlike pyrogenic hydrocarbons where the presence of these compounds is relatively high. The relative distributions in alkyl homologues provide the important distinguishing features to hydrocarbon source identification.

For PAHs in produced water, the presence of the petrogenic signature of the produced crude oil is modified by the solubilities of the individual PAHs. In the produced waters of this study, 80% to 90% of the PAHs consisted of the naphthalenes. Naphthalene had the highest concentration in the produced water with decreasing alkyl concentrations as alkyl carbon number increased. Concentrations of the 3-ring PAH families (fluorenes, phenanthrenes, and dibenzothiophenes) were considerably lower in concentration compared to the naphthalenes, and the relative concentration differences between the alkyl groups in each of the PAH families were considerably smaller because the relative solubilities of alkyl group compounds were lower. The concentrations of the 4- through 6-ring PAHs were negligible or non-detectable because of the low-level presence of these compounds in produced oil and the low solubilities in water. Perylene was the only 4- through 6-ring PAH present in all produced water samples, but at low concentrations of approximately 75 ng/L.

The PAH distribution of the GC19A secondary discharge was different than the primary discharge (**Table 3-6**). In the secondary discharge, naphthalenes

made up only 40 to 50% of the total PAH, because the relative concentrations of alkylated phenanthrenes and dibenzothiophenes were considerably elevated. Total PAH concentrations for the secondary discharge were approximately 130,000 ng/L compared to 20,000 ng/L for the primary discharge. The secondary discharge PAH distribution reflected the produced crude oil distribution, not the distribution typical of most produced waters as typified in the primary discharge. It seems that there was emulsified oil in the produced water of this secondary discharge.

Ambient seawater samples were essentially devoid of PAHs except in two samples at HI356A (R). Two water samples near HI356A (R), one of the replicate samples from each cruise, had PAHs with a weathered petroleum signature. Since the water samples were not filtered, the source of these PAHs was probably minute tarballs. At GC19A (D), low-level concentrations (<10 ng/L) of C_1 to C_3-naphthalenes, biphenyl, fluorene, phenanthrene, and C_1-phenanthrenes were detected in all three replicate water samples for Cruise 3. The presence of these PAHs was due to laboratory contamination as determined at the same concentration in the laboratory procedural blank analyzed in the same batch with the field samples. These ambient seawater samples should therefore not be considered hydrocarbon-impacted water.

Tissues

Fluorene and BAP. No bivalves or fish samples contained fluorene above the MDL of 3.6 ng/g dry weight. BAP was, however, detected in the bivalve samples, but not in any of the fish samples. The MDL for BAP was 2.8 ng/g. BAP concentrations were no higher than 21 ng/g dry weight. Summaries of the BAP concentration ranges in the bivalve and fish samples are presented in **Tables 3-7** through **3-18**. The percentage of samples which contained detectable amounts of BAP above MDL and fraction of samples detected above PQL for particular species are also provided in these tables.

In Cruise 2 samples, BAP was not detected in the jewel box, but was detected in the thorny oyster in each sample from the discharge site and 33% of the samples from the reference site. Concentrations ranged at the discharge sites from 5.6 to 12 ng/g and at the reference sites from <2.8 to 5.7 ng/g, all below the PQL. In Cruise 3 samples, BAP was however detected in samples of the jewel box. Except for EB165A (D), no BAP was detected in the thorny oyster; 83% of the thorny oyster samples had detectable BAP concentrations up to 8.2 ng/g. Jewel box BAP concentrations were <2.8 to 8.6J ng/g dry weight at the EB165A (D)/HI356A (R) pair and <2.8 to 21 ng/g dry weight at the GC19A (D)/EI361A (R) pair. One sample from each of the discharge and reference sites of the GC19A (D)/EI 361A (R) pair had BAP concentrations above the PQL. The presence of BAP did not correlate with the presence of petrogenic PAHs in the tissues, which is discussed later.

Other PAHs. More PAHs were detected in the bivalve samples than the fish samples. Summaries of the PAH concentration ranges in the bivalve and fish samples, percentage of samples which contained detectable amounts of PAHs above the MDLs, and fraction of samples detected above the PQLs are presented in **Tables 3-7** through **3-18**.

Fish. Except for one yellow chub replicate analysis at HI356A (R) which had a full suite of alkyl naphthalenes at concentrations from 20 to 35 ng/g dry weight, the fish species contained only trace amounts of C_1-naphthalenes, C_1-fluorenes, and occasionally C_2-naphthalenes and biphenyl with total PAHs no higher than 20 ng/g dry weight. The produced water PAH signature was not evident in these fish samples.

Independent of cruise or platform, 100% of the yellow chub had detectable C_1-naphthalenes at concentrations less than 16 ng/g dry weight, and approximately 50% of the remaining fish (creole-fish, rockhind, sergeant major, and gray triggerfish) had C_1-naphthalenes at concentrations less than 7 ng/g. For all fish, 20% to 30% of the fish had C_1-fluorenes at concentrations less than 13 ng/g dry weight. Biphenyl was detected in only 20% to 30% of the samples of yellow chub and rockhind. C_2-naphthalenes were detected in 40% of the samples of yellow chub. For all fish species except sergeant major, more individual PAHs were detected, and the higher PAH concentrations were associated with the reference sites.

Bivalves. The bivalve species bioaccumulated more PAHs at higher concentrations than the fish species. The number of PAHs present in the tissues and PAH concentrations were generally higher for the thorny oyster than the jewel box at both platform pairs from both cruises. A petrogenic signature was observed in some of the samples from both discharge and reference sites. The PAH distributions in the tissues, however, did not show the dominance of naphthalenes observed in the produced water PAH distributions.

For the EB165A (D)/HI356A (R) pair, the PAH distributions and concentration ranges for both bivalve species were similar at both discharge and reference sites except from Cruise 3. Approximately 50% of the samples contained the C_1- and C_2-naphthalenes and 80% of the samples contained the C_2- and C_3-dibenzothiophenes at concentrations less than 20 ng/g dry weight. In Cruise 3 samples, however, more of the detected PAHs in the bivalves, especially the thorny oyster, were associated with HI356A (R). The PAH distribution for all thorny oyster samples at HI356A (R) resembled a petrogenic PAH signature, not observed at the discharge site. The full suite of alkyl (C_1 through C_4) naphthalenes were present in 85% of the bivalves samples at individual concentrations ranging from 6 to 170 ng/g dry weight. One hundred percent of the thorny oyster samples contained the C_2- and C_3-alkyl phenanthrenes and dibenzothiophenes which ranged in concentrations from 18 to 55 ng/g dry weight. Over 50% of thorny oyster

samples contained anthracene at less than 10 ng/g dry weight and over 80% of both species contained the C_1-fluorenes at concentrations as high as 40 ng/g dry weight.

For the GC19A (D)/EI361A (R) pair, the petrogenic signature of alkyl naphthalenes, phenanthrenes, and dibenzothiophenes was evident only in bivalve samples from both cruises at GC19A (D), especially in the thorny oyster. All of the thorny oyster samples from both cruises contained this petrogenic signature at individual sample concentrations as high as 180 ng/g dry weight. To a lesser extent, approximately 60% of the jewel box samples had alkyl naphthalenes, phenanthrenes, and dibenzothiophenes at concentrations of less than 60 ng/g dry weight. The petrogenic signature in tissues from the discharge site was not evident in any bivalve tissues from the reference site. The C_1- and C_2-naphthalenes were present in all reference bivalve tissues at less than 20 ng/g dry weight. Approximately 60% of the bivalve samples contained the C_2- and C_3-dibenzothiophenes at concentrations less than 25 ng/g. Similar to Cruise 2, C_1-fluorenes and anthracene were present in Cruise 3 bivalve samples, but unlike Cruise 2, no perylene was present in any of the Cruise 3 bivalve samples. The presence of anthracene and some of the 5- and 6-ring PAH (benzo(e)pyrene) indicate that there is a pyrogenic source of PAHs in the samples.

3.2.4 Metals

3.2.4.1 Produced Water and Ambient Seawater. The results of the analyses of produced and ambient seawater samples for metals are presented in **Appendix D**, **Tables D-107** to **D-119**. Results of the produced water analyses are summarized in **Table 3-19** and the results of the ambient seawater analyses are summarized in **Table 3-20**.

The salinity of produced water from EB165A (D) was 130 g/kg for both sampling periods, thereby showing uniformity in the total dissolved solids content of the produced water over a six-month period. Concentrations of barium and arsenic in the produced water at EB165A (D) also showed reasonable uniformity between Cruise 2 and Cruise 3 with variations of <5% and <15%, respectively. Levels of cadmium and mercury were too low to clearly show differences between sampling periods.

For the primary discharge at GC19A (D), the salinity of produced water samples was only about 4% lower during Cruise 3 relative to Cruise 2. Concentrations of arsenic and barium were 19% and 17% lower, respectively, in the Cruise 2 samples (**Table 3-19**) showing that concentrations of trace metals may have somewhat greater variability over time than levels of total dissolved solids (i.e., salinity). Concentrations of cadmium ($\leq$0.8 µg/L) and mercury (<0.010 µg/L) were too low to differentiate adequately between sampling periods. The salinity of the secondary discharge from GC19A (D) was almost twice that for the primary discharge. Cadmium levels in the secondary discharge were considerably higher than from the primary discharge (**Table 3-19**); however, concentrations of arsenic and barium were lower, and mercury was still not detected.

Concentrations of arsenic in ambient seawater from all four sets of samples had a grand mean of 1.3 ± 0.2 µg/L; however, seasonal differences were observed for arsenic levels at both EB165A (D) and HI356A (R) with lower dissolved arsenic values recorded during Cruise 2. All ambient seawater samples from the area surrounding GC19A (D) and EI361A (R) had very similar arsenic levels during both sampling periods. The values were similiar to the concentrations in Cruise 3 samples from EB165A (D) and HI356A (R). Dissolved barium levels in ambient seawater were relatively uniform at 8.1 ± 0.8 µg/L for all samples except those collected from the areas around EB165A (D) and HI356A (R) during Cruise 2 when dissolved barium levels were more than 60% greater than measured for the other samples (i.e., increased by 4 to 7 µg/L). Concentrations of dissolved cadmium in ambient seawater are generally very low, with 75% of the samples from Cruise 3 having <0.005 µg/L (the MDL). Several samples of ambient seawater from Cruise 2 had levels of dissolved cadmium within the range of 0.010J to 0.020J µg/L which were below the PQL and a few had considerably higher levels. However, an equipment blank problem for cadmium was discovered during Cruise 2 and eliminated during Cruise 3. Thus, it is believed that dissolved cadmium levels were <0.020 µg/L (and probably lower) in all ambient seawater samples. Concentrations of mercury in ambient seawater samples from Cruises 2 and 3 were below the MDL of 0.010 µg/L.

3.2.4.2 Tissues. The results of the analyses of tissue samples for metals are presented in **Appendix D**, **Tables D-120** through **D-159**, and summarized in **Tables 3-21** to **3-27**. Concentrations of arsenic in the species collected near GC19A (D) and EI361A (R) do not show large differences among samples as a function of location or sample period (**Tables 3-21** through **3-27**). The uniformity of arsenic values within the data set for a given species at the GC19A (D)/EI361A (R) pair is strong. Arsenic levels in the jewel box and thorny oyster at both EB165A (D) and HI356A (R) showed an increase between Cruises 2 and 3. In contrast, the opposite trend was observed in yellow chub from both EB165A (D) and HI356A (R) and creole-fish from EB165A (D).

A decrease in barium in the jewel box was recorded between Cruises 2 and 3 at the GC19A (D)/EI361A (R) pair with little change recorded at the EB165A (D)/HI356A (R) pair. An increase in barium in the thorny oyster was recorded between Cruises 2 and 3 at the GC19A (D)/EI361A (R) pair with a similar small change at the EB165A (D)/HI356A (R) pair. The yellow chub and creole-fish from both EB165A (D) and HI356A (R) showed large (>10 times) decreases in barium levels, similar to the shift observed for the GC19A (D)/EI361A (R) pair of locations. Data from Cruise 1 also show lower levels similar to those observed during Cruise 3.

Concentrations of cadmium in the jewel box from GC19A (D) were lower than at EI361A (R) (**Table 3-21**). In contrast to the observed difference for the jewel box, no large differences were observed for cadmium levels in the thorny oyster and the fish species for discharge versus reference sites. Cadmium levels in the bivalves (4 to 30 µg/g dry weight) are considerably higher than the levels of ND to 0.020 µg/g dry weight in fish muscle tissue.

Mercury levels in all samples of the jewel box from both pairs of discharge/reference sites were very similar to one another (0.07 ± 0.01 µg/g dry weight; **Table 3-21**) and show no enhanced bioaccumulation at the discharge sites. A similar uniformity is seen in the mercury data for the thorny oyster (**Table 3-22**) with a grand mean of 0.16 ± 0.03 µg/g dry weight. Mercury levels in the fish are also very consistent between discharge and reference sites with the exception of mercury in the yellow chub from GC19A (D) versus EI361A (R) for Cruise 3 where values are higher at the discharge site (**Tables 3-23** through **3-27**). However, the opposite is observed in rockhind (**Table 3-25**) and gray triggerfish (**Table 3-27**) with fish from the reference site having higher mercury levels.

3.2.5 Radionuclides

3.2.5.1 Produced Water and Ambient Seawater. Produced water and ambient seawater samples collected during Cruises 2 and 3 were analyzed for ^{226}Ra and ^{228}Ra. These results are presented in **Appendix D** (**Tables D-160** through **D-172**) and summarized in **Tables 3-28** and **3-29**.

^{226}Ra and ^{228}Ra activites in unfiltered produced water samples ranged from 250 to 380 and 460 to 960 pCi/L, respectively. Activities of ^{226}Ra and ^{228}Ra in unfiltered ambient seawater samples ranged from ND to 0.29 and ND to 2.7 pCi/L, respectively.

3.2.5.2 Tissues. ^{226}Ra and ^{228}Ra radioactivities observed in the edible tissues of species collected at the platforms are presented in **Appendix D**, **Tables D-173** through **D-212** and summarized in **Tables 3-30** and **3-31**. Levels of these isotopes in bivalve tissue samples ranged between ND and 0.34 pCi/g dry weight for ^{226}Ra and between ND and 0.20 pCi/g dry weight for ^{228}Ra. For fish tissue samples, the levels of ^{226}Ra and ^{228}Ra were ND to 0.058 and ND to 0.22 pCi/g dry weight, respectively.

3.3 STATISTICAL TESTING

3.3.1 Power of Statistical Testing

Power is defined as the probability of detecting a false null hypothesis. It is particularly useful to examine power levels in this study because in many cases (83%), the null hypothesis was not rejected. In these cases, the power of the analysis is an indication of the confidence that the null hypothesis is indeed correct. To evaluate the capability of the study to detect differences between discharging and reference platforms, the magnitude of the difference that could be detected was calculated (Cohen, 1977) for three high power levels (**Appendix A**, **Tables A-1** through **A-3**).

For perspective, these differences were scaled by the magnitude of the mean concentration at the reference platform and reported as a percentage in the tables. For the majority of these cases, detectable differences between the mean levels at the two platforms are small, frequently much less than the magnitude of the reference mean. For example, the detectable difference for cadmium in jewel box at GC19A (D)/EI361A (R) during Cruise 2 was 3.4 µg/g dry weight for a 95% power level. This means that there is a 95% probability that a true difference greater than 3.4 µg/g

dry weight between the discharging and reference platforms would be statistically detected; this detectable difference is 33% compared to the mean level at the reference platform during Cruise 2. In most cases, the statistical test would detect a mean concentration at the discharging platform that is truly double (or less) the reference mean concentration. However, there were exceptions such as barium levels in yellow chub samples collected at EB165A (D) and HI356A (R). In this case, the discharging mean would have to be more than an order of magnitude greater than the reference mean to be considered statistically significant; however, the magnitude of the detectable difference was small--1.0 µg/g dry weight at 95% power. These cases were relatively few, and the overall quality of the data to detect differences was very high.

3.3.2 Type I Error and Multiple Comparisons

For a statistical test, there is a probability of a Type I error, which is rejecting by random chance the null hypothesis when the null hypothesis is actually true. If a number of statistical tests are performed on a set of data then a number of statistically significant results can be expected because a Type I error occurred (a true null hypothesis was rejected by random chance), which would be a false positive result. The potential effect of this problem on the statistical results from this study is illustrated in **Table 3-32**. For the total of 465 statistical tests, the expected number of statistical significant results by random chance is 28, compared to the 81 observed statistically significant results. Type I error may have been responsible for some of the observed statistically significant results.

3.4 QUALITY ASSURANCE

3.4.1 Program Summary

The results of the QA Program confirm the high quality and reliability of the analytical data developed in this study. This statement is based on and supported by the findings and documentation provided through the review of QA/QC records, QA Statements and case narratives, data quality reviews, interlaboratory comparisons, and the onsite audits conducted at three of the participating laboratories. All necessary documentation is maintained at CSA and the contract laboratories. The documentation is archived in a manner that allows retrieval of the data, documents, and records if required for future external audit purposes.

The QA Program ensured that the study participants documented the methodology (work plans, QAPjPs, SOPs, and case narratives), QC steps (criteria targets and achieved results), detection limits, internal audit processes, and any qualifiers associated with the data and results in adequate detail. Detailed planning, close coordination among the study personnel of participating organizations, clear responsibilities, and thorough documentation contributed to the successful implementation of the QA Program. The success of the QA Program has been validated and good data quality documented through the results of the analyses of the QC samples, MDL determinations, interlaboratory comparisons, and the laboratory audits.

3.4.2 Data Quality Review

Field Activities

Adherence to the field SOPs and QC requirements by CSA personnel were well documented in the QA Officer's Field Representative's Daily QA/QC Field Checklist. CSA collected the requisite number of samples in the various matrices for the study to accomplish its objectives. Adequate sample volume and replication for each of the matrices was provided to each participating laboratory to meet their analytical requirements ensuring excellent completeness in the data collection effort. Minimal levels of the target chemicals were reported in the field, trip, and equipment blanks analyzed and reported by the laboratories.

Organics

Battelle and ADL demonstrated accurate and precise results and achieved low detection limits; data quality for the VOC and PAH analyses met the DQOs. The percent recoveries of matrix spikes and percent differences between sample and matrix spike duplicates reported for each sample batch or data package were within the acceptance criteria prescribed because samples exhibiting analytical results that were out of the range for the relevant acceptance criteria were reanalyzed.

The very low detection limits achieved by the laboratories are documented in the MDLs (**Table 2-13**). Because the analytical methods used in this study achieved very low MDLs (in the low parts per billion range), phenol, and BEHP were often detected in the laboratory procedural blanks of the tissue analysis even though extraordinary measures were implemented in minimizing contamination during processing and analysis. Concentrations of these compounds in the procedural blanks were in the range observed in the tissue samples. The EPA MDL procedure included analysis of seven procedural blanks with the seven spiked tissue matrix samples. The seven spiked tissue sample results for phenol and BEHP were corrected for the laboratory contamination.

For the PAHs, standards for many of the alkyl homologues (i.e., C_1, C_2, C_3 alkyl groups) in a particular PAH family (e.g., dibenzothiophenes, naphthalenes) were not available, and as a result, MDLs of these individual alkyl groups were assigned the value of the parent compound or the previous alkyl group. For those alkyl groups in which only the parent compound MDL was used as the MDL of the alkyl groups (e.g., dibenzothiophenes), the MDLs are probably conservative, and lower than would be expected for an alkyl group MDL. The phenanthrenes are an example of where MDLs of larger alkyl groups are considerably higher (3 to 7 times) than the MDL of the parent compound.

Review of procedural blank results for the target compounds in tissues indicated that even though the low-level contamination of phenol and BEHP was considered in the tissue MDL determination for these analytes, there were occasional concentrations of phenol and BEHP above the MDL (i.e., ND) in procedural blanks of some of the sample

tissue batches. Phenol procedure blank concentrations were as high as 40 ng/g wet weight (MDL = 9.1 ng/g), and BEHP concentrations were as high as 67 ng/g wet weight (MDL = 32 ng/g). These wet weight concentrations were based on 25 g wet weight tissue. On a dry weight basis, phenol procedural blank concentrations ranged from 180 to 400 ng/g dry weight depending on the species type, and the phthalate ranged from 300 to 670 ng/g dry weight. The procedural blank concentrations are still very low for these compounds; however, their presence above MDLs in procedural blanks indicated the degree of variability that can be expected in the tissue samples. Tissue concentrations for phenol and BEHP that are up to 5 times above MDL may be considered suspect and as sample contamination. Tissue concentrations for these compounds that are above the PQL (five times the MDL) are believed to be acceptable values.

Metals

Data quality for produced water, ambient seawater, and tissues analyzed by FIT was excellent based on the values obtained for arsenic, barium, cadmium, and mercury in the SRMs, matrix spikes, and sample duplicates. Low values were obtained in field and trip blanks. The MDLs for metal analyses of tissue samples as reported in **Table 2-14** were 0.05 µg arsenic/g, 0.02 µg barium/g, 0.002 µg cadmium/g and 0.001 µg mercury/g on a dry weight basis. Accuracy in analyses of the tissue samples was determined by using both oyster and fish SRMs from NIST and the NRC as analogues for the range of tissue types received. The concentration values obtained in SRMs for arsenic, cadmium and, mercury were within the acceptance criteria.

Matrix spikes were also performed as a part of all arsenic and cadmium analyses and percent recovery was within acceptance criteria in all cases. Matrix spike recovery for mercury was also within acceptance criteria for the first sampling period (97±4%), however the digestion procedure resulted in the explosive failure of several digestion tubes. For this reason, the mercury SOP was modified during the second sampling period to include a safer digestion procedure at lower temperatures and pressures. The spike corrected mercury concentrations of the SRMs were all within the certified ranges and insured data compatibility between sampling periods and digestion procedures. Precision, based on tissue aliquots from single fish and bivalve samples, was within the DQOs for all metals in >95% of analyses. No tissue concentrations less than the MDL were obtained for arsenic and mercury. The barium and cadmium analyses resulted in values below the MDL in only 4% and 13% of the tissue samples (all fish), respectively. Except for elevated levels of cadmium in an equipment blank for ambient seawater samples that was corrected in the subsequent cruise, metals analyses of field QC samples were within acceptance criteria, being below five times the MDLs.

Radionuclides

Quality control data from the matrix spikes and reference materials demonstrated that the accuracy and precision of the radionuclide measurements generally were well within the data quality objectives. Although a number of the method duplicates in some cases

were out of the stated acceptance criteria ranges for precision, these were due to the very low activity levels found in the majority of the samples.

Due to the nature of the material and the analytical methods, MDLs comparable to the organics and metals were not developed for radionuclides. As defined by the methodology, a lower limit of detection (Minimum Detectable Activity) was determined for each sample **a priori** as a function of the matrix, sample volume, background activity, and counting time. Core Laboratories was able to achieve detection limits at very low levels of activity and produced reliable and reproducible results at these low levels. As presented in **Table 2-16**, Core Laboratories reported ^{226}Ra detection limits of 0.010 to 0.13 pCi/L, 0.007 to 0.030 pCi/L, and 0.002 to 0.010 pCi/g (dry weight) in produced water, ambient seawater, and tissues, respectively. Detection limits for ^{228}Ra were 0.030 to 0.75 pCi/L, 0.010 to 0.070 pCi/L, and 0.0008 to 0.030 pCi/g (dry weight), respectively. In addition, Core Laboratories developed a method that achieved these low detection limits in nearly every case although there were certain samples where the detection limits were not achieved that were expected due to limited sample volume.

3.4.3 Interlaboratory Comparisons

The results of the interlaboratory comparisons are presented in **Appendix E**. The analytical results between the two laboratories for each analyte class (VOCs, PAHs, metals, and radionuclides) were comparable to those that other good laboratories would generate.

Organics

The results of the VOCs analysis of a produced water sample analyzed by Battelle and ADL (**Appendix E**, **Table E-1**) were comparable although the ADL data were slightly higher (e.g., ADL reported a benzene concentration of 730 µg/L compared to 550 µg/L by Battelle). In contrast, low VOC levels were reported by Battelle in a produced water sample while ADL reported non-detectable levels (**Appendix E**, **Table E-2**). These differences may have reflected differences between analytical operators and were not considered to be significant. Both laboratories reported VOC levels in tissues from jewel box, yellow chub, creole-fish, red snapper, rockhind, and spadefish (*Chaetodipterus faber*) that were generally at ND levels with the sole exception of toluene in the jewel box (**Appendix E**, **Tables E-4** to **E-8**). The spadefish was used as it was sampled during the Platform Survey Component.

The SVOC results reported by ADL and Battelle for a produced water sample were similarly comparable (**Appendix E**, **Table E-9**). There were no consistent differences among the various analytes in the SVOC suite. Both laboratories reported the presence of BEHP in their procedural blanks reflecting the difficulty of avoiding contamination from phthalates. Similarly, SVOCs determined in an ambient seawater sample were comparable (**Appendix E**, **Table E-10**). Both laboratories reported ND levels for all analytes with the exception of phenol, naphthalene, and BEHP.

ADL showed reportable levels of these compounds in the ambient water samples and BEHP in its procedural blank. Both laboratories also reported similar SVOC levels in tissues of the jewel box, yellow chub, red snapper, rockhind, spadefish, and gray triggerfish (**Appendix E**, **Tables E-11** to **E-16**).

Metals

One sample each of produced water, ambient seawater, and tissues from jewel box, yellow chub, red snapper, rockhind, spadefish, and gray triggerfish were analyzed for arsenic, barium, cadmium, and mercury by FIT and Battelle as the comparison laboratory. Overall, the agreement in the data produced by the two laboratories was good. Results of the metal analysis of the produced water sample by FIT and Battelle yielded exactly the same result for barium and within 15% agreement for arsenic (**Appendix E**, **Table E-17**). The produced water sample was not analyzed for cadmium and mercury by Battelle. In the ambient seawater sample, concentrations of arsenic and barium obtained by both laboratories agreed within 10%. In contrast, cadmium levels from the FIT data (0.002 µg/L) were considerably lower than those obtained by Battelle (0.34 µg/L) (**Appendix E**, **Table E-18**).

Comparable levels of metals were reported also by FIT and Battelle in the six tissue samples analyzed. Although there was a ±50% variation in most samples, many values agreed within a fraction of a µg/g (**Appendix E**, **Tables E-19** to **E-24**). At the low levels of barium and cadmium found in the fish, the lack of agreement between laboratories sometimes appeared sizeable as a fractional deviation. However, the absolute difference was generally <0.1 µg/g. Very good agreement was obtained for five of the six mercury values in tissues with a single unexplained discrepancy.

Radionuclides

Good comparability was also observed in radionuclide analyses conducted by the primary and comparison laboratories. Although the analytical techniques utilized were quite different, the results of the radionuclide analyses interlaboratory comparison samples by Core Laboratories and Paragon Analytics were generally similar (**Appendix E**, **Table E-25**). Both laboratories achieved the required detection limits specified in the DQOs for the study. Paragon reported ^{226}Ra detection limits in tissue ranging from 0.0029 to 0.0051 pCi/g and ^{228}Ra detection limits in tissue ranging from 0.0054 to 0.0061 pCi/g. The Paragon data for tissue can be considered good because recoveries of a ^{133}Ba tracer in each sample ranged from 81.6% to 102.8%.

The radionuclide analysis of a produced water sample by both laboratories resulted in comparable data. Although the ^{226}Ra activity reported by Paragon was more than 400% greater, this difference in a single comparison sample is not thought to be significant. Very low radium activity was reported by both laboratories in an ambient seawater sample. Data for radionuclide activity in samples from thorny oyster, yellow chub, creole-fish, and gray triggerfish from both laboratories were also similar. Except for two samples showing very low ^{226}Ra activity, Core Laboratories reported ND levels for all four tissue samples. Similarly, Paragon reported ND ^{226}Ra and ^{228}Ra activity in all

tissue samples. The differences are likely due to methodology; Core Laboratories measured ^{226} Ra and ^{228} Ra activity in 100 g samples while Paragon required 1,000 g samples to achieve the required detection limits.

Both sets of radionuclide data from the interlaboratory comparison demonstrate that there is not a significant amount of activity in tissue samples for either ^{226}Ra or ^{228}Ra. Utilizing a new counting technology, Core Laboratories demonstrated in the ^{226}Ra analysis that there were significant differences in activity between the interlaboratory comparison samples. The ^{228}Ra levels are similarly comparable in the two sets of data. The Core Laboratories data were able to demonstrate that there is activity below a detection limit of a range of 0.0014 pCi/g.

3.4.4 Laboratory Audits

The results of the laboratory audits by the OOC QA Audit Team are provided in detail in an 18 May 1995 letter report prepared by Dr. Stanko. The audit was primarily focused on the methodology being employed, the level and adequacy of the QA/QC, the uniformity and completeness of data packages, and the credibility of the data. The audit team found that the three participating laboratories were consistently adhering to their SOPs, and if not, properly documenting deviations, technical problems, and corrective actions. The audit team also reported that the laboratories were establishing clear data and documentation trails, providing adequate QA/QC in their laboratory and analytical procedures, and were submitting credible data reports from the various analyses that were conducted. The results of the audit demonstrate that the data are credible and of high quality and are backed up with adequate documentation that is available from the participating laboratories and meets current industry/government practices.

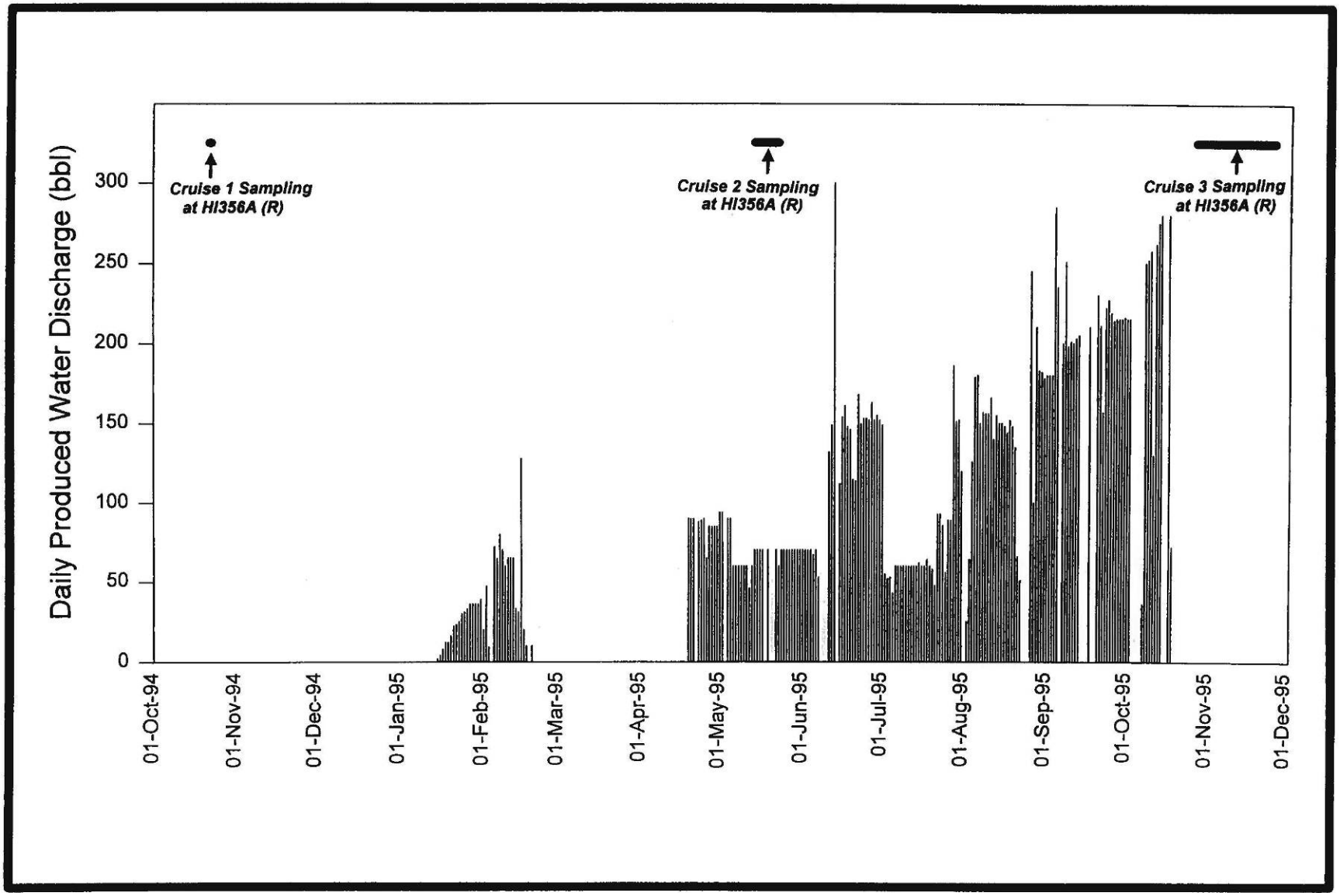

Figure 3-1. Daily produced water discharge volume at High Island A 356A (HI356A) (R).

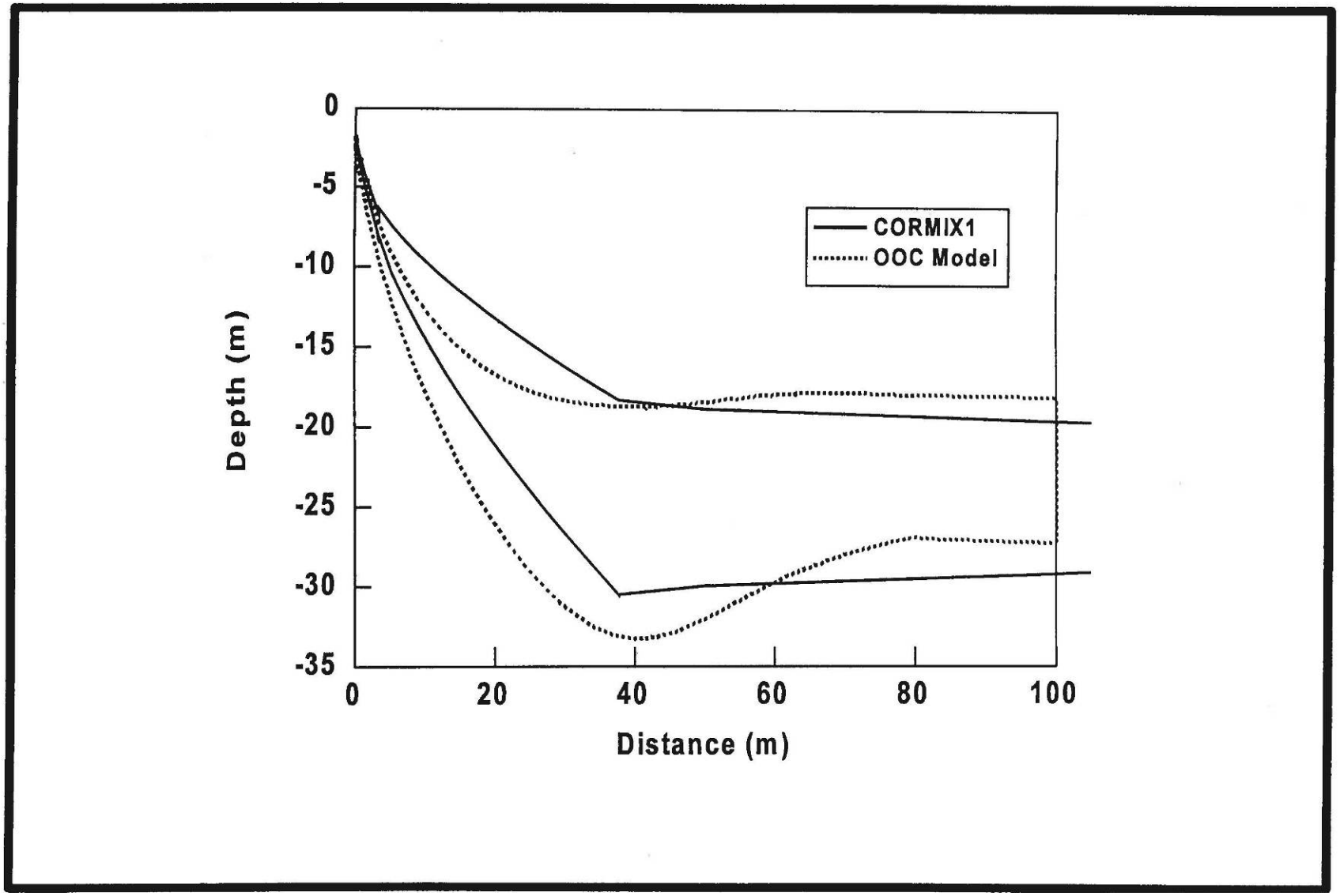

Figure 3-2. Plume boundaries for a 7,054 bbl/d produced water discharge at Green Canyon 19A predicted with CORMIX1 and the OOC Model. The boundaries indicate the depths where the effluent concentration falls to 37% of the maximum (i.e., centerline) concentration at any given distance.

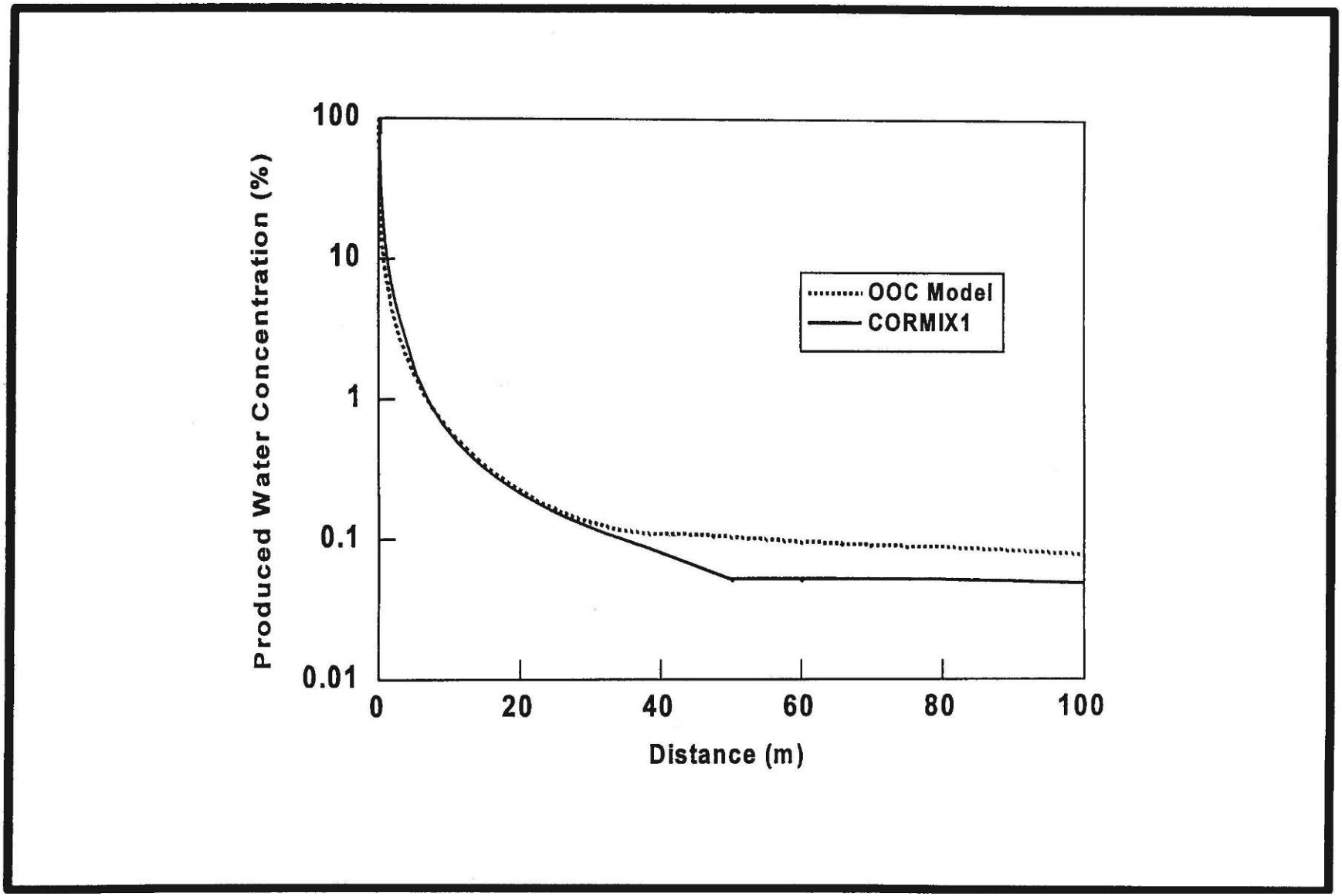

Figure 3-3. Maximum downstream plume concentrations for a 7,054 bbl/d produced water discharge at Green Canyon 19A predicted with CORMIX1 and the OOC Model.

Table 3-1. Mean concentrations of volatile organic compounds in produced water samples (µg/L).

Analyte	Cruise 2		Cruise 3		
	EB165A	GC19A	EB165A	GC19A (primary high-volume discharge)	GC19A (secondary low-volume discharge)
Benzene	900	440	990	1,000	470
Toluene	450	360	600	980	340
Ethylbenzene	67	70	64	110	28
m/p-Xylenes	260	230	260	340	100
o-Xylene	130	140	120	190	64
C_3-Benzenes	49	52	25	29	15
C_4-Benzenes	9	13	5	ND	ND
Total VOC	1,900	1,300	2,100	2,600	1,000

Table 3-2. Summary of volatile organic compound concentrations (µg/L) in ambient seawater samples (n=3) collected during the Definitive Cruises.

Cruise	Analyte	Platform			
		EB165A	HI356A	GC19A	EI361A
2 (Spring 1995)	Benzene	ND	ND	ND	ND
	Toluene	ND	ND - 0.15J	ND	ND - 0.16J
	Ethylbenzene	ND	ND	ND	ND
	m/p-Xylenes	ND	ND	ND	ND
	o-Xylene	ND	ND	ND	ND
	C_3-Benzenes	ND	ND	ND	ND
	C_4-Benzenes	ND	ND	ND	ND
3 (Fall 1995)	Benzene	ND - 0.62J	ND	ND	ND
	Toluene	ND - 0.13J	ND	ND	ND
	Ethylbenzene	ND	ND	ND	ND
	m/p-Xylenes	ND	ND	ND	ND
	o-Xylene	ND	ND	ND	ND
	C_3-Benzenes	ND	ND	ND	ND
	C_4-Benzenes	ND	ND	ND	ND

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).
ND = Not detected.

Table 3-3. Tissue samples which had volatile organic target compounds above method detection limits (MDL) (concentrations in ng/g dry weight). Ninety-six percent of the volatile organic compound values were below the MDL.

Cruise (Sampling Period)	Platform	Species	Sample Composite (analysis)	Organic Compound and Concentration Range for Replicate Sample	
2 (Spring 1995)	EB165A(D)	Jewel box	C(1) & C(2)	Benzene	C:5.9J-7.3J
3 (Fall 1995)	EB165A(D)	Jewel box	A(1) & A(2), B(1) & B(2), C(1) & C(2)	Toluene	A:15J B:11J-16J C:10J-11J
3 (Fall 1995)	EB165A(D)	Thorny oyster	B(2)	Toluene	B:22
2 (Spring 1995)	HI356A (R)	Thorny oyster	A(1) & A(2)	Benzene	A:6.6J-9.3J
3 (Fall 1995)	HI356A (R)	Jewel box	A(1) & A(2), B(1) & B(2), C(1) & C(2)	Toluene	A:18J-21 B:28-29 C:33-43
3 (Fall 1995)	HI356A (R)	Thorny oyster	A(1) & A(2), B(1) & B(2), C(1) & C(2)	Toluene	A:37-41 B:12J-13J C:8.3J-11J
2 (Spring 1995)	GC19A (D)	Yellow chub	A(1) & A(2)	Benzene	A:5.2J-7.7J
3 (Fall 1995)	GC19A (D)	Jewel box	A(1) & A(2), B(1) & B(2), C(1) & C(2)	Toluene	A:5.8J-17J B:16J-20 C:8.4J-18J
3 (Fall 1995)	GC19A (D)	Thorny oyster	A(1) & A(2), B(1) & B(2), C(1) & C(2)	Toluene	A:18J-35 B:28-46 C:19-30
3 (Fall 1995)	GC19A (D)	Gray triggerfish	A(1) & A(2)	Toluene	A:9.9J-11J
3 (Fall 1995)	EI361A (R)	Gray triggerfish	A(1) & A(2), B(1) & B(2), C(1) & C(2)	Toluene	A:6.8J-8.4J B:5.8J-6.1J C:9.3J-10J
3 (Fall 1995)	EI361A (R)	Jewel box	A(1) & A(2), B(1) & B(2), C(1) & C(2)	Toluene	A:40-64 B:44-51 C:53-64
3 (Fall 1995)	EI361A (R)	Yellow chub	A(1), B(1), C(2)	Toluene	A:11J B:7.5J C:11J
3 (Fall 1995)	EI361A (R)	Creole-fish	A(1) & A(2)	Toluene	A:14J-15J
3 (Fall 1995)	EI361A (R)	Thorny oyster	A(1) & A(2), B(1) & B(2), C(1) & C(2)	Toluene	A:20-25 B:28-46 C:58-68

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).
MDL = Benzene: 3.2 ng/g dry weight; Toluene: 3.8 ng/g dry weight.
PQL = Benzene: 16 ng/g dry weight; Toluene: 19 ng/g dry weight.

Table 3-4. Concentration range (ng/g dry weight) and percent above MDL (in parentheses) of phenol and BEHP in tissue samples collected during Cruise 2 from the two discharge (D)/reference (R) platform pairs.

Species/Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
Jewel box				
Phenol	<38-180 (33%)[a]	83-280 (100%)[b]	200-470 (100%)[e]	180-370 (100%)[b]
BEHP	<140-860 (33%)[e]	<140-330 (16%)[a]	<140-900 (50%)[c]	<140-1,900 (33%)[d]
Thorny oyster				
Phenol	100-130 (100%)[a]	68-120 (100%)[a]	120-220 (100%)[b]	75-120 (100%)[a]
BEHP	<140	<140-540 (16%)[a]	<140-430 (83%)[a]	190-1,500 (100%)[b]
Yellow chub				
Phenol	<38-86 (66%)[a]	<38-170 (83%)[a]	70-550 (100%)[b]	66-180 (100%)[a]
BEHP	<140-1,700 (66%)[a]	<140-200 (16%)[a]	<140	<140-830 (33%)[d]
Creole-fish				
Phenol	<38-94 (33%)[a]	<38-130 (66%)[a]	76-280 (100%)[b]	<38-110 (50%)[a]
BEHP	<140	<140	<140	<140-690 (16%)[e]
Rockhind				
Phenol	81-150 (100%)[a]	50-190 (100%)[a]	---	---
BEHP	<140-270 (16%)[a]	<140-200 (33%)[a]	---	---
Gray triggerfish				
Phenol	---	---	330-640 (100%)[e]	81-210 (100%)[b]
BEHP	---	---	<140	<140

[a] None of the detects above practical quantitation level (PQL) (J qualified values).
[b] One-sixth of detects above PQL.
[c] One-quarter of detects above PQL.
[d] One-half of detects above PQL.
[e] All detects above PQL.

Table 3-5. Concentration range (ng/g dry weight) and percent above MDL (in parentheses) of phenol and BEHP in tissue samples collected during Cruise 3 from the two discharge (D)/reference (R) platform pairs.

Species/Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
Jewel box				
Phenol	280-450 (100%)[e]	91-330 (100%)[d]	150-340 (100%)[b]	240-800 (100%)[e]
BEHP	<140-980 (66%)[c]	<140-790 (50%)[e]	<140-530 (33%)[a]	<140-1,000 (66%)[d]
Thorny oyster				
Phenol	300-610 (100%)[e]	110-210 (100%)[b]	160-520 (100%)[d]	110-220 (100%)[b]
BEHP	<140-1,000 (33%)[d]	<140-940 (33%)[d]	<140-890 (33%)[d]	<140-1,000 (16%)[e]
Yellow chub				
Phenol	130-200 (100%)[b]	76-140 (100%)[a]	81-130 (100%)[a]	44-120 (100%)[a]
BEHP	<140-520 (16%)[a]	<140	<140-310 (33%)[a]	<140-220 (16%)[a]
Creole-fish				
Phenol	<38-110 (66%)[a]	99-180 (100%)[a]	<38-71 (33%)[a]	54-160 (100%)[a]
BEHP	<140	<140-160 (16%)[a]	<140-380 (50%)[a]	<140-490 (50%)[a]
Sergeant major				
Phenol	45-94 (100%)[a]	61-89 (100%)[a]	---	---
BEHP	<140-240 (16%)	<140-750 (33%)[d]	---	---
Gray triggerfish				
Phenol	---	---	310-1,000 (100%)[e]	72-280 (100%)[b]
BEHP	---	---	<140-290 (16%)[a]	<140-330 (33%)[a]

[a] None of the detects above practical quantitation level (PQL) (J qualified values).
[b] One-sixth of detects above PQL.
[c] One-quarter of detects above PQL.
[d] One-half of detects above PQL.
[e] All detects above PQL.

Table 3-6. Mean polycyclic aromatic hydrocarbon concentrations (ng/L) in produced waters from Cruises 2 and 3.

Compound	Cruise 2		Cruise 3		
	EB165A	GC19A (Primary Discharge)	EB165A	GC19A (Primary Discharge)	GC19A (Secondary Discharge)
Naphthalene	15,000	14,000	10,000	5,500	11,000
2-Methylnaphthalene	8,800	8,800	6,900	3,800	11,000
1-Methylnaphthalene	6,400	8,500	4,900	3,500	9,400
2,6-dimethylnaphthalene	1,200	1,200	620	600	1,700
2,3,5-trimethylnaphthalene	520	620	380	270	2,000
C_1-Naphthalenes	12,000	11,000	7,100	4,400	12,000
C_2-Naphthalenes	6,400	8,100	5,000	5,300	13,000
C_3-Naphthalenes	3,000	4,700	2,700	3,000	15,000
C_4-Naphthalenes	1,900	2,800	1,100	1,700	7,500
Acenaphthylene	170	ND	ND	370	ND
Acenaphthene	18	ND	ND	76	87
Biphenyl	1,000	780	550	370	480
Fluorene[a]	160	260	110	200	150
C_1-Fluorenes	220	400	170	100	900
C_2-Fluorenes	390	760	220	250	1,800
C_3-Fluorenes	510	950	330	350	2,900
Anthracene	20	21	30	48	ND
Phenanthrene	150	340	120	160	1,100
1-Methylphenanthrene	76	190	73	120	1,500
C_1-Phenanthrenes/anthracenes	250	650	270	290	5,400
C_2-Phenanthrenes/anthracenes	270	820	300	290	9,000
C_3-Phenanthrenes/anthracenes	260	680	530	130	8,000
C_4-Phenanthrenes/anthracenes	280	580	540	210	6,600
Dibenzothiophene	87	350	72	180	1,300
C_1-Dibenzothiophenes	200	730	180	270	4,900
C_2-Dibenzothiophenes	280	1,200	430	490	13,000
C_3-Dibenzothiophenes	350	1,300	380	450	15,000
Fluoranthene	2	10	ND	8	ND
Pyrene	10	24	18	10	220
C_1-Fluoranthenes/pyrenes	ND	81	57	ND	750

Table 3-6. (Continued).

Compound	Cruise 2		Cruise 3		
	EB165A	GC19A (Primary Discharge)	EB165A	GC19A (Primary Discharge)	GC19A (Secondary Discharge)
C_2-Fluoranthenes/pyrenes	ND	110	64	ND	1,400
Benzo[a]anthracene	ND	ND	ND	ND	ND
Chrysene	ND	11	ND	ND	170
C_1-Chrysenes	ND	34	ND	ND	640
C_2-Chrysenes	ND	61	ND	ND	1,300
C_3-Chrysenes	ND	77	ND	ND	990
C_4-Chrysenes	ND	ND	ND	ND	1,000
Benzo[b]fluoranthene	ND	ND	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND	ND	ND
Benzo[e]pyrene	ND	ND	2	2	30
Benzo[a]pyrene[a]	ND	ND	ND	2	27
Perylene	47	180	36	36	310
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND	3	6

ND = Not detected.
[a] EPA-specified target chemical per NPDES Permit.

Table 3-7. Concentration range (ng/g dry weight) and percent above MDL (in parentheses) of individual PAHs in tissues of jewel box collected during Cruise 2 from the two discharge (D)/reference (R) platform pairs.

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
Fluorene[a]	<3.6	<3.6	<3.6	<3.6
Benzo(a)pyrene[a]	<2.8	<2.8	<2.8	<2.8
Naphthalene	<8.6	<8.6	<8.6	<8.6
2-Methylnaphthalene	<2.3-12 (83%)[b]	10-32 (100%)[d]	10-20 (100%)[d]	11-20 (100%)[d]
1-Methylnaphthalene	<2.9	<2.9	<2.9-7.3 (16%)[b]	<2.9
2,6-Dimethylnaphthalene	7-9.3 (100%)[b]	<7-17 (50%)[c]	<2.1	<2.1-5.5 (33%)[b]
2,3,5-Trimethylnaphthalene	<2.1	<2.1	<2.1-5.1 (16%)[b]	<2.1
C_1-Naphthalenes	5.2-9.4 (100%)[b]	9-30 (100%)[c]	8-18 (100%)[d]	<2.7-13 (83%)[b]
C_2-Naphthalenes	<5.1-15 (83%)[b]	<5.1-36 (33%)[c]	<5.1-28 (33%)[c]	<5.1-12 (16%)[b]
C_3-Naphthalenes	<5.1-12 (33%)[b]	<5.1	<5.1-37 (33%)[c]	<5.1
C_4-Naphthalenes	<5.1	<5.1	<5.1-54 (33%)[c]	<5.1
Acenaphthylene	<3.8	<3.8	<3.8	<3.8
Acenaphthene	<3.8	<3.8	<3.8	<3.8
Biphenyl	<2.3	<2.3	<2.3-5.7 (16%)[b]	<2.3
C_1-Fluorenes	<3.6-7.2 (16%)[b]	<3.6	<3.6-15 (33%)[b]	<3.6-9.4 (66%)[b]
C_2-Fluorenes	<3.6	<3.6	<3.6	<3.6
C_3-Fluorenes	<3.6	<3.6	<3.6	<3.6
Anthracene	<2.3	<2.3	<2.3	<2.3
Phenanthrene	<3.5	<3.5	<3.5-9.2 (16%)[b]	<3.5
1-Methylphenanthrene	<2.3	<2.3	<2.3	<2.3
C_1-Phenanthrenes	<6.3	<6.3	<6.3	<6.3
C_2-Phenanthrenes	<16	<16	<16	<16
C_3-Phenanthrenes	<16	<16	<16-37 (16%)[b]	<16
C_4-Phenanthrenes	<16	<16	<16	<16
Dibenzothiophene	<1.3	<1.3	<1.3	<1.3
C_1-Dibenzothiophenes	<1.3	<1.3	<1.3-15 (66%)[b]	<1.3
C_2-Dibenzothiophenes	<1.3-9.9 (66%)[e]	<1.3	15-40 (100%)[e]	<1.3-10 (33%)[e]
C_3-Dibenzothiophenes	<1.3-14 (66%)[e]	<1.3	20-64 (100%)[e]	<1.3-10 (50%)[e]
Fluoranthene	<2.6	<2.6	<2.6	<2.6
Pyrene	<3.3	<3.3	<3.3	<3.3
C_1-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
C_2-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
C_3-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
Benz(a)anthracene	<2.5	<2.5	<2.5	<2.5
Chrysene	<2.2	<2.2	<2.2	<2.2
C_1-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_2-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_3-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_4-Chrysenes	<2.2	<2.2	<2.2	<2.2

Table 3-7. (Continued).

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
Benzo(b)fluoranthene	<2.2	<2.2	<2.2	<2.2
Benzo(k)fluoranthene	<3.6	<3.6	<3.6	<3.6
Benzo(e)pyrene	<2.3-25 (33%)[e]	<2.3	18-41 (100%)[e]	14-26 (100%)[e]
Perylene	<3.3-49 (33%)[e]	<3.3	35-75 (100%)[e]	26-41 (100%)[e]
Indeno(1,2,3-c,d)pyrene	<2.3	<2.3	<2.3	<2.3
Dibenz(a,h)anthracene	<2.0	<2.0	<2.0	<2.0
Benzo(g,h,i)perylene	<2.9	<2.9	<2.9	<2.9

[a] EPA-specified target chemical per NPDES Permit.
[b] None of the detects above practical quantitation level (PQL) (J qualified values).
[c] One-half of the detects above PQL.
[d] Two-thirds of the detects above PQL.
[e] All of the detects above PQL.

Table 3-8. Concentration range (ng/g dry weight) and percent above MDL (in parentheses) of individual PAHs in tissues of jewel box collected during Cruise 3 from the two discharge (D)/reference (R) platform pairs.

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
Fluorene[a]	<3.6	<3.6	<3.6	<3.6
Benzo(a)pyrene[a]	<2.8-8.2 (83%)[b]	<2.8-8.6 (33%)[b]	<2.8-21 (66%)[d]	<2.8-21 (83%)[c]
Naphthalene	<8.6	<8.6	<8.6	<8.6
2-Methylnaphthalene	7-10 (100%)[b]	3.8-14 (100%)[e]	5-6.8 (100%)[b]	6.4-11 (100%)[b]
1-Methylnaphthalene	6.1-9.7 (100%)[b]	<2.9-8.9 (33%)[b]	<2.9-5.5 (83%)[b]	<2.9-7.3 (33%)[b]
2,6-Dimethylnaphthalene	<2.1-7.1 (50%)[b]	<2.1-19 (66%)[d]	<2.1-32 (66%)[e]	<2.1-13 (66%)[d]
2,3,5-Trimethylnaphthalene	<2.1-4 (33%)[b]	<2.1-2.4 (16%)[b]	<2.1	<2.1
C_1-Naphthalenes	11-12 (100%)[b]	4.5-12 (100%)[b]	6.4-8.1 (100%)[b]	7.4-13 (100%)[b]
C_2-Naphthalenes	<5.1-31 (83%)[c]	19-32 (100 %)[e]	20-34 (100%)[e]	15-25 (100%)[e]
C_3-Naphthalenes	<5.1	<7.9-32 (100%)[e]	<5.1-18 (66%)[b]	<5.1-24 (50%)[b]
C_4-Naphthalenes	<5.1	<5.1-34 (33%)[e]	<5.1	<5.1
Acenaphthylene	<3.8	<3.8	<3.8	<3.8
Acenaphthene	<3.8	<3.8	<3.8	<3.8
Biphenyl	<2.3-5.9 (33%)[b]	<2.3	<2.3	<2.3
C_1-Fluorenes	<3.6-28 (66%)[e]	11-32 (100%)[e]	<3.6-23 (66%)[e]	10-16 (100%)[b]
C_2-Fluorenes	<3.6	<3.6	<3.6	<3.6
C_3-Fluorenes	<3.6	<3.6	<3.6	<3.6
Anthracene	<2.3	<2.3	<2.3	<2.3
Phenanthrene	<3.5-6 (33%)[b]	<3.5-8.3 (16%)[b]	<3.5	<3.5
1-Methylphenanthrene	<2.3-15 (33%)[e]	<2.3-6.3 (16%)[b]	<2.3	<2.3
C_1-Phenanthrenes	<6.3-15 (33%)[b]	<6.3-23 (66%)[b]	<6.3	<6.3-15 (16%)[b]
C_2-Phenanthrenes	<16	<16-58 (66%)[b]	<16-44 (50%)[b]	<16-38 (50%)[b]
C_3-Phenanthrenes	<16	<16	<16	<16
C_4-Phenanthrenes	<16	<16	<16	<16
Dibenzothiophene	<1.3	<1.3	<1.3	<1.3
C_1-Dibenzothiophenes	<1.3	<1.3	<1.3	<1.3
C_2-Dibenzothiophenes	<1.3-28 (66%)[f]	<1.3-28 (66%)[f]	<1.3-22 (66%)[f]	<1.3-19 (66%)[f]
C_3-Dibenzothiophenes	<1.3-23 (33%)[f]	<1.3-22 (66%)[f]	<1.3-27 (66%)[f]	<1.3-18 (66%)[f]
Fluoranthene	<2.6	<2.6	<2.6	<2.6
Pyrene	<3.3	<3.3	<3.3	<3.3
C_1-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
C_2-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
C_3-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
Benz(a)anthracene	<2.5-58 (33%)[e]	<2.5	<2.5	<2.5
Chrysene	<2.2	<2.2	<2.2	<2.2
C_1-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_2-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_3-Chrysenes	<2.2	<2.2	<2.2	<2.2

Table 3-8. (Continued).

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
C_4-Chrysenes	<2.2	<2.2	<2.2	<2.2
Benzo(b)fluoranthene	<2.2	<2.2	<2.2	<2.2
Benzo(k)fluoranthene	<3.6	<3.6	<3.6	<3.6
Benzo(e)pyrene	<2.3-5.1 (33%)[b]	<2.3-12 (66%)[b]	<2.3	<2.3-9.4 (33%)[b]
Perylene	<3.3	<3.3	<3.3	<3.3
Indeno(1,2,3-c,d)pyrene	<2.3	<2.3	<2.3	<2.3
Dibenz(a,h)anthracene	<2.0	<2.0	<2.0	<2.0
Benzo(g,h,i)perylene	<2.9	<2.9	<2.9	<2.9

[a] EPA-specified target chemical per NPDES Permit.
[b] None of the detects above practical quantitation level (PQL) (J qualified values).
[c] One-fifth of detects above PQL.
[d] One-quarter of detects above PQL.
[e] One-half of detects above PQL.
[f] All detects above PQL.

Table 3-9. Concentration range (ng/g dry weight) and percent above MDL (in parentheses) of individual PAHs in tissues of American thorny oyster collected during Cruise 2 from the two discharge (D)/reference (R) platform pairs.

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
Fluorene[a]	<3.6	<3.6	<3.6	<3.6
Benzo(a)pyrene[a]	5.6-8.9 (100%)[b]	<2.8-5.7 (33%)[b]	6.6-12 (100%)[b]	<2.8-5.4 (33%)[b]
Naphthalene	<8.6	<8.6	<8.6	<8.6
2-Methylnaphthalene	<2.3-3.7 (33%)[b]	<2.3-4.3 (16%)[b]	5.7-11 (100%)[b]	<2.3-4.7 (50%)[b]
1-Methylnaphthalene	<2.9	<2.9	<2.9-6.2 (33%)[b]	<2.9
2,6-Dimethylnaphthalene	<2.1-4.4 (33%)[b]	4.1-6.3 (100%)[b]	6-11 (100%)[b]	3.9-6.1 (100%)[b]
2,3,5-Trimethylnaphthalene	<2.1	<2.1	2.5-3.8 (100%)[b]	<2.1
C_1-Naphthalenes	<2.7	<2.7	5.2-11 (100%)[b]	<2.7-4.7 (16%)[b]
C_2-Naphthalenes	<5.1	<5.1	14-24 (100%)[b]	<5.1-8.8 (33%)[b]
C_3-Naphthalenes	<5.1	<5.1	22-40 (100%)[d]	<5.1
C_4-Naphthalenes	<5.1	<5.1	41-54 (100%)[d]	<5.1
Acenaphthylene	<3.8	<3.8	<3.8	<3.8
Acenaphthene	<3.8	<3.8	<3.8	<3.8
Biphenyl	<2.3	<2.3	<2.3-6.8 (50%)[b]	<2.3-19 (16%)[e]
C_1-Fluorenes	<3.6-5.6 (16%)[b]	<3.6	<3.6-23 (33%)[d]	<3.6
C_2-Fluorenes	<3.6	<3.6	<3.6	<3.6
C_3-Fluorenes	<3.6	<3.6	<3.6	<3.6
Anthracene	<2.3-4.8 (50%)[b]	<2.3	<2.3-3.6 (16%)[b]	<2.3
Phenanthrene	<3.5	<3.5	<3.5-9.2 (16%)[b]	<3.5
1-Methylphenanthrene	<2.3-3.5 (33%)[b]	<2.3	3.6-4.4 (100%)[b]	<2.3-11 (16%)[b]
C_1-Phenanthrenes	<6.3	<6.3-12 (50%)[b]	3.6-16 (100%)[b]	<6.3
C_2-Phenanthrenes	<16	<16	39-50 (100%)[b]	<16
C_3-Phenanthrenes	<16	<16	51-60 (100%)[b]	<16
C_4-Phenanthrenes	<16	<16	46-55 (100%)[b]	<16
Dibenzothiophene	<1.3	<1.3	<1.3-1.8 (33%)[b]	<1.3
C_1-Dibenzothiophenes	<1.3	<1.3	8.8-16 (100%)[e]	<1.3
C_2-Dibenzothiophenes	5.6-11 (100%)[d]	<1.3	47-60 (100%)[e]	<1.3-7.5 (50%)[b]
C_3-Dibenzothiophenes	5.6-13 (100%)[d]	<1.3-5.7 (33%)[b]	91-100 (100%)[e]	<1.3-14 (66%)[d]
Fluoranthene	<2.6	<2.6	<2.6	<2.6
Pyrene	<3.3	<3.3	<3.3	<3.3
C_1-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
C_2-Fluoranthenes/Pyrenes	<3.3	<3.3	12-16 (100%)[b]	<3.3
C_3-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
Benz(a)anthracene	<2.5	<2.5	<2.5	<2.5
Chrysene	<2.2-3.9 (33%)[b]	<2.2	<2.2	<2.2
C_1-Chrysenes	<2.2-8.9 (66%)[b]	<2.2	8.5-12 (100%)[c]	<2.2
C_2-Chrysenes	<2.2-11 (33%)[b]	<2.2	17-27 (100%)[e]	<2.2
C_3-Chrysenes	<2.2	<2.2	<2.2	<2.2

Table 3-9. (Continued).

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
C_4-Chrysenes	<2.2	<2.2	<2.2	<2.2
Benzo(b)fluoranthene	<2.2	<2.2	<2.2	<2.2
Benzo(k)fluoranthene	<3.6	<3.6	<3.6	<3.6
Benzo(e)pyrene	4.1-5.8 (100%)[b]	<2.3-4.1 (33%)[b]	6-11 (100%)[b]	<2.3-4 (33%)[b]
Perylene	<3.3	<3.3-4.8 (16%)[b]	26-35 (100%)[e]	<3.3
Indeno(1,2,3-c,d)pyrene	<2.3	<2.3	<2.3	<2.3
Dibenz(a,h)anthracene	<2.0	<2.0	<2.0	<2.0
Benzo(g,h,i)perylene	<2.9	<2.9	<2.9-5.7 (50%)[b]	<2.9

[a] EPA-specified target chemical per NPDES Permit.
[b] None of the detects above practical quantitation level (PQL) (J qualified values).
[c] One-third of the detects above PQL.
[d] One-half of the detects above PQL.
[e] All of the detects above PQL.

Table 3-10. Concentration range (ng/g dry weight) and percent above MDL (in parentheses) of individual PAHs in tissues of American thorny oyster collected during Cruise 3 from the two discharge (D)/reference (R) platform pairs.

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
Fluorene[a]	<3.6	<3.6	<3.6	<3.6
Benzo(a)pyrene[a]	<2.8-8.2 (83%)[b]	<2.8	<2.8	<2.8
Naphthalene	<8.6	<8.6	<8.6	<8.6
2-Methylnaphthalene	<2.3-7.8 (66%)[b]	<2.3-9.3 (83%)[b]	<2.3-4.3 (33%)[b]	4.9-6.2 (100%)[b]
1-Methylnaphthalene	6.1-9.7 (100%)[b]	<2.9-6 (16%)[b]	<2.9	<2.9
2,6-Dimethylnaphthalene	<2.1-7.2 (66%)[b]	<2.1-22 (66%)[d]	<2.1-3.4 (16%)[b]	3.8-5.5 (100%)[b]
2,3,5-Trimethylnaphthalene	<2.1-7.7 (16%)[b]	<2.1-29 (66%)[d]	<2.1	<2.1
C_1-Naphthalenes	<2.7-9.2 (83%)[b]	<2.7-10 (83%)[b]	<2.7-5.2 (66%)[b]	5.1-8.1 (100%)[b]
C_2-Naphthalenes	9.2-28 (100%)[b]	9.4-57 (100%)[d]	<5.1-12 (83%)[b]	8.3-15 (100%)[b]
C_3-Naphthalenes	9.2-32 (100%)[d]	12-140 (100%)[d]	<5.1-15 (66%)[b]	<5.1-9 (33%)[b]
C_4-Naphthalenes	<5.1	18-170 (100%)[d]	<5.1-38 (66%)[d]	<5.1
Acenaphthylene	<3.8	<3.8	<3.8	<3.8
Acenaphthene	<3.8	<3.8	<3.8	<3.8
Biphenyl	<2.3	<2.3	<2.3	<2.3
C_1-Fluorenes	<3.6-24 (33%)[d]	11-41 (100%)[d]	13-23 (100%)[c]	12-22 (100%)[c]
C_2-Fluorenes	<3.6	<3.6	<3.6	<3.6
C_3-Fluorenes	<3.6	<3.6	<3.6	<3.6
Anthracene	7.4-10 (100%)[b]	<2.3-9.4 (83%)[b]	3.9-9.5 (100%)[b]	<2.3-6.4 (66%)[b]
Phenanthrene	<3.5	<3.5-14 (66%)[b]	<3.5	<3.5
1-Methylphenanthrene	<2.3	<2.3-14 (66%)[b]	<2.3	<2.3
C_1-Phenanthrenes	<6.3-19 (33%)[b]	<6.3-80 (66%)[d]	<6.3	<6.3
C_2-Phenanthrenes	<16-44 (83%)[b]	34-120 (100%)[d]	27-57 (100%)[b]	26-40 (100%)[b]
C_3-Phenanthrenes	<16	<16	<16-180 (66%)[d]	<16
C_4-Phenanthrenes	<16	<16	<16-60 (66%)[b]	<16
Dibenzothiophene	<1.3	<1.3-6 (66%)[b]	<1.3	<1.3
C_1-Dibenzothiophenes	<1.3	<1.3-36 (66%)[d]	<1.3	<1.3
C_2-Dibenzothiophenes	<1.3-33 (66%)[d]	12-70 (100%)[e]	25-40 (100%)[e]	15-22 (100%)[e]
C_3-Dibenzothiophenes	<1.3-26 (66%)[d]	7.5-47 (100%)[e]	41-65 (100%)[e]	21-25 (100%)[e]
Fluoranthene	<2.6	<2.6	<2.6	<2.6-4.6 (16%)[b]
Pyrene	<3.3	<1.7	<3.3	<3.3-11 (16%)[b]
C_1-Fluoranthenes/Pyrenes	<3.3	<3.3-17 (33%)[b]	<3.3	<3.3
C_2-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3-6.4 (33%)[b]
$_{C3}$-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
Benz(a)anthracene	<2.5	<2.5	<2.5	<2.5-4.1 (16%)[b]
Chrysene	<2.2	<2.2	<2.2	<2.2
C_1-Chrysenes	<2.2	<2.2	<2.2-6 (66%)[b]	<2.2-5.5 (33%)[b]
C_2-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_3-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_4-Chrysenes	<2.2	<2.2	<2.2	<2.2

Table 3-10. (Continued).

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
Benzo(b)fluoranthene	<2.2	<2.2	<2.2	<2.2
Benzo(k)fluoranthene	<3.6	<3.6	<3.6	<3.6
Benzo(e)pyrene	<2.3	<2.3	<2.3-3.3 (16%)[b]	<2.3
Perylene	<3.3	<3.3	5.6-7.7 (100%)[b]	<3.3
Indeno(1,2,3-c,d)pyrene	<2.3	<2.3	<2.3	<2.3
Dibenz(a,h)anthracene	<2.0	<2.0	<2.0	<2.0
Benzo(g,h,i)perylene	<2.9	<2.9	<2.9	<2.9

[a] EPA-specified target chemical per NPDES Permit.
[b] None of the detects above practical quantitation level (PQL) (J qualified values).
[c] One-third of the detects above PQL.
[d] One-half of the detects above PQL.
[e] All of the detects above PQL.

Table 3-11. Concentration range (ng/g dry weight) and percent above MDL (in parentheses) of individual PAHs in tissues of yellow chub collected during Cruise 2 from the two discharge (D)/reference (R) platform pairs.

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
Fluorene[a]	<3.6	<3.6	<3.6	<3.6
Benzo(a)pyrene[a]	<2.8	<2.8	<2.8	<2.8
Naphthalene	<8.6	<8.6	<8.6	<8.6
2-Methylnaphthalene	2.8-4.5 (100%)[b]	2.6-3.6 (100%)[b]	<2.3-3.6 (83%)[b]	4.6-6.3 (100%)[b]
1-Methylnaphthalene	<2.9	<2.9-4.1 (16%)[b]	<2.9	<2.9-3.1 (33%)[b]
2,6-Dimethylnaphthalene	<2.1	<2.1-2.7 (16%)[b]	<2.1	<2.1
2,3,5-Trimethylnaphthalene	<2.1	<2.1-2.8 (16%)[b]	<2.1	<2.1
C_1-Naphthalenes	3-4.4 (100%)[b]	<2.7-5.3 (66%)[b]	<2.7-3.7 (50%)[b]	3.8-6.1 (100%)[b]
C_2-Naphthalenes	<5.1	<5.1-17 (16%)[b]	<5.1-6.6 (16%)[b]	5-11 (100%)[b]
C_3-Naphthalenes	<5.1	<5.1-32 (16%)[b]	<5.1	<5.1
C_4-Naphthalenes	<5.1	<5.1-30 (16%)[b]	<5.1	<5.1
Acenaphthylene	<3.8	<3.8	<3.8	<3.8
Acenaphthene	<3.8	<3.8	<3.8	<3.8
Biphenyl	<2.3	<2.3	<2.3	<2.3-2.8 (66%)
C_1-Fluorenes	<3.6-9 (50%)[b]	<3.6-21 (66%)[c]	13-24 (100%)[c]	<3.6-12 (66%)[b]
C_2-Fluorenes	<3.6	<3.6	<3.6	<3.6
C_3-Fluorenes	<3.6	<3.6	<3.6	<3.6
Anthracene	<2.3	<2.3	<2.3	<2.3
Phenanthrene	<3.5	<3.5-4 (16%)[b]	<3.5-4.2 (66%)[b]	<3.5
1-Methylphenanthrene	<2.3	<2.3-3.9 (16%)[b]	<2.3	<2.3
C_1-Phenanthrenes	<6.3	<6.3-7.8 (66%)[b]	<6.3	<6.3
C_2-Phenanthrenes	<16	<16	<16	<16
C_3-Phenanthrenes	<16	<16	<16	<16
C_4-Phenanthrenes	<16	<16	<16	<16
Dibenzothiophene	<1.3	<1.3	<1.3	<1.3
C_1-Dibenzothiophenes	<1.3	<1.3	<1.3	<1.3
C_2-Dibenzothiophenes	<1.3	<1.3	<1.3	<1.3
C_3-Dibenzothiophenes	<1.3	<1.3	<1.3	<1.3
Fluoranthene	<2.6	<2.6	<2.6	<2.6
Pyrene	<3.3	<3.3	<3.3	<3.3
C_1-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
C_2-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
C_3-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
Benz(a)anthracene	<2.5	<2.5	<2.5	<2.5
Chrysene	<2.2	<2.2	<2.2	<2.2
C_1-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_2-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_3-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_4-Chrysenes	<2.2	<2.2	<2.2	<2.2

Table 3-11. (Continued).

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
Benzo(b)fluoranthene	<2.2	<2.2	<2.2	<2.2
Benzo(k)fluoranthene	<3.6	<3.6	<3.6	<3.6
Benzo(e)pyrene	<2.3	<2.3	<2.3	<2.3
Perylene	<3.3	<3.3	<3.3	<3.3
Indeno(1,2,3-c,d)pyrene	<2.3	<2.3	<2.3	<2.3
Dibenz(a,h)anthracene	<2.0	<2.0	<2.0	<2.0
Benzo(g,h,i)perylene	<2.9	<2.9	<2.9	<2.9

[a] EPA-specified target chemical per NPDES Permit.
[b] None of the detects above practical quantitation level (PQL) (J qualified values).
[c] One-half of the detects above PQL.

Table 3-12. Concentration range (ng/g dry weight) and percent above MDS (in parentheses) of individual PAHs in tissues of yellow chub collected during Cruise 3 from the two discharge (D)/reference (R) platform pairs.

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
Fluorene[a]	<3.6	<3.6	<3.6	<3.6
Benzo(a)pyrene[a]	<2.8	<2.8	<2.8	<2.8
Naphthalene	<8.6	<8.6	<8.6	<8.6
2-Methylnaphthalene	3.3-4.7 (100%)[b]	2.8-4 (100%)[b]	3.1-5.4 (100%)[b]	7.5-16 (100%)[c]
1-Methylnaphthalene	<2.9	<2.9	<2.9-3.2 (33%)[b]	3.4-7.6 (100%)[b]
2,6-Dimethylnaphthalene	<2.1	<2.1	<2.1	<2.1
2,3,5-Trimethylnaphthalene	<2.1	<2.1	<2.1	<2.1
C_1-Naphthalenes	4.2-5.2 (100%)[b]	3.1-4.5 (100%)[b]	3.2-6.6 (100%)[b]	6.4-16 (100%)[b]
C_2-Naphthalenes	5.1-5.6 (16%)[b]	<5.1-7.2 (33%)[b]	<5.1	8-16 (100%)[b]
C_3-Naphthalenes	<5.1	<5.1	<5.1	<5.1
C_4-Naphthalenes	<5.1	<5.1	<5.1	<5.1
Acenaphthylene	<3.8	<3.8	<3.8	<3.8
Acenaphthene	<3.8	<3.8	<3.8	<3.8
Biphenyl	<2.3	<2.3	<2.3	<2.3-2.4 (16%)[b]
C_1-Fluorenes	<3.6	<3.6	<3.6	<3.6
C_2-Fluorenes	<3.6	<3.6	<3.6	<3.6
C_3-Fluorenes	<3.6	<3.6	<3.6	<3.6
Anthracene	<2.3	<2.3	<2.3	<2.3
Phenanthrene	<3.5	<3.5	<3.5	<3.5
1-Methylphenanthrene	<2.3	<2.3	<2.3	<2.3
C_1-Phenanthrenes	<6.3	<6.3	<6.3	<6.3
C_2-Phenanthrenes	<16	<16	<16	<16
C_3-Phenanthrenes	<16	<16	<16	<16
C_4-Phenanthrenes	<16	<16	<16	<16
Dibenzothiophene	<1.3	<1.3	<1.3	<1.3
C_1-Dibenzothiophenes	<1.3	<1.3	<1.3	<1.3
C_2-Dibenzothiophenes	<1.3	<1.3	<1.3	<1.3
C_3-Dibenzothiophenes	<1.3	<1.3	<1.3	<1.3
Fluoranthene	<2.6	<2.6	<2.6	<2.6
Pyrene	<3.3	<3.3	<3.3	<3.3
C_1-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
C_2-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
C_3-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
Benz(a)anthracene	<2.5	<2.5	<2.5	<2.5
Chrysene	<2.2	<2.2	<2.2	<2.2
C_1-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_2-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_3-Chrysenes	<2.2	<2.2	<2.2	<2.2

Table 3-12. (Continued).

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
C_4-Chrysenes	<2.2	<2.2	<2.2	<2.2
Benzo(b)fluoranthene	<2.2	<2.2	<2.2	<2.2
Benzo(k)fluoranthene	<3.6	<3.6	<3.6	<3.6
Benzo(e)pyrene	<2.3	<2.3	<2.3	<2.3
Perylene	<3.3	<3.3	<3.3	<3.3
Indeno(1,2,3-c,d)pyrene	<2.3	<2.3	<2.3	<2.3
Dibenz(a,h)anthracene	<2.0	<2.0	<2.0	<2.0
Benzo(g,h,i)perylene	<2.9	<2.9	<2.9	<2.9

[a] EPA-specified target chemical per NPDES Permit.
[b] None of the detects above practical quantitation level (PQL) (J qualified values).
[c] One-third of the detects above PQL.

Table 3-13. Concentration range (ng/g dry weight) and percent above MDL (in parentheses) of individual PAHS in tissues of creole-fish collected during Cruise 2 from the two discharge (D)/reference(R) platform pairs.

Compound	EB165A(D)	HI356A(R)	GC19A(D)	EI361A(R)
Fluorene[a]	<3.6	<3.6	<3.6	<3.6
Benzo(a)pyrene[a]	<2.8	<2.8	<2.8	<2.8
Naphthalene	<8.6	<8.6	<8.6	<8.6
2-Methylnaphthalene	<2.3	<2.3-2.6 (16%)[b]	3-4.1 (100%)[b]	<2.3-4.8 (66%)[b]
1-Methylnaphthalene	<2.9	<2.9	<2.9	<2.9
2,6-Dimethylnaphthalene	<2.1	<2.1	<2.1	<2.1
2,3,5-Trimethylnaphthalene	<2.1	<2.1	<2.1	<2.1
C_1-Naphthalenes	<2.7-3.4 (16%)[b]	<2.7	3.5-4.1 (100%)[b]	<2.7-3.7 (16%)[b]
C_2-Naphthalenes	<5.1	<5.1	<5.1	<5.1
C_3-Naphthalenes	<5.1	<5.1	<5.1	<5.1
C_4-Naphthalenes	<5.1	<5.1	<5.1	<5.1
Acenaphthylene	<3.8	<3.8	<3.8	<3.8
Acenaphthene	<3.8	<3.8	<3.8	<3.8
Biphenyl	<2.3	<2.3	<2.3	<2.3
C_1-Fluorenes	<3.6	<3.6-9.8 (66%)[b]	<3.6-5.1 (50%)[b]	<3.6-5.1 (16%)[b]
C_2-Fluorenes	<3.6	<3.6	<3.6	<3.6
C_3-Fluorenes	<3.6	<3.6	<3.6	<3.6
Anthracene	<2.3	<2.3	<2.3	<2.3
Phenanthrene	<3.5	<3.5	<3.5	<3.5
1-Methylphenanthrene	<2.3	<2.3	<2.3	<2.3
C_1-Phenanthrenes	<6.3	<6.3	<6.3	<6.3
C_2-Phenanthrenes	<16	<16	<16	<16
C_3-Phenanthrenes	<16	<16	<16	<16
C_4-Phenanthrenes	<16	<16	<16	<16
Dibenzothiophene	<1.3	<1.3	<1.3	<1.3
C_1-Dibenzothiophenes	<1.3-1.6 (16%)[b]	<1.3	<1.3	<1.3
C_2-Dibenzothiophenes	<1.3	<1.3	<1.3	<1.3
C_3-Dibenzothiophenes	<1.3	<1.3	<1.3	<1.3
Fluoranthene	<2.6	<2.6	<2.6	<2.6
Pyrene	<3.3	<3.3	<3.3	<3.3
C_1-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
C_2-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
C_3-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
Benz(a)anthracene	<2.5	<2.5	<2.5	<2.5
Chrysene	<2.2	<2.2	<2.2	<2.2
C_1-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_2-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_3-Chrysenes	<2.2	<2.2	<2.2	<2.2

Table 3-13. (Continued).

Compound	EB165A(D)	HI356A(R)	GC19A(D)	EI361A(R)
C_4-Chrysenes	<2.2	<2.2	<2.2	<2.2
Benzo(b)fluoranthene	<2.2	<2.2	<2.2	<2.2
Benzo(k)fluoranthene	<3.6	<3.6	<3.6	<3.6
Benzo(e)pyrene	<2.3	<2.3	<2.3	<2.3
Perylene	<3.3	<3.3	<3.3	<3.3
Indeno(1,2,3-c,d)pyrene	<2.3	<2.3	<2.3	<2.3
Dibenz(a,h)anthracene	<2.0	<2.0	<2.0	<2.0
Benzo(g,h,i)perylene	<2.9	<2.9	<2.9	<2.9

[a] EPA-specified target chemical per NPDES Permit.
[b] None of the detects above practical quantitation level (J qualified values).

Table 3-14. Concentration range (ng/g dry weight) and percent above MDL (in parentheses) of individual PAHs in tissues of creole-fish collected during Cruise 3 from the two discharge (D)/reference (R) platform pairs.

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
Fluorene[a]	<3.6	<3.6	<3.6	<3.6
Benzo(a)pyrene[a]	<2.8	<2.8	<2.8	<2.8
Naphthalene	<8.6	<8.6	<8.6	<8.6
2-Methylnaphthalene	<2.3-3.9 (66%)[b]	<2.3-4 (83%)[b]	<2.3-4.3 (83%)[b]	3.3-4.5 (100%)[b]
1-Methylnaphthalene	<2.9	<2.9	<2.9	<2.9
2,6-Dimethylnaphthalene	<2.1	<2.1	<2.1	<2.1
2,3,5-Trimethylnaphthalene	<2.1	<2.1	<2.1	<2.1
C_1-Naphthalenes	3.3-4.7 (100%)[b]	3.6-4.2 (100%)[b]	<2.7-5.1 (66%)[b]	3.8-5.9 (100%)[b]
C_2-Naphthalenes	<5.1	<5.1-8.3 (16%)[b]	<5.1	<5.1
C_3-Naphthalenes	<5.1	<5.1	<5.1	<5.1
C_4-Naphthalenes	<5.1	<5.1	<5.1	<5.1
Acenaphthylene	<3.8	<3.8	<3.8	<3.8
Acenaphthene	<3.8	<3.8	<3.8	<3.8
Biphenyl	<2.3	<2.3	<2.3	<2.3
C_1-Fluorenes	<3.6	<3.6-10 (66%)[b]	<3.6	<3.6-13 (33%)[b]
C_2-Fluorenes	<3.6	<3.6	<3.6	<3.6
C_3-Fluorenes	<3.6	<3.6	<3.6	<3.6
Anthracene	<2.3	<2.3	<2.3	<2.3
Phenanthrene	<3.5	<3.5	<3.5	<3.5
1-Methylphenanthrene	<2.3	<2.3-14 (33%)[b]	<2.3	<2.3
C_1-Phenanthrenes	<6.3	<6.3-14 (33%)[b]	<6.3	<6.3
C_2-Phenanthrenes	<16	<16	<16	<16
C_3-Phenanthrenes	<16	<16	<16	<16
C_4-Phenanthrenes	<16	<16	<16	<16
Dibenzothiophene	<1.3	<1.3	<1.3	<1.3
C_1-Dibenzothiophenes	<1.3	<1.3	<1.3	<1.3
C_2-Dibenzothiophenes	<1.3	<1.3	<1.3	<1.3
C_3-Dibenzothiophenes	<1.3	<1.3	<1.3	<1.3
Fluoranthene	<2.6	<2.6	<2.6	<2.6
Pyrene	<3.3	<3.3	<3.3	<3.3
C_1-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
C_2-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
C_3-Fluoranthenes/Pyrenes	<3.3	<3.3	<3.3	<3.3
Benz(a)anthracene	<2.5	<2.5	<2.5	<2.5
Chrysene	<2.2	<2.2	<2.2	<2.2
C_1-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_2-Chrysenes	<2.2	<2.2	<2.2	<2.2
C_3-Chrysenes	<2.2	<2.2	<2.2	<2.2

Table 3-14. (Continued).

Compound	EB165A (D)	HI356A (R)	GC19A (D)	EI361A (R)
C_4-Chrysenes	<2.2	<2.2	<2.2	<2.2
Benzo(b)fluoranthene	<2.2	<2.2	<2.2	<2.2
Benzo(k)fluoranthene	<3.6	<3.6	<3.6	<3.6
Benzo(e)pyrene	<2.3	<2.3	<2.3	<2.3
Perylene	<3.3	<3.3	<3.3	<3.3
Indeno(1,2,3-c,d)pyrene	<2.3	<2.3	<2.3	<2.3
Dibenz(a,h)anthracene	<2.0	<2.0	<2.0	<2.0
Benzo(g,h,i)perylene	<2.9	<2.9	<2.9	<2.9

[a] EPA-specified target chemical per NPDES Permit.
[b] None of the detects above practical quantitation level (J qualified values).

Table 3-15. Concentration range (ng/g dry weight) and percent above MDL (in parentheses) of individual PAHs in tissues of rockhind collected during Cruise 2 from the EB165 (D)/HI356 (R) platform pair.

Compound	EB165A (D)	HI356A (R)
Fluorene[a]	<3.6	<3.6
Benzo(a)pyrene[a]	<2.8	<2.8
Naphthalene	<8.6	<8.6
2-Methylnaphthalene	<2.3-5 (66%)[b]	<2.3-5.3 (33%)[b]
1-Methylnaphthalene	<2.9	<2.9
2,6-Dimethylnaphthalene	<2.1	<2.1
2,3,5-Trimethylnaphthalene	<2.1	<2.1
C_1-Naphthalenes	<3-5 (66%)[b]	<2.7-6.1 (33%)[b]
C_2-Naphthalenes\	<5.1	<5.1
C_3-Naphthalenes	<5.1	<5.1
C_4-Naphthalenes	<5.1	<5.1
Acenaphthylene	<3.8	<3.8
Acenaphthene	<3.8	<3.8
Biphenyl	<2.3-2.9 (33%)[b]	<2.3-2.7 (16%)[b]
C_1-Fluorenes	<3.6-9 (50%)[b]	<3.6-11 (33%)[b]
C_2-Fluorenes	<3.6	<3.6
C_3-Fluorenes	<3.6	<3.6
Anthracene	<2.3	<2.3
Phenanthrene	<3.5	<3.5
1-Methylphenanthrene	<2.3	<2.3
C_1-Phenanthrenes	<6.3	<6.3
C_2-Phenanthrenes	<16	<16
C_3-Phenanthrenes	<16	<16
C_4-Phenanthrenes	<16	<16
Dibenzothiophene	<1.3	<1.3
C_1-Dibenzothiophenes	<1.3	<1.3
C_2-Dibenzothiophenes	<1.3	<1.3
C_3-Dibenzothiophenes	<1.3	<1.3
Fluoranthene	<2.6	<2.6
Pyrene	<3.3	<3.3
C_1-Fluoranthenes/Pyrenes	<3.3	<3.3
C_2-Fluoranthenes/Pyrenes	<3.3	<3.3
C_3-Fluoranthenes/Pyrenes	<3.3	<3.3
Benz(a)anthracene	<2.5	<2.5
Chrysene	<2.2	<2.2
C_1-Chrysenes	<2.2	<2.2
C_2-Chrysenes	<2.2	<2.2
C_3-Chrysenes	<2.2	<2.2

Table 3-15. (Continued).

Compound	EB165A (D)	HI356A (R)
C_4-Chrysenes	<2.2	<2.2
Benzo(b)fluoranthene	<2.2	<2.2
Benzo(k)fluoranthene	<3.6	<3.6
Benzo(e)pyrene	<2.3	<2.3
Perylene	<3.3	<3.3
Indeno(1,2,3-c,d)pyrene	<2.3	<2.3
Dibenz(a,h)anthracene	<2.0	<2.0
Benzo(g,h,i)perylene	<2.9	<2.9

[a] EPA-specified target chemical per NPDES Permit.
[b] None of the detects above practical quantitation level (J qualified values).

Table 3-16. Concentration range (ng/g dry weight) and percent above MDL (in parentheses) of individual PAHs in tissues of sergeant major collected during Cruise 3 from the EB165 (D)/HI356 (R) platform pair.

Compound	EB165A (D)	HI356A (R)
Fluorene[a]	<3.6	<3.6
Benzo(a)pyrene[a]	<2.8	<2.8
Naphthalene	<8.6	<8.6
2-Methylnaphthalene	3.6-6.6 (100%)[b]	3.2-4.2 (100%)[b]
1-Methylnaphthalene	<2.9-3.8 (50%)[b]	<2.9
2,6-Dimethylnaphthalene	<2.1	<2.1
2,3,5-Trimethylnaphthalene	<2.1	<2.1
C_1-Naphthalenes	4.2-6.6 (100%)[b]	3.4-5.2 (100%)[b]
C_2-Naphthalenes	<5.1	<5.1
C_3-Naphthalenes	<5.1	<5.1
C_4-Naphthalenes	<5.1	<5.1
Acenaphthylene	<3.8	<3.8
Acenaphthene	<3.8	<3.8
Biphenyl	<2.3	<2.3
C_1-Fluorenes	<3.6	<3.6
C_2-Fluorenes	<3.6	<3.6
C_3-Fluorenes	<3.6	<3.6
Anthracene	<2.3	<2.3
Phenanthrene	<3.5	<3.5
1-Methylphenanthrene	<2.3	<2.3
C_1-Phenanthrenes	<6.3	<6.3
C_2-Phenanthrenes	<16	<16
C_3-Phenanthrenes	<16	<16
C_4-Phenanthrenes	<16	<16
Dibenzothiophene	<1.3	<1.3
C_1-Dibenzothiophenes	<1.3	<1.3
C_2-Dibenzothiophenes	<1.3	<1.3
C_3-Dibenzothiophenes	<1.3	<1.3
Fluoranthene	<2.6	<2.6
Pyrene	<3.3	<3.3
C_1-Fluoranthenes/Pyrenes	<3.3	<3.3
C_2-Fluoranthenes/Pyrenes	<3.3	<3.3
C_3-Fluoranthenes/Pyrenes	<3.3	<3.3
Benz(a)anthracene	<2.5	<2.5
Chrysene	<2.2	<2.2
C_1-Chrysenes	<2.2	<2.2
C_2-Chrysenes	<2.2	<2.2
C_3-Chrysenes	<2.2	<2.2

Table 3-16. (Continued).

Compound	EB165A (D)	HI356A (R)
C_4-Chrysenes	<2.2	<2.2
Benzo(b)fluoranthene	<2.2	<2.2
Benzo(k)fluoranthene	<3.6	<3.6
Benzo(e)pyrene	<2.3	<2.3
Perylene	<3.3	<3.3
Indeno(1,2,3-c,d)pyrene	<2.3	<2.3
Dibenz(a,h)anthracene	<2.0	<2.0
Benzo(g,h,i)perylene	<2.9	<2.9

[a] EPA-specified target chemical per NPDES Permit.
[b] None of the detects above practical quantitation level (J qualified values).

Table 3-17. Concentration range (ng/g dry weight) and percent above MDL (in parentheses) of individual PAHs in tissues of gray triggerfish collected during Cruise 2 from the GC19A (D)/EI361A (R) platform pair.

Compound	GC19A (D)	EI361A (R)
Fluorene[a]	<3.6	<3.6
Benzo(a)pyrene[a]	<2.8	<2.8
Naphthalene	<8.6	<8.6
2-Methylnaphthalene	<2.3	<2.3-2.9 (16%)[b]
1-Methylnaphthalene	<2.9	<2.9
2,6-Dimethylnaphthalene	<2.1	<2.1
2,3,5-Trimethylnaphthalene	<2.1	<2.1
C_1-Naphthalenes	<2.7	<2.7
C_2-Naphthalenes	<5.1	<5.1
C_3-Naphthalenes	<5.1	<5.1
C_4-Naphthalenes	<5.1	<5.1
Acenaphthylene	<3.8	<3.8
Acenaphthene	<3.8	<3.8
Biphenyl	<2.3	<2.3
C_1-Fluorenes	<3.6	<3.6-8.1 (33%)[b]
C_2-Fluorenes	<3.6	<3.6
C_3-Fluorenes	<3.6	<3.6
Anthracene	<2.3	<2.3
Phenanthrene	<3.5	<3.5
1-Methylphenanthrene	<2.3	<2.3-3.7 (16%)[b]
C_1-Phenanthrenes	<6.3	<6.3
C_2-Phenanthrenes	<16	<16
C_3-Phenanthrenes	<16	<16
C_4-Phenanthrenes	<16	<16
Dibenzothiophene	<1.3	<1.3
C_1-Dibenzothiophenes	<1.3	<1.3
C_2-Dibenzothiophenes	<1.3	<1.3
C_3-Dibenzothiophenes	<1.3	<1.3
Fluoranthene	<2.6	<2.6
Pyrene	<3.3	<3.3
C_1-Fluoranthenes/Pyrenes	<3.3	<3.3
C_2-Fluoranthenes/Pyrenes	<3.3	<3.3
C_3-Fluoranthenes/Pyrenes	<3.3	<3.3
Benz(a)anthracene	<2.5	<2.5
Chrysene	<2.2	<2.2
C_1-Chrysenes	<2.2	<2.2
C_2-Chrysenes	<2.2	<2.2
C_3-Chrysenes	<2.2	<2.2

Table 3-17. (Continued).

Compound	GC19A (D)	EI361A (R)
C_4-Chrysenes	<2.2	<2.2
Benzo(b)fluoranthene	<2.2	<2.2
Benzo(k)fluoranthene	<3.6	<3.6
Benzo(e)pyrene	<2.3	<2.3
Perylene	<3.3	<3.3
Indeno(1,2,3-c,d)pyrene	<2.3	<2.3
Dibenz(a,h)anthracene	<2.0	<2.0
Benzo(g,h,i)perylene	<2.9	<2.9

[a] EPA-specified target chemical per NPDES Permit.
[b] None of the detects above practical quantitation level (J qualified values).

Table 3-18. Concentration range (ng/g dry weight) and percent above MDL (in parentheses) of individual PAHs in tissues of gray triggerfish collected during Cruise 3 from the GC19A (D)/EI361A (R) platform pair.

Compound	GC19A (D)	EI361A (R)
Fluorene[a]	<3.6	<3.6
Benzo(a)pyrene[a]	<2.8	<2.8
Naphthalene	<8.6	<8.6
2-Methylnaphthalene	<2.3-3.6 (66%)[b]	<2.3-3.6 (50%)[b]
1-Methylnaphthalene	<2.9	<2.9
2,6-Dimethylnaphthalene	<2.1	<2.1
2,3,5-Trimethylnaphthalene	<2.1	<2.1
C_1-Naphthalenes	<2.7-4.4 (50%)[b]	<2.7-4 (66%)[b]
C_2-Naphthalenes	<5.1	<5.1
C_3-Naphthalenes	<5.1	<5.1
C_4-Naphthalenes	<5.1	<5.1
Acenaphthylene	<3.8	<3.8
Acenaphthene	<3.8	<3.8
Biphenyl	<2.3	<2.3
C_1-Fluorenes	<3.6-4.8 (16%)[b]	<3.6-11 (66%)[b]
C_2-Fluorenes	<3.6	<3.6
C_3-Fluorenes	<3.6	<3.6
Anthracene	<2.3	<2.3
Phenanthrene	<3.5-4.8 (16%)[b]	<3.5
1-Methylphenanthrene	<2.3	<2.3
C_1-Phenanthrenes	<6.3	<6.3
C_2-Phenanthrenes	<16	<16
C_3-Phenanthrenes	<16	<16
C_4-Phenanthrenes	<16	<16
Dibenzothiophene	<1.3	<1.3
C_1-Dibenzothiophenes	<1.3	<1.3
C_2-Dibenzothiophenes	<1.3	<1.3
C_3-Dibenzothiophenes	<1.3	<1.3
Fluoranthene	<2.6-4.2 (16%)[b]	<2.6
Pyrene	<3.3-9 (16%)[b]	<3.3
C_1-Fluoranthenes/Pyrenes	<3.3	<3.3
C_2-Fluoranthenes/Pyrenes	<3.3	<3.3
C_3-Fluoranthenes/Pyrenes	<3.3	<3.3
Benz(a)anthracene	<2.5	<2.5
Chrysene	<2.2	<2.2
C_1-Chrysenes	<2.2	<2.2
C_2-Chrysenes	<2.2	<2.2
C_3-Chrysenes	<2.2	<2.2

Table 3-18. (Continued).

Compound	GC19A (D)	EI361A (R)
C_4-Chrysenes	<2.2	<2.2
Benzo(b)fluoranthene	<2.2	<2.2
Benzo(k)fluoranthene	<3.6	<3.6
Benzo(e)pyrene	<2.3	<2.3
Perylene	<3.3	<3.3
Indeno(1,2,3-c,d)pyrene	<2.3	<2.3
Dibenz(a,h)anthracene	<2.0	<2.0
Benzo(g,h,i)perylene	<2.9	<2.9

[a] EPA-specified target chemical per NPDES Permit.
[b] None of the detects above practical quantitation level (J qualified values).

Table 3-19. Mean concentrations (± 1 standard deviation) of arsenic, barium, cadmium, mercury, and salinity in produced water.

Platform	Cruise	Arsenic (µg/L)	Barium (µg/L)	Cadmium (µg/L)	Mercury (µg/L)	Salinity (g/kg)
EB165A (D)	2	5.7 ± 0.20	240m ± 6.0	0.32 ± 0.04	<0.010	130
EB165A (D)	3	4.8 ± 0.20	250 ± 8.0	<0.3	<0.010	130
GC19A (D)	2	27 ± 1.3	150 ± 2.0	0.48 ± 0.08	<0.010	120
GC19A (D) (primary discharge)	3	22 ± 0.60	130 ± 1.0	0.8	<0.010	110
GC19A (D) (secondary discharge)	3	4.6 ± 0.30	89 ± 3.8	14 ± 1.6	<0.010	220

Table 3-20. Mean concentrations (± 1 standard deviation) of arsenic and barium in ambient seawater.

Platform	Cruise	Arsenic (µg/L)	Barium (µg/L)
EB165A (D)	2	1.1 ± 0.020	12 ± 0.30
HI356A (R)	2	0.89 ± 0.030	15 ± 0.30
EB165A (D)	3	1.5 ± 0.14	8.7 ± 0.50
HI356A (R)	3	1.6 ± 0.050	8.9 ± 0.20
GC19A (D)	2	1.4 ± 0.020	6.7 ± 0.20
EI361A (R)	2	1.4 ± 0.050	8.5 ± 0.10
GC19A (D)	3	1.4 ± 0.060	7.8 ± 0.10
EI361A (R)	3	1.4 ± 0.020	7.8 ± 0.10

Note: Most cadmium levels <MDL (0.005 µg/L) and all mercury levels <MDL (0.010 µg/L).

Table 3-21. Mean concentrations (± 1 standard deviation) of arsenic, barium, cadmium, and mercury in the jewel box.

Platform	Cruise	Arsenic (µg/g dry weight)	Barium (µg/g dry weight)	Cadmium (µg/g dry weight)	Mercury (µg/g dry weight)
EB165A (D)	2	45 ± 1.5	13 ± 1.2	6.9 ± 0.81	0.063 ± 0.013
EB165A (D)	3	60 ± 2.8	14 ± 1.9	8.2 ± 0.29	0.072 ± 0.008
HI356A (R)	2	55 ± 1.1	21 ± 2.0	8.1 ± 1.3	0.072 ± 0.006
HI356A (R)	3	63 ± 6.7	23 ± 13	8.7 ± 0.31	0.066 ± 0.006
GC19A (D)	2	43 ± 1.9	54 ± 36	7.1 ± 0.52	0.086 ± 0.006
GC19A (D)	3	46 ± 2.8	140 ± 53	4.0 ± 0.63	0.085 ± 0.021
EI361A (R)	2	52 ± 3.1	27 ± 16.7	10 ± 1.1	0.073 ± 0.017
EI361A (R)	3	62 ± 3.1	34 ± 23.8	11 ± 1.3	0.066 ± 0.004

Table 3-22. Mean concentrations (± 1 standard deviation) of arsenic, barium, cadmium, and mercury in the thorny oyster.

Platform	Cruise	Arsenic (µg/g dry weight)	Barium (µg/g dry weight)	Cadmium (µg/g dry weight)	Mercury (µg/g dry weight)
EB165A (D)	2	74 ± 12	15 ± 0.86	26 ± 3.3	0.13 ± 0.002
EB165A (D)	3	100 ± 12	17 ± 1.4	33 ± 2.8	0.18 ± 0.032
HI356A (R)	2	67 ± 9.9	20 ± 0.36	20 ± 5.5	0.15 ± 0.009
HI356A (R)	3	73 ± 9.2	20 ± 3.6	25 ± 1.3	0.19 ± 0.038
GC19A (D)	2	100 ± 16	20 ± 1.7	24 ± 5.0	0.20 ± 0.091
GC19A (D)	3	100 ± 20	24 ± 5.4	23 ± 2.1	0.18 ± 0.020
EI361A (R)	2	85 ± 15	17 ± 2.5	25 ± 4.9	0.12 ± 0.010
EI361A (R)	3	100 ± 11	25 ± 11	32 ± 1.7	0.17 ± 0.003

Table 3-23. Mean concentrations (± 1 standard deviation) of arsenic, barium, cadmium, and mercury in yellow chub.

Platform	Cruise	Arsenic (µg/g dry weight)	Barium (µg/g dry weight)	Cadmium (µg/g dry weight)	Mercury (µg/g dry weight)
EB165A (D)	2	6.1 ± 0.76	1.8 ± 0.59	0.018 ± 0.004	0.099 ± 0.012
EB165A (D)	3	3.3 ± 0.41	0.12 ± 0.11	0.009J ± 0.001	0.059 ± 0.013
HI356A (R)	2	5.0 ± 0.14	1.3 ± 0.54	0.014 ± 0.002	0.090 ± 0.015
HI356A (R)	3	2.6 ± 0.36	0.078 ± 0.058	0.011 ± 0.001	0.071 ± 0.008
GC19A (D)	2	4.3 ± 0.20	1.4 ± 0.47	0.012 ± 0.001	0.077 ± 0.016
GC19A (D)	3	4.1 ± 0.20	0.13 ± 0.019	0.007J ± 0.001	0.12 ± 0.032
EI361A (R)	2	3.2 ± 0.39	1.4 ± 0.31	0.010J ± 0.001	0.077 ± 0.007
EI361A (R)	3	3.2 ± 0.029	0.074 ± 0.008	0.008J ± 0.000	0.067 ± 0.005

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).

Table 3-24. Mean concentrations (± 1 standard deviation) of arsenic, barium, cadmium, and mercury in creole-fish.

Platform	Cruise	Arsenic (µg/g dry weight)	Barium (µg/g dry weight)	Cadmium (µg/g dry weight)	Mercury (µg/g dry weight)
EB165A (D)	2	10 ± 0.73	1.5 ± 0.11	0.013 ± 0.002	0.15 ± 0.024
EB165A (D)	3	7.3 ± 1.3	0.11 ± 0.041	0.012 ± 0.005	0.13 ± 0.022
HI356A (R)	2	7.6 ± 0.94	1.1 ± 0.30	0.009J ± 0.003	0.14 ± 0.012
HI356A (R)	3	9.0 ± 1.3	0.10 ± 0.069	0.012 ± 0.003	0.12 ± 0.029
GC19A (D)	2	5.3 ± 0.68	1.3 ± 0.18	0.012 ± 0.001	0.17 ± 0.019
GC19A (D)	3	6.2 ± 0.95	0.10 ± 0.091	0.016 ± 0.001	0.19 ± 0.023
EI361A (R)	2	6.1 ± 1.2	1.1 ± 0.20	0.008J ± 0.002	0.13 ± 0.006
EI361A (R)	3	4.8 ± 1.6	0.17 ± 0.039	0.012 ± 0.002	0.16 ± 0.005

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).

Table 3-25. Mean concentrations (± 1 standard deviation) of arsenic, barium, cadmium, and mercury in rock-hind.

Platform	Cruise	Arsenic (µg/g dry weight)	Barium (µg/g dry weight)	Cadmium (µg/g dry weight)	Mercury (µg/g dry weight)
EB165A (D)	2	9.2 ± 0.056	0.34 ± 0.048	0.002J ± 0.001	0.32 ± 0.049
HI356A (R)	2	4.6 ± 0.61	0.29 ± 0.18	0.002J ± 0.000	0.53 ± 0.12

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).

Table 3-26. Mean concentrations (± 1 standard deviation) of arsenic, barium, cadmium, and mercury in sergeant major.

Platform	Cruise	Arsenic (µg/g dry weight)	Barium (µg/g dry weight)	Cadmium (µg/g dry weight)	Mercury (µg/g dry weight)
EB165A (D)	3	21 ± 3.1	0.32 ± 0.12	0.022 ± 0.006	0.26 ± 0.010
HI356A (R)	3	32 ± 3.5	0.67 ± 0.17	0.008J ± 0.001	0.20 ± 0.018

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).

Table 3-27. Mean concentrations (± 1 standard deviation) of arsenic, barium, cadmium, and mercury in gray triggerfish.

Platform	Cruise	Arsenic (µg/g dry weight)	Barium (µg/g dry weight)	Cadmium (µg/g dry weight)	Mercury (µg/g dry weight)
GC19A (D)	2	25 ± 1.8	0.29 ± 0.24	0.002J ± 0.003	0.28 ± 0.050
EI361A (R)	2	29 ± 4.6	0.76 ± 0.41	0.002J ± 0.002	0.13 ± 0.037
GC19A (D)	3	26 ± 3.0	0.20 ± 0.10	0.009J ± 0.001	0.11 ± 0.013
EI361A (R)	3	27 ± 3.8	0.12 ± 0.13	0.003J ± 0.000	0.45 ± 0.084

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).

Table 3-28. Radioactivities of ^{226}Ra and ^{228}Ra in produced water.

Analyte	Cruise	Platform		
		EB165A	GC19A	
			Primary Discharge	Secondary Discharge
^{226}Ra (pCi/L)	2	260	250-260	---
	3	350-360	230-290	360-380
^{228}Ra (pCi/L)	2	940-960	820-840	---
	3	730-790	460	860-920

Table 3-29. Radioactivities of ^{226}Ra and ^{228}Ra in ambient seawater.

Analyte	Cruise	Platform			
		EB165A	HI356A	GC19A	EI361A
^{226}Ra (pCi/L)	2	0.030 - 0.11	ND - 0.090	0.16 - 0.22	0.090 - 0.29
	3	ND - 0.030	0.040 - 0.17	ND - 0.060	ND
^{228}Ra (pCi/L)	2	ND	ND - 2.7	ND - 0.24	ND - 0.58
	3	ND	ND	ND - 0.26	ND

ND = Not detected.

Table 3-30. Summary of ^{226}Ra activities (pCi/g dry weight) in tissue samples.

Taxon	Cruise	Platform			
		GC19A	EI361A	EB165A	HI356A
Jewel box	2	ND - 0.10	0.036 - 0.12	0.083 - 0.18	0.027 - 0.26
	3	0.057 - 0.10	0.043 - 0.11	0.035 - 0.11	0.037 - 0.13
Yellow chub	2	ND - 0.028	ND - 0.033	ND - 0.017	ND - 0.023
	3	ND - 0.015	ND - 0.008	ND - 0.009	ND
Creole-fish	2	ND - 0.051	ND - 0.058	ND - 0.026	ND - 0.024
	3	ND - 0.020	ND - 0.010	ND - 0.020	ND - 0.010
Rockhind	2	---	---	0.010 - 0.054	ND - 0.020
Sergeant major	3	---	---	ND - 0.030	ND - 0.013
Thorny oyster	2	0.16 - 0.34	0.07 - 0.32	0.13 - 0.19	0.078 - 0.14
	3	0.078 - 0.10	0.064 - 0.10	0.074 - 0.12	0.061 - 0.17
Gray triggerfish	2	ND - 0.053	ND - 0.024	---	---
	3	ND - 0.005	ND - 0.010	---	---

ND = Not detected.

Table 3-31. Summary of ^{228}Ra activities (pCi/g dry weight) in tissue samples.

Taxon	Cruise	Platform			
		GC19A	EI361A	EB165A	HI356A
Jewel box	2	ND	ND	ND - 0.14	ND
	3	ND - 0.058	ND - 0.10	ND - 0.043	ND - 0.093
Yellow chub	2	ND - 0.18	ND - 0.088	ND - 0.078	ND - 0.14
	3	ND - 0.021	ND - 0.040	ND - 0.026	ND - 0.022
Creole-fish	2	ND - 0.22	ND - 0.069	ND - 0.092	ND - 0.046
	3	ND - 0.035	ND - 0.078	ND - 0.19	ND - 0.029
Rockhind	2	---	---	ND - 0.131	ND - 0.12
Sergeant major	3	---	---	ND - 0.040	ND - 0.044
Thorny oyster	2	ND - 0.10	ND	ND	ND - 0.15
	3	ND - 0.083	ND - 0.078	ND - 0.13	ND - 0.20
Gray triggerfish	2	ND - 0.021	ND - 0.097	---	---
	3	ND - 0.039	ND	---	---

ND = Not detected.

Table 3-32. Evaluation of potential Type I error.

	Analysis of Variance	Contrast	Friedman Test	Mann-Whitney Test	Fisher's Exact Test
Probability of Type I error for individual statistical test (α)	0.05	0.05	0.05	0.10	0.05
Number of tests	66	110	44	93	152
Number of statistically significant results	23	7	10	28	13
Number of statistically significant results with D>R	13	4	8	19	11
Number of statistically significant results with R>D	10	3	2	9	2
Expected number of statistically significant results by random chance (Type I error)	3.3	5.5	2.2	9.3	7.6
Probability of observing actual number or more statistical significant results by random chance	0.00	0.31	0.00	0.00	0.04

Section 4
DISCUSSION

4.1 PROBLEMS IN DETECTING BIOACCUMULATION

Detection of bioaccumulation of chemicals by marine animals from treated produced water discharged to the open ocean from offshore production platforms poses several technical difficulties. The extent of bioaccumulation of a metallic or organic chemical by marine animals from produced water or any other source depends on the concentration and chemical form(s) of the chemical in the ambient water and food (the exposure concentration) and tendency of marine organisms to bioaccumulate the chemical. Exposure concentrations (relative to background concentrations) of chemicals of concern in the ambient environment of marine organisms near offshore production platforms depend on the difference in the concentration of the chemicals in the produced water and the ambient seawater and the rate of dilution of the produced water following discharge to the ocean. Most of the chemicals of concern in produced water are natural products that are present naturally, with additions from human activities, in clean seawater and in tissues of marine animals. The problem of detecting bioaccumulation of these chemicals from produced water is to distinguish between natural bioaccumulation from background concentrations or from non-platform sources and enhanced bioaccumulation from the diluting produced water plume itself. Each of the problems inherent in detecting bioaccumulation of chemicals from produced water is discussed in this section.

4.1.1 Problem Definition

The objective of this study was to determine whether certain chemicals in produced water bioaccumulate in the edible tissues of fishes and invertebrates near high-volume (>4,600 bbl/d) produced water discharges to offshore waters of the Gulf of Mexico and to evaluate the environmental significance of concentrations of target chemicals in edible tissues of marine animals from the vicinity of offshore production platforms in the Gulf of Mexico.

This objective was accomplished by sampling and analyzing produced water, ambient seawater, bivalves, and fishes from two pairs of produced water discharging/reference platform pairs on the outer continental shelf off Louisiana and Texas. The two discharging platforms discharge large volumes (>4,600 bbl/d) of produced water to oceanic waters relatively remote from other discharge sources, affording the optimal conditions for demonstrating bioaccumulation of chemicals from produced water, if it occurs. Reference sites are comparable to their paired discharge sites in geographic location and water depth and were selected based on a lack of documented produced water discharges. As previously described (**Sections 2.1.3** and **3.2**), a low volume produced water discharge occurred during this study at one of the reference sites (HI356A). Statistical comparisons of concentrations of target produced water chemicals in soft tissues of bivalves and muscle tissue of fishes from the discharging/reference platform pairs were used to determine if animals from discharging platforms are

bioaccumulating the target chemicals from the produced water discharges. Data on concentrations of target chemicals in produced water and ambient seawater were used to estimate the potential exposure of marine animals to elevated concentrations of target chemicals in ambient seawater. A determination was made whether tissue residues of target chemicals in marine animals from the vicinity of the two produced water discharges differ from typical concentrations by comparing them to tissue residue data for the same or closely related taxa in the scientific literature. The results of this evaluation for each species and target chemical were classified in one of four categories: 1) strong evidence for bioaccumulation; 2) weak or inconclusive evidence for bioaccumulation; 3) doubtful or contradictory evidence for bioaccumulation; and 4) no evidence for bioaccumulation.

Produced water destined for ocean disposal is treated to remove petroleum hydrocarbons to a concentration below current regulatory limits of 42 mg/L daily maximum and 29 mg/L monthly average total oil and grease (57 FR 224:54642, November 19, 1992 and 58 FR 231:63964, December 3, 1993). Produced waters that meet these regulatory requirements still contain small amounts of petroleum hydrocarbons, other organic compounds, and several metals and radionuclides. Nearly all the chemicals usually present as natural constituents of produced water are derived from the fossil fuels and the geological strata in which the produced water resided for millions of years. These chemicals also are natural ingredients of seawater and are present at trace concentrations even in clean ocean water. Produced water is diluted rapidly when it is discharged to the ocean, usually by several hundred fold within a few tens of meters of the produced water discharge (Brandsma and Smith, 1996). Background concentrations of most produced water chemicals are reached within 100 to 1,000 m or less from most produced water discharges.

Marine plants and animals are able to bioaccumulate bioavailable forms of all the chemicals in produced water even when they are present at natural background concentrations in the ambient seawater. Therefore, the problem in detecting or demonstrating bioaccumulation of chemicals from produced water is to distinguish between tissue residues of target chemicals that are clearly attributable to uptake from the rapidly-diluting produced water plume and those that represent natural background concentrations of chemicals in the animal tissues. The difficulty in detecting bioaccumulation from a point source in free-ranging marine animals is greatest for metals, because most are present at naturally high and variable concentrations in coastal seawater and the tissues of marine animals.

4.1.2 Dilution of Produced Water Following Discharge to the Ocean

Marine animals near an ocean discharge of produced water may be exposed to a rapidly diluting plume containing a wide variety of metals and organic chemicals characteristic of produced water. In order to bioaccumulate chemicals from the diluting plume, marine organisms must be exposed to elevated concentrations (compared to natural concentrations in clean ambient seawater) of chemicals for long enough (days or weeks) to permit significant bioaccumulation. Mobile animals, such as fishes and many crustaceans, and biofouling or benthic animals more than a few tens of meters

from the produced water outfall, are unlikely to be exposed to the chemicals in the diluting produced water plume long enough and at high enough concentrations to allow for biologically significant bioaccumulation.

Saline produced waters dilute rapidly upon discharge to well-mixed marine waters. Dispersion modeling studies of the fate of produced water differ in specific details but all predict a rapid initial dilution of discharges by 30- to 100-fold within the first few tens of meters of the outfall, followed by a slower rate of dilution at greater distances (Smith, 1993; Terrens and Tait, 1993; Strømgren *et al.*, 1995; Brandsma and Smith, 1996). Terrens and Tait (1993) modeled the fate of produced water discharged to the Bass Strait off southeastern Australia. Under typical oceanographic conditions for the area, the produced water is diluted nearly 30-fold within 10 m of the discharge and by 1,800-fold 1,000 m downcurrent of produced water discharges. Brandsma and Smith (1996) modeled the fate of produced water discharged under typical Gulf of Mexico conditions. For a median produced water discharge rate of 115 m^3/d (722 bbl/d), a 500-fold dilution was predicted 10 m from the outfall and a 1,000-fold dilution was predicted 100 m from the outfall. For a maximum discharge rate of 3,978 m^3/d (25,000 bbl/d), a 50-fold dilution was predicted 100 m from the outfall. In the present investigation, the 7,054 bbl/d produced water discharge from GC19A was predicted to dilute by a factor of 100-fold within a few meters of the outfall (**Section 3.2.1**) under stratified water conditions. A further 10-fold dilution occurs by the time the plume reaches 100 m from the outfall. The larger-volume (11,200 bbl/d) produced water discharge from EB165A is predicted to descend deeper following discharge but dilutes nearly as rapidly as the produced water plume from GC19A.

Modeling studies of high volume discharges of warm high-salinity produced water to the North Sea predict that plumes would be diluted by about 500-fold within about 60 m of the outfall under well-mixed water column conditions; under conditions of a stratified water column, a 300-fold dilution is reached 60 m from the discharge (Stephenson *et al.*, 1994). Further dilution is slower; a 1,000-fold dilution is attained after about 1 h when the produced water plume has drifted about 1,000 m.

Field measurements of produced water dilution are highly variable but confirm the predictions of modeling studies, that dilution is rapid. Continental Shelf Associates, Inc. (1993) reported that radium from a 6,570 bbl/d produced water discharge in a water depth of 18 m in the Gulf of Mexico was diluted by a factor of 426 at 5 m from the discharge, and by a factor of 1,065 at 50 m from the discharge. Smith *et al.* (1994) used a dye tracer to measure dilution of produced water being discharged at a rate of 2,900 to 6,500 bbl/d in a water depth of 82 m and found a 100-fold dilution within 10 m of the discharge and a 1,000-fold dilution within 103 m of the discharge. Somerville (1987) measured a 2,800-fold dilution of produced water 1,000 m downcurrent from a North Sea produced water discharge.

The most abundant hydrocarbons of environmental concern in produced water are the light, one-ring aromatic hydrocarbons (benzene, toluene, ethylbenzene, and xylenes [the BTEX compounds]). Because they are very volatile, they evaporate rapidly from the water following a produced water discharge. Brooks *et al.* (1980) reported that the

maximum concentration of benzene measured in seawater immediately below the produced water discharge pipe at a production platform in the Buccaneer Field off Galveston, Texas, was 0.07 µg/L. This represents a nearly 150,000-fold dilution of the concentration of benzene in the produced water effluent (9,500 µg/L), and is well below the EPA risk-based concentration for benzene in drinking water of 0.36 µg/L. Concentrations of total gaseous and volatile hydrocarbons, including BTEX aromatics (75%), decreased from 22,000 µg/L in the effluent to 65 µg/L at the air/water interface below the outfall, to less than 2 µg/L in the surface water about 50 m away, indicating very rapid evaporation and dilution of the volatile components of the produced water.

Terrens and Tait (1996) measured concentrations of BTEX and several PAHs in ambient seawater 20 m from an 11 million L/d (69,000 bbl/d) produced water discharge from a platform in the Bass Strait off Australia. There was an inverse relationship between molecular weight (and volatility) and the dilution of individual aromatic hydrocarbons. Individual monoaromatic hydrocarbons were diluted by 53,000-fold (benzene) to 12,000-fold (xylenes). PAHs were diluted by 12,000-fold (naphthalene) to 2,000-fold (pyrene) at 20 m downcurrent from the outfall. Concentrations of higher molecular weight PAHs were below the detection limit (0.0002 µg/L) in the ambient seawater 20 m from the outfall. The inverse relationship between molecular weight of the aromatic hydrocarbons and their rates of dilution probably was due in large part to the more rapid evaporation of lighter components accelerated by the high temperature (95°C) of the discharged produced water.

BTEX concentrations in the upper water column near production platforms off Louisiana ranged from 0.008 µg/L to 0.332 µg/L (Sauer, 1980), compared to background concentrations of 0.009 µg/L to 0.10 µg/L of benzene in surface waters of the OCS off Texas and Louisiana (Sauer *et al.*, 1978). These compounds are very volatile with half-lives in the water column of a few hours or days, depending on water temperature and mixing conditions.

Dilution of BTEX and other produced water constituents in receiving waters is less rapid where a large volume of highly saline produced water is discharged to poorly mixed, low-salinity estuarine waters. Rabalais *et al.* (1992) were able to measure elevated (compared to background) concentrations of radium, but not volatile hydrocarbons, to about 1,000 m downcurrent of a high-volume produced water discharge to shallow brackish waters of an inland canal. The concentration of total volatile hydrocarbons (including BTEX) approached 100 µg/L on one occasion in bottom water in the vicinity of three produced water discharges (total volume ≈ 43,000 bbl/d) to Pass Fourchon, a shallow marsh area in south Louisiana (Rabalais *et al.*, 1991). BTEX compounds do not adsorb strongly to suspended or deposited marine sediments. Their concentrations in sediments near produced water discharges nearly always are very low (Armstrong *et al.*, 1979; Neff *et al.*, 1989).

4.1.3 Metals and Radium in Produced Water and Ambient Seawater

Four metals, arsenic, barium, cadmium, and mercury, and two radionuclides, ^{226}Ra and ^{228}Ra, were measured in produced water, ambient seawater, and the tissues of marine animals from the vicinity of two offshore platforms discharging produced water and two reference platforms. Each discharge site was paired with a reference site that it resembled with respect to location and water depth. The two reference sites were non-discharging platforms at the beginning of the program. However, as previously mentioned (**Sections 2.1.3** and **3.2**), it was discovered late in the study (during Cruise 3) that, at HI356A (R), there was a low volume discharge averaging 85 bbl/d from 14 January to 18 October 1995. The volume discharged from the reference platform was low compared to the volume discharged from the paired discharge site (>4,600 bbl/d).

The ability to detect bioaccumulation of these metals by marine animals near the two discharge sites depends on concentrations of the metals in the produced water, rate of dilution of the produced water in the receiving waters, and the relative concentrations of the metals in tissues of marine animals from the paired non-discharging (reference) and discharge sites. Potential exposure concentrations (concentrations in ambient seawater near discharge sites) can be estimated from concentrations of metals in the produced water and rates of dilution of the produced water after discharge to the ocean. If estimated exposure concentrations are low, the amount of bioaccumulation of metals from produced water above background concentrations (concentrations in animals from reference sites) also will be low and difficult to distinguish statistically from natural variability. If concentrations of metals in tissues of marine animals from the reference platforms are high or variable, it will be difficult to detect bioaccumulation that can be attributed to exposure to metals from produced water.

The metals data demonstrate the difficulty in detecting bioaccumulation of contaminants from produced water. Only arsenic and barium were detected consistently in both produced water and ambient seawater (**Table 4-1**). None of the samples contained detectable levels of mercury at concentrations above the MDL of 0.01 µg/L for ambient seawater and produced water. Cadmium was not present at a concentration above the MDL in produced water collected from EB165A (D) in Cruise 2. Cadmium concentrations in ambient seawater at the two discharging and reference sites was below 0.02 µg/L at the time of both cruises. Thus, true enrichment factors (concentration in produced water/concentration in ambient seawater) could not be estimated for cadmium and mercury in produced water from both platforms.

As previously mentioned in **Section 3.2**, it was discovered at the time of the third cruise, that there were two produced water discharges from GC19A (D). The secondary discharge (126 bbl/d) was small compared to the primary (6,249 bbl/d). Metals composition of produced water from the two discharges is quite different (**Table 4-1**), indicating that the produced waters, although processed on the same platform, are from different hydrocarbon reservoirs. Some marine organisms near GC19A (D) may be exposed to produced water plumes from both discharges.

Enrichment factors for arsenic in produced water collected from EB165A (D) and GC19A (D) during the two cruises were 5.2 and 3.2, and 19, 16, and 33, respectively (**Table 4-1**). Dilution of these produced waters with ambient seawater by as little as 40-fold will bring concentrations of arsenic down to ambient concentrations within a few meters from the platforms. Mercury concentrations in the undiluted produced water apparently are low enough that even less dilution will bring its concentration down to ambient values. A typical mercury concentration in surface ocean water from the northwestern Gulf of Mexico is about 0.001 µg/L (Trefry, personal communication). If it is assumed that the produced waters contain a mercury concentration equal to the MDL of 0.01 µg/L, the produced waters are enriched by a factor of 10. Mercury in produced water will be diluted to background almost immediately following discharge. The mean concentrations of cadmium were relatively high (0.8 µg/L and 14 µg/L) in two separate produced water discharges from GC19A sampled during Cruise 3 (**Table 4-1**). The concentration of cadmium in ambient seawater near the platform was less than 0.02 µg/L, resulting in high estimated enrichments. It would require a dilution of 8-fold or 140-fold to bring cadmium concentrations down to a typical seawater background concentration of 0.1 µg/L. These dilutions occur within 100 m or less from GC19A (D) (**Figure 3-3**).

High-volume produced water discharges to the ocean usually are diluted by at least 50-fold within 10 to 20 m of the outfall (Terrens and Tait, 1993, 1996; Brandsma and Smith, 1996). Therefore, very few marine animals living near these offshore produced water discharges will ever be exposed to elevated concentrations (compared to natural concentrations in ambient seawater) of arsenic, cadmium, and mercury. The only animals that might be exposed to elevated concentrations of arsenic, cadmium, and mercury for extended periods of time (long enough to allow for statistically significant bioaccumulation) are biofouling animals on underwater platform structures near the produced water discharge. Inorganic forms of these metals do not biomagnify in marine food webs and are bioaccumulated inefficiently from food (Neff, 1997a); thus, these metals are unlikely to accumulate to high concentrations in tissues of fishes and crustaceans that may be consuming biofouling animals from underwater platform structures.

Barium, on the other hand, is very abundant in produced water from the three offshore discharges. It is enriched compared to concentrations in ambient seawater by factors of 11,000 to 29,000 (**Table 4-1**). However, barium from produced water precipitates rapidly as barium sulfate (barite) following discharge of barium-rich produced water to sulfate-rich seawater (Neff and Sauer, 1995). Thus, concentrations of dissolved barium (the most bioavailable form) remain low in ocean waters near the outfall. Barium, because of its low solubility in seawater, has a low bioavailability and toxicity to marine organisms. Marine bivalves may accumulate fine particles of barite during filter feeding. However, they retain the barium in their tissues as insoluble concretions of barite that are not toxic to the bivalves or their consumers (Jenkins *et al.*, 1989). Barium concentrations remain at low, essentially background concentrations in solution in ambient seawater near produced water discharges, so bioaccumulation of this element from produced water is minimal and generally not detectable.

Concentrations of arsenic, barium, cadmium, and mercury in produced water and ambient seawater measured in this study were similar to those measured in an investigation recently performed for the U.S. Department of Energy (DOE) (Continental Shelf Associates, Inc., 1997) in the same general area (**Table 4-1**). Thus, the two produced waters sampled here contained concentrations of these metals that are typical of high-volume produced water discharges to the Gulf of Mexico. Concentrations of barium were lower and concentrations of arsenic were higher in ambient seawater at some of the discharge and reference sites sampled in the DOE study than those in ambient seawater from the sites measured in this study. This was caused by dilution of seawater with brackish water (high in dissolved barium and low in arsenic compared to seawater) at nearshore DOE sites.

Concentrations of total radium in produced water discharges from the two discharging platforms ranged from 720 pCi/L to 1,260 pCi/L (**Table 4-2**). ^{228}Ra activity always was higher than ^{226}Ra activity in the produced water samples examined in this investigation. These radium concentrations were comparable to those reported for other produced water discharges to the Gulf of Mexico. Activities as high as about 1,500 pCi/L each for ^{226}Ra and ^{228}Ra have been reported for produced waters from oil and gas wells in the northwestern Gulf of Mexico (Neff, 1997a). Radium concentrations in ambient seawater at the discharge and reference sites ranged from ND (<0.01 pC/L) to about 0.9 pCi/L (**Table 4-2**). Typical background concentrations of ^{226}Ra and ^{228}Ra in ocean waters are 0.03 to 0.10 pCi/L and 0.005 pCi/L, respectively. Concentrations in coastal waters, particularly near natural sources are higher, often approaching 1.0 pCi/L, and ^{228}Ra usually is more abundant than ^{226}Ra (Neff, 1997a). Thus, concentrations measured in ambient seawater near discharging and reference platforms are normal. One of three samples of ambient seawater from HI356A (R) from Cruise 2 contained 2.7 pCi/L of ^{228}Ra; the other two samples did not contain ^{228}Ra above the MDL. Thus, the one high sample may be anomalous.

^{226}Ra and ^{228}Ra are enriched in produced water compared to their concentrations in ambient seawater. Enrichments for ^{226}Ra, ^{228}Ra, and total radium in produced water from the three produced water discharges ranged from 1,300 to 45,000 (**Table 4-2**). If radium remained in solution, it should be present at elevated concentrations in seawater to 1,000 m or more from the produced water discharges. However, radium sulfate is even less soluble in seawater than barium sulfate. Actual molar concentrations in produced water are quite low (1 pCi = 1 picogram of ^{226}Ra and an even smaller amount of ^{228}Ra). Therefore, there is not enough radium in the produced water samples to support direct precipitation with sulfate from seawater to produce radium sulfate. However, essentially all the radium in produced water co-precipitates with barium to form an insoluble Ba,RaSO_4 complex (Neff and Sauer, 1995). Therefore, concentrations of dissolved, potentially bioavailable radium in ambient seawater near the produced water discharges can be expected to decrease very rapidly in the diluting produced water plume, more rapidly than can be accounted for by dilution alone.

Because of the concentrations of these metals in produced water and their behavior during dilution in ambient seawater, concentrations in soluble, bioavailable forms in ambient seawater near the produced water discharges are expected to be very low,

approaching or equivalent to natural ambient concentrations. Concentrations of metals were not measured in seawater from close to the produced water discharges. However, samples from 2,000 m upcurrent from the produced water discharges were analyzed and compared to metals concentrations in ambient seawater at the paired reference sites. Concentrations of all metals were comparable and at approximately background concentrations at the paired produced water and reference sites, with exception; ^{8}Ra at HI356A (R) during Cruise 2 (**Table 4-2**).

Arsenic concentrations in ambient seawater from the two produced water sites and the two reference sites were in the range of 0.89 to 1.6 µg/L. Natural concentrations of total arsenic in ocean waters usually are in the range of 1 to 3 µg/L; concentrations in coastal waters often are slightly lower because of dilution with freshwater runoff from land (Neff, 1997a,b). Thus, the concentrations of arsenic in ambient seawater from the produced water and reference sites were within the range of background concentrations in the ocean. Concentrations were slightly higher in the fall (Cruise 3) than in the spring (Cruise 2), as expected from the natural geochemical cycle of arsenic in the ocean (Neff, 1997b). Concentrations of arsenic in ambient seawater near the two platforms were not elevated above the natural range of concentrations expected in clean natural seawater.

Typical concentrations of dissolved barium in ocean waters are in the range of about 3 to 19 µg/L (Neff and Sauer, 1995). Dissolved barium concentrations often are higher in coastal and estuarine waters influenced by riverine runoff because of desorption of barium from suspended particles in the low-salinity mixing zone of the estuary. All barium concentrations in ambient seawater from the two produced water sites and two reference sites were typical for ocean waters. Concentrations were similar in ambient seawater at the discharge and reference sites and in both seasons.

At the time of the second cruise, concentrations of arsenic in ambient seawater at the platform pair EB165A (D)/HI356A (R) were below expected concentrations; concentrations of barium were higher than expected; and the concentration of ^{228}Ra was higher at HI356A (R) than expected. These differences are consistent with the presence of a lower-salinity water mass, containing high suspended solids, from river runoff in the area at the time of the second cruise. This conclusion is supported by the observation that ambient seawater from HI356A (R) at the time of the second cruise had a salinity of 34‰. A water column profile (conductivity, temperature, and depth) obtained from the vicinity of HI356A (R) at the time of the second cruise confirms that at that time, surface waters at the site were stratified, with a layer of lower salinity water extending from the surface to a depth of about 20 m. The salinity of ambient seawater at HI356A (R) at the time of the third cruise and at all other sampling sites during both the second and third cruises was 36‰. These observations show that natural environmental conditions can affect the concentrations of metals in surface waters of the ocean on short-term and seasonal scales.

Natural concentrations of cadmium in clean ocean water are in the range of 0.001 to 0.10 µg/L (Neff, 1997a). Coastal waters may contain up to about 0.2 µg/L dissolved cadmium. Mean cadmium concentrations in ambient seawater from all locations and

times examined in this study were less than 0.02 µg/L, well within the range of natural concentrations for clean ocean waters. It is unlikely that concentrations of total dissolved and particulate cadmium in seawater near the produced water discharges are elevated significantly above natural concentrations.

Mercury could not be detected (MDL, 0.008 µg/L in ambient seawater and 0.01 µg/L in produced water) in either produced water or ambient seawater samples. Mercury is present in clean seawater at very low concentrations and is difficult to measure accurately. Typical concentrations in surface ocean water are in the range of 0.00007 to 0.006 µg/L; clean coastal waters may contain up to about 0.02 µg/L total dissolved mercury (Neff, 1997a). Trefry (1996, pers. comm.) reports typical concentrations of total dissolved mercury in open ocean waters of the northwestern Gulf of Mexico of 0.0005 to 0.001 µg/L, well below the MDL in this study. Produced water from the discharges probably contains mercury at a concentration close to the MDL for mercury in saline produced waters (0.01 µg/L) (Trefry, 1996, pers. comm.). Therefore, mercury concentrations in these produced waters are enriched by approximately 10-fold. It is very unlikely that concentrations of total dissolved mercury in ambient seawater near the produced water outfalls are elevated above natural background concentrations.

Concentrations of ^{226}Ra and ^{228}Ra in surface waters of the open ocean are in the range of 0.03 to 0.10 pCi/L and 0.005 pCi/L, respectively (Neff, 1997a). These activities of ^{226}Ra and ^{228}Ra in surface waters of the open ocean are equivalent to concentrations of 0.03 to 0.1 pg/L and 0.000018 pg/L, respectively. Radium concentrations tend to increase with depth in the ocean, paralleling the concentrations of barium and silica (Chung, 1980; Nozaki, 1991). Typical concentrations of radium isotopes in deep ocean waters are 0.04 to 0.16 pCi/L. ^{226}Ra is more abundant than ^{228}Ra in open ocean waters. For example, the ^{228}Ra/^{226}Ra ratio in surface waters of the Pacific Ocean is in the range of <0.03 to nearly 1, with highest ratios in nearshore waters (Nozaki, 1991).

^{228}Ra radioactivity is more abundant than ^{226}Ra radioactivity in many coastal waters and estuaries, such as the New York Bight. Several bays contain 0.013 to 0.14 pCi/L ^{226}Ra and 0.009 to 0.36 pCi/L ^{228}Ra. Continental shelf waters off west Florida and nearshore waters of the eastern Irish Sea contain higher concentrations of radium (approaching or exceeding 1 pCi/L) than other marine waters (Fanning *et al.*, 1982; Miller *et al.*, 1990; Poole *et al.*, 1995). The estuaries adjacent to the eastern Gulf of Mexico, Tampa Bay, FL and Charlotte Harbor, FL, contain up to 1.45 and 2.47 pCi/L ^{226}Ra, respectively, indicating that the excess radium in the adjacent ocean is derived from river runoff. The source of the high radium concentrations in the eastern Irish Sea and the eastern Gulf of Mexico is runoff from phosphate mining and processing operations (Miller *et al.*, 1990; Poole *et al.*, 1995). By comparison, the average concentration of ^{226}Ra in waters of the Dead Sea is 31.35 pCi/L (Bonotto, 1990) and probably is derived from natural phosphate deposits.

Concentrations of non-essential micronutrient metals (all the metals analyzed except arsenic) in tissues of marine animals are dependent to a certain extent on the concentrations in the ambient seawater where the animals live (Chapman *et al.*, 1996). Concentrations of non-essential metals in tissues of marine animals vary seasonally

depending on environmental and biological factors and sometimes are regulated at a relatively constant concentration within the non-toxic range of the metal in solution in seawater. Arsenic, an essential trace nutrient, is abundant in tissues of marine animals. However, most of the arsenic in marine animals is organic, primarily in the form of non-toxic arsenobetaine (Neff, 1997b). Concentrations of arsenic appear to be regulated in the tissues of most marine animals. Because of the low and variable concentrations of metals in ambient seawater from produced water and reference sites, it may be difficult to attribute tissue residues of the metals in marine animals from the vicinity of the produced water discharges to bioaccumulation of metals from the produced water discharges.

4.1.4 Monocyclic Aromatic Hydrocarbons in Produced Water and Ambient Seawater

The organic chemicals analyzed in this program include VOCs, PAHs, phenol, and BEHP. All but BEHP are present at higher concentrations in produced water than in ambient seawater. However, concentrations in ambient seawater are near or below the MDL and small amounts of some of the compounds appear in field and laboratory blanks.

There is no evidence of elevated concentrations of any of the target organic chemicals in ambient seawater samples from 2,000 m upcurrent from the two produced water-discharging platforms, compared to concentrations in ambient seawater from the reference sites. Concentrations of total VOCs in produced water from the two discharge sites ranged from 994 µg/L to 2,671 µg/L (**Table 4-3**). Total VOC concentrations in ambient seawater ranged from below the MDL to 0.75 µg/L; all measured concentrations in ambient seawater were below the PQL (five times MDLs) for individual benzenes. Toluene was the only monocyclic aromatic hydrocarbon detected in ambient seawater samples from the two reference sites on Cruise 2; both benzene and toluene were present in the ambient seawater sample from EB165A (D) collected on Cruise 3.

Concentrations of VOCs in field and laboratory blanks ranged from below the detection limit (most samples) to 3.10 µg/L (**Table 4-3**). The MDL for individual VOCs in water ranges from 0.09 µg/L to 0.31µg/L (**Table 2-10**). Much of the VOCs in ambient seawater probably are the result of sample contamination during collection, processing, or analysis of samples (Sauer, 1980). VOCs in produced water are diluted very rapidly, mainly by evaporation, following discharge of produced water to the ocean.

The VOCs of major environmental concern are BTEX. They enter the marine environment in large amounts from a variety of natural and human sources (Neff, 1997a). BTEX reaches the marine environment in domestic and industrial wastewater effluents (including treated produced water from production platforms), runoff from land, and spills of crude and refined petroleum products. Other sources may be important locally. For example, two-stroke and four-stroke outboard engines inject large amounts of BTEX directly into the water in which they are operated (Jüttner, 1994). Some BTEX are natural products, synthesized by many bacteria, fungi, plants, and possibly animals (Fishbein, 1984).

However, BTEX are not persistent in seawater. Although solubility in seawater is moderate (approximately 108 mg/L to 1,400 mg/L), they are so volatile that they evaporate rapidly from the sea surface. Individual BTEX compounds have log octanol/water partition coefficients (log K_{ow}s) from 2.13 to 3.20, indicating a low affinity for bioaccumulation in tissue lipids of aquatic organisms and for sorption to sediment organic matter. Because of their chemical/physical properties, BTEX are not persistent in seawater, bind only weakly to marine sediments, and are not bioaccumulated to high concentrations by marine organisms. Trimethylbenzenes and more highly alkylated monoaromatic hydrocarbons have much lower aqueous solubilities, higher log K_{ow}s and lower volatilities than BTEX and, therefore, are more persistent in the ocean.

Although the amounts entering the marine environment from all sources undoubtedly are large, concentrations of BTEX in seawater and estuarine waters generally are very low. Concentrations of individual BTEX compounds usually range from 0.001 to about 0.2 µg/L, except near point sources of BTEX, such as domestic sewage treatment plant outfalls, chemical industry outfalls, produced water discharges, natural oil seeps, and oil spills. For example, BTEX concentrations in the Narragansett Bay system are highest in the Providence River near wastewater outfalls; concentrations decrease sharply with distance down the bay, and concentrations are quite low in Rhode Island Sound off the mouth of the bay (Wakeham *et al.*, 1982).

In theGulf of Mexico, BTEX concentrations are higher in nearshore waters than offshore. The concentration of total C_3-benzenes in Mississippi River water near Memphis, TN is 0.092 µg/L but is below the MDL just south of New Orleans, LA (DeLeon *et al.*, 1986). Near-bottom waters in shallow canals and bayous in coastal Louisiana sometimes contained up to 10 µg/L of individual BTEX compounds before discharges of produced water to them were terminated a few years ago (Rabalais *et al.*, 1991). Concentrations of individual and total BTEX compounds decreased sharply with distance from the discharges.

In more open coastal environments, BTEX concentrations rarely exceed 0.1 µg/L. Twenty meters downcurrent from a production platform discharging 11 million L/d of produced water containing an average of 6,410 µg/L total BTEX to the Bass Strait off southeast Australia, the average concentration of BTEX is 0.43 µg/L, a dilution of 14,900-fold (Terrens and Tait, 1996). The most abundant monoaromatic hydrocarbons in both the produced water and ambient seawater are toluene and xylenes. Even near point sources, concentrations of BTEX in marine waters nearly always are well below EPA marine chronic water quality criterion values, which range from 43 (ethylbenzene) to 5,000 µg/L (toluene) (EPA, 1992).

Background concentrations of BTEX compounds in seawater are very low and reflect an equilibrium between concentrations in surface waters and in the overlying air (Sauer, 1980). The concentration of total xylenes in a seawater sample from a reef off Bermuda is 0.00014 µg/L (Ehrhardt and Burns, 1990). The concentrations of benzene and toluene in a seawater sample from 1,000 m in the Caribbean Sea are 0.0016 and 0.0015 µg/L, respectively (Sauer, 1980).

The extremely low concentrations of VOCs in seawater, even near offshore produced water discharges, coupled to their low potential for bioaccumulation in tissues of marine organisms (estimated bioconcentration factors [BCFs: concentration in tissues/concentration in ambient seawater] for individual BTEX ranged from 19 to 134), make it difficult to detect bioaccumulation of VOCs by marine organisms in the vicinity of produced water discharges.

4.1.5 Polycyclic Aromatic Hydrocarbons in Produced Water and Ambient Seawater

Concentrations of PAHs in produced water are much lower than those of VOCs (Neff, 1997a). As a general rule, concentrations of aromatic hydrocarbons in produced water decrease nearly logarithmically with increasing molecular weight and decreasing aqueous solubility. Naphthalene, fluorene, phenanthrene, dibenzothiophene, and their alkyl homologues, in that order, are the most abundant PAHs in produced water. They represent more than 99% of the total PAHs in the two produced waters sampled in this investigation. Higher molecular weight four- through six-ring PAHs rarely are present at greater than trace (about 0.1 µg/L) concentrations. Concentrations of total PAHs in produced water from the two produced water outfalls ranged from 40 µg/L to 55 µg/L (**Table 4-4**). Between 75% and 90% of the total PAHs are naphthalene and alkylnaphthalenes. Flourene, an EPA target analyte, is present in produced water from the two platforms at concentrations ranging from 0.059 µg/L to 0.37 µg/L. Higher molecular weight 4- and 5-ring PAHs represent less than 1% of the total PAHs in the produced water samples. The EPA target analyte BAP (a 5-ring PAH), was present in one of three replicate samples of produced water collected on Cruise 3 from the primary discharge from GC19A (D) (0.003J µg/L) and in all three samples from the low-volume secondary discharge from the platform (0.014 to 0.036 µg/L). The two target PAHs, because of their low concentrations in produced water, are not good candidates for use in monitoring bioaccumulation of PAHs from produced water.

Concentrations of total PAHs in ambient seawater at the discharge and reference sites during Cruises 2 and 3 ranged from below the MDL (ND) to 2.24 µg/L; PAHs, mostly naphthalene and C_1-naphthalene, were detected in a few laboratory and field blanks at concentrations up to 0.01 µg/L (**Table 4-4**). The highest concentration of total PAHs in an ambient seawater sample was in one replicate from HI356A (R), collected on Cruise 3. The most abundant PAHs in this sample were alkyl fluorenes, alkyl phenanthrenes, alkyl dibenzothiophenes, and alkyl chrysenes, indicating that the PAHs probably were from a petroleum source. PAH assemblages in petroleum contain higher concentrations of alkyl PAHs than parent unalkylated PAHs, whereas PAH assemblages from combustion sources usually contain more unalkylated than alkylated PAHs (Youngblood and Blumer, 1975; Sauer and Uhler, 1994).

One of three replicate ambient seawater samples collected at HI356A (R) during Cruise 2 also contained an elevated concentration of total PAHs (0.69 µg/L). The PAH composition of the two ambient seawater samples from HI356A (R) was similar (**Figure 3-7**). The naphthalenes were present at low concentrations and the samples were enriched in alkyl phenanthrenes, dibenzothiophenes, and fluoranthrenes/pyrenes with smaller amounts of alkyl chrysenes. The presence of alkyl chrysenes (very low

solubility) suggests that the samples contained particulate hydrocarbons (a tar ball or dispersed crude oil). This would explain the absence of quantifiable concentrations of PAHs in the two replicate ambient seawater samples collected on each cruise from the same location as the PAH-contaminated samples.

PAHs have low aqueous solubilities and high values for K_{ow}. Log K_{ow}s ranged from 3.33 (naphthalene) to 7.0 (indeno(1,2,3-cd)pyrene), indicating that they have a strong tendency to bioaccumulate from water and food into the tissues of marine animals (Veith and Kosian, 1983). Natural marine waters from most locations in the world contain traces of one or several PAHs. Because PAHs are ubiquitous trace contaminants of marine waters and sediments, many marine invertebrates and fishes, even from clean marine environments, contain traces of PAHs in their tissues. Therefore, care must be taken in attributing such tissue residues to a particular point source, such as a produced water discharge.

Natural oil seeps are common on the outer continental shelf and slope off Louisiana. MacDonald *et al.* (1993) estimated the total volume of natural oil seepage in the area to be about 120,000 bbl/y (5.04 million gal/y). Wade *et al.* (1989) reported an average concentration of 0.028 µg/L total PAH in water samples collected near a hydrocarbon seep in 570 m of water in the Gulf of Mexico.

Concentrations of total semivolatile PAHs in the water near a shallow-water seep off southern California are in the range of 0.15 to 0.52 µg/L (Stuermer *et al.*, 1982). The total concentration of phenanthrene, dibenzothiophene, fluoranthene, pyrene, and their alkyl homologues in the water column of the northern Arabian Gulf in 1986 was 0.019 µg/L (Ehrhardt and Douabul, 1989). Phenanthrene and monomethylphenanthrenes were the most abundant PAHs present. The total concentrations of naphthalene, fluorene, phenanthrene, dibenzothiophene, fluoranthene, pyrene, and their alkyl homologues in water samples from three nearshore locations around Bermuda ranged from 0.003 to 0.062 µg/L (Ehrhardt and Burns, 1990). A water sample from an offshore reference station contained only 0.00001 µg/L fluoranthene. Surface waters from the Dover Strait (English Channel) contain 0.0007 to 0.018 µg/L naphthalene and 0.0009 to 0.0093 µg/L phenanthrene (Law and Whinnett, 1994). C_1- through C_3-naphthalenes also are encountered frequently, sometimes at relatively high concentrations. For example, one water sample from that study contained 0.066 µg/L C_1-naphthalene, 0.410 µg/L C_2-naphthalenes, and 0.180 µg/L C_3-naphthalenes, indicating recent probable contamination with fuel oil. High molecular weight PAHs, such as BAP, rarely were present in the Dover Strait samples at concentrations above the analytical detection limit (0.001 to 0.002 µg/L). A few samples contained 0.0018 to 0.0064 µg/L BAP. Concentrations of total PAHs (sum of 15 parent compounds) in waters of the Baltic Sea ranged from 0.0005 to 0.014 µg/L (Witt, 1995). Low molecular weight two- and three-ring PAHs were more abundant than high molecular weight PAHs. Concentrations of BAP ranged from 0.000005 to 0.00012 µg/L. The surface microlayer (0-2 mm) contained higher concentrations, ranging from 0.008 to 0.140 µg/L.

Concentrations of total PAHs in the upper water column outside the path of floating crude oil from the 1989 Valdez oil spill usually were in the range of 0.015 to 0.050 µg/L (Neff and Burns, 1996). In the most heavily oiled areas in the spill path, concentrations of total PAHs were in the range of 0.1 to occasionally as high as 10 µg/L shortly after the spill, and decreased to 0.05 µg/L or less within a few months (Neff and Stubblefield, 1995). Surface waters of Occoquan Reservoir, Virginia, do not contain detectable concentrations (>0.01 µg/L) of PAHs during October when boating activity on the reservoir is minimal (Mastran *et al.*, 1994). However, in June during peak boating activity, concentrations of total PAHs in the water are in the range of 0.01 to 4.12 µg/L. The PAHs in the water column in June are of combined petrogenic and pyrogenic origin and are derived from small fuel spills and engine exhaust from power boats. Surface and bottom waters of Chesapeake Bay contain 0.0028 to 0.019 µg/L and 0.0025 to 0.034 µg/L, respectively, total dissolved plus particulate PAHs (Ko and Baker, 1994). As expected, the lower molecular weight PAHs analyzed (fluorene through pyrene) are present primarily in solution, whereas the higher molecular weight PAHs are mainly particle-bound. Fluorene and phenanthrene are most abundant, suggesting a primarily petrogenic origin for the PAH assemblage.

4.1.6 Phenol and BEHP in Produced Water and Ambient Seawater

Detection of bioaccumulation of phenol and BEHP from produced water in marine animals near offshore produced water discharges poses different problems. Phenol is abundant in most produced waters. Typical concentrations of phenol in produced waters from the Gulf of Mexico are in the range of 240 to 2,900 µg/L (Neff, 1997a). There is one report of a phenol concentration of 20,800 µg/L in a Gulf of Mexico produced water (Burns and Roe Industrial Services Corp., 1983). Phenol concentrations in produced water from the two discharging platforms sampled in this study ranged from 320 to 610 µg/L (**Table 4-4**). Thus, phenol concentrations in produced waters sampled in this study were in the lower part of the range reported for produced water discharges to the Gulf of Mexico. Phenol concentrations were higher than concentrations of total PAHs in all produced water samples from the two platforms.

Phenol also was present in ambient seawater from both produced water discharge sites and from reference sites, as well as in laboratory and field blanks (**Table 4-4**). However, the highest blank concentration was higher than any of the measured concentrations in ambient seawater, leading to uncertainty as to whether phenol actually was present in ambient seawater. The highest measured concentration of phenol in ambient seawater was 0.25 µg/L, more than 2,400 times lower than the highest concentration in produced water. In a similar fashion, high blank concentrations complicated interpretation of BEHP levels in seawater and produced water samples (**Table 4-4**). Phenol has a low log K_{ow} and low estimated bioaccumulation factor (0.47 to about 6.0) and so has little potential to bioaccumulate in tissues of marine animals. It also is difficult to analyze in tissues of marine organisms (detection limit, 0.038 µg/g dry weight). Therefore, given the rapid dilution of chemicals in produced water following discharge to the ocean, it is highly unlikely that bioaccumulation of phenol from produced water can be detected.

Although phthalate esters were reported in some samples of produced water collected from 30 production platforms in the northwestern Gulf of Mexico (Burns and Roe Industrial Services Corp., 1983), there is no concrete evidence that BEHP is a natural or introduced constituent of crude oil or produced water. BEHP was detected in 47 of 59 samples of produced water analyzed as part of the 30-platform study (Burns and Roe Industrial Services Corp., 1983; EPA, 1985). The median concentration in samples in which it was reported was 56 µg/L. The maximum concentration reported was 649 µg/L, about twice its solubility (340 µg/L: Howard *et al.*, 1985) in distilled water. This sample was an analytical artifact. Phthalate esters have not been detected in produced water samples from other sources (Large, 1990) and those reported by Burns and Roe Industrial Services Corp. (1983) probably were laboratory artifacts.

BEHP is an industrial chemical that is not known to be produced by natural biological or diagenic processes. It has not been identified as an additive used in oil and gas production or produced water treatment (Hudgins, 1989, 1991, 1992). BEHP is a physical plasticizer in several types of soft plastics and leaches readily from plastics into air and water. Because of its ubiquity in air, water, and even laboratory solvents, it is extremely difficult to analyze quantitatively in environmental samples (Lopezavila *et al.*, 1990; Sullivan and Carty, 1994). Most likely, the traces detected in some produced water samples were analytical artifacts introduced during sampling, processing, and analysis of produced water samples.

The produced water samples collected from the two discharging platforms on Cruises 2 and 3 contain <0.09 to 0.57 µg/L BEHP (**Table 4-4**). Ambient seawater samples from discharge sites and reference sites contain <0.09 to 1.80 µg/L BEHP. Blanks contain up to 0.35 µg/L. Thus, although elaborate precautions were taken to avoid it, laboratory contamination probably was responsible for all or most of the BEHP detected in the produced water and ambient seawater samples. These results lend support to the contention that phthalates are not natural or intentionally added constituents of produced water. Therefore, it is not possible to demonstrate bioaccumulation of BEHP from produced water by marine organisms because it is not a normal ingredient of produced water.

4.1.7 Summary

In summary, the chemicals with the greatest potential to bioaccumulate (metals, high molecular weight PAHs, and BEHP) are generally present at low or nondetectable concentrations in produced water. Therefore, it may be difficult to detect their bioaccumulation from produced water by marine animals in the vicinity of produced water discharges. Produced water is diluted very rapidly during mixing with ambient seawater, rendering concentrations of produced water constituents very low in ambient seawater to which marine animals might be exposed. Phenol and VOCs, although sometimes present at elevated concentrations in produced water compared to their concentrations in clean seawater, also are diluted rapidly when produced water is discharged to the ocean. They have a low tendency to bioaccumulate in tissues of marine animals near the produced water outfalls.

4.2 EVALUATION OF BIOACCUMULATION

4.2.1 Arsenic

Arsenic probably is an essential micronutrient for all plants and animals (Uthus, 1992). Therefore, it is not surprising that nearly all marine organisms contain measurable concentrations of inorganic and organic arsenic in their tissues. However, concentrations of total arsenic vary widely in tissues of different taxa of marine plants and animals and even in the tissues of a particular taxon from one location to another (**Table 4-5**). The variability in concentrations of arsenic in tissues of marine animals may be related to the forms and concentrations of arsenic in the diet and the ability of different marine animals to sequester, metabolize, or excrete accumulated inorganic and organic arsenic.

Concentrations of total arsenic in whole or muscle tissues of marine organisms worldwide range from below the detection limit of the analytical method (0.01 to 0.6 µg/g dry weight, depending on the method) to 2,739 µg/g dry weight (ppm) (**Table 4-6**). There is no consistent trend by taxonomic group or trophic level. Because of the wide range of non-normally distributed concentrations of a chemical contaminant found in tissues of marine organisms, the geometric mean value (mean of log-transformed data) best represents the "typical" concentration.

Among marine animals, lowest geometric mean concentrations of total arsenic are found in muscle tissue of marine mammals (pinnipeds and cetaceans), followed by whole tissues of mixed zooplankton. Whole or muscle tissues of fishes, bivalves, and crustaceans also contain relatively low concentrations of total arsenic. Highest typical concentrations of total arsenic are found in whole or muscle tissues of snails, polychaete worms, and crustacean larvae, many of which feed on marine micro- and macro-algae or organic detritus that often are rich in organic arsenic. Most of the arsenic in muscle or whole soft tissues of marine animals is organic, usually exceeding 95% (Edmonds and Francesconi, 1993).

O'Connor and Beliaeff (1995) have identified "high" concentrations of several metals and organic contaminants in soft tissues of mussels and oysters sampled in the National Status and Trends Mussel Watch Program. A "high" concentration is defined as the geometric mean concentration plus one standard deviation of the lognormal distribution of concentrations among sampling sites. Approximately 85% of animals sampled contain less than the “high” concentration. Nevertheless, the “high” concentration is not necessarily an indication of environmental contamination. The “high” concentration for arsenic in mussels and oysters is 17 µg/g dry weight. Eastern oyster *Crassostrea virginica* from the U.S. Atlantic coast contains <0.6 to 96.1 µg/g total arsenic (NOAA, 1995). Highest concentrations are in animals from the coasts of South and North Carolina, areas with extensive offshore deposits of phosphate (often rich in arsenic).

Concentrations of total arsenic in tissues of marine organisms from the U.S. Gulf of Mexico are comparable to those in tissues of similar species from other marine waters

of the world (**Table 4-6**). The largest number of analyses is available for bivalves, mostly eastern oyster, sampled by the U.S. Mussel Watch Program (NOAA, 1995). Overall, concentrations of total arsenic are lower in bivalves from the Gulf of Mexico than in bivalves from other locations. Oysters from coastal waters of the U.S. Gulf of Mexico contain <0.2 to 126 µg/g total arsenic. Highest concentrations are in oysters from coastal areas along the west coast of Florida receiving drainage from natural phosphate mineral deposits. Another bivalve, the jewel box *Chama* spp., contains somewhat elevated concentrations of arsenic in its tissue (Naito, 1994; NOAA, 1995). Jewel box from platforms discharging produced water to OCS waters off Louisiana contain lower concentrations of arsenic (16.9 to 58.5 µg/g dry weight) than jewel box from the Florida Keys (64.8 to 92.5 µg/g).

Arsenic concentrations in muscle tissue of fishes from the Gulf of Mexico usually are below 10 µg/g. The geometric mean arsenic concentration in muscle or whole tissues of fishes from the U.S. Gulf of Mexico is 0.84 µg/g dry weight compared to a geometric mean of 5.59 µg/g for marine fishes worldwide. However, gray triggerfish *Balistes capriscus* from the vicinity of offshore oil platforms discharging produced water to OCS waters off Louisiana contain 14.2 to 114.2 µg/g arsenic in muscle tissues (Naito, 1994). They feed on small attached epiflora and epifauna (probably rich in arsenic; see **Table 4-5**) attached to rocky reefs and platform structures.

Two species of bivalves, the jewel box (*Chama macerophylla*) and American thorny oyster (*Spondylus americanus*), collected from paired produced water discharge sites and reference sites in this study contained 42 to 120 µg/g dry weight total arsenic (**Table 4-7**). This concentration range is within the range reported for bivalves from the Gulf of Mexico and elsewhere in the world. However, the mean concentrations of arsenic in soft tissues of bivalves from discharging and non-discharging offshore platforms is higher than the mean concentrations in tissues of bivalves from coastal and estuarine waters because the concentration of arsenic in clean oceanic water is higher than that in most coastal and estuarine waters.

Most of the bivalves for which arsenic data are summarized in **Table 4-6** are from coastal waters of the Gulf. The paired discharge and reference platforms sampled in this study are 125 to 170 km offshore on the outer continental shelf and slope. Oceanic waters usually contain higher concentrations of total arsenic than coastal waters (Neff, 1997b). River water contains an average of 0.8 µg/L total dissolved arsenic (Froelich *et al.*, 1985), whereas typical seawater contains 1 to 3 µg/L total arsenic (Andreae, 1979). Thus, arsenic concentrations in water tend to increase with distance offshore. The bivalves are bioaccumulating arsenic from the ambient seawater and from their phytoplankton diet (which bioaccumulates arsenic from ambient seawater). This may account for the higher arsenic concentrations in bivalves sampled in this study.

Alternatively, the bivalves on the offshore platforms sampled here may be feeding on species of phytoplankton that bioaccumulate inorganic arsenate and convert it to methyl arsenic species that are readily bioaccumulated by bivalves. The distribution of methylarsenic-synthesizing microalgal species in the ocean is very uneven and seasonal (Millward *et al.*, 1996). Residues of arsenic in jewel box, and to a lesser

extent thorny oyster, show a seasonal trend of higher concentrations in the fall than in the spring (**Figures 4-1** and **4-2**). This suggests a seasonal variation in the supply of bioavailable forms of arsenic to the bivalves, possibly due to seasonal blooms of methyarsenic-synthesizing phytoplankton, or to seasonal differences in dilution of ambient seawater with low-arsenic Mississippi River water.

If the arsenic in the bivalve tissues was coming from the produced water, one would expect tissue residues of arsenic to be significantly higher in bivalves from the legs of the produced water-discharging platforms than from the reference platforms. However, average concentrations of arsenic were significantly higher in the jewel box from EI361A (R) than at the paired produced water discharge GC19A (D) for both Cruise 2 and 3 (**Table 4-7**). All other paired comparisons by cruise number were not significant. When data for the two cruises were combined, the jewel box from the two reference sites contained significantly higher concentrations of arsenic than from the paired discharge sites. However, thorny oyster from EB165A (D) contained significantly higher concentrations of arsenic than from the paired site, HI356A (R), when data for both cruises were combined.

Average arsenic concentrations in produced water from GC19A (D) were about five times higher than the arsenic concentration in produced water from EB165A (D) (**Table 4-1**). Thus, arsenic bioaccumulation, if it is from produced water, should be greater from GC19A (D) than from EB165A (D). This was not the case. These results provide strong evidence that the two species of bivalves are not bioaccumulating arsenic from produced water from the two platforms.

Fishes collected from the vicinity of the produced water discharge sites and the reference sites contained 2.3 to 35 µg/g dry weight total arsenic (**Tables 4-8** and **4-9**). Highest concentrations were in gray triggerfish and sergeant major (*Abudefduf saxatilis*). This range of concentrations of arsenic in fish muscle tissue is in the middle of the ranges reported for fishes from the world oceans and the Gulf of Mexico (**Tables 4-5** and **4-6**). However, arithmetic and geometric mean concentrations of arsenic in fish tissues from this study were higher than those for fishes from the Gulf of Mexico (**Table 4-6**). Most arsenic concentrations in tissues of yellow chub (*Kyphosus incisor*), creole-fish (*Paranthias furcifer*), and rockhind (*Epinephelus adcensionis*) were below the geometric mean arsenic concentrations in fishes from throughout the world (**Tables 4-5** and **4-6**). These concentrations are in the range of concentrations that would be expected in fishes from an uncontaminated marine environment.

Gray triggerfish and sergeant majors probably are obtaining their elevated body burdens of arsenic by consuming biofouling algae (usually containing naturally high concentrations of inorganic and organic arsenic) from the submerged legs of the platforms or from rocky reefs in the area. Gray triggerfish from Sonnier Bank on the outer continental shelf about 60 km south of the Louisiana coast, a site that does not contain a production platform, contained an average of 85.6 µg/g dry weight of arsenic in edible muscle tissue (Continental Shelf Associates, Inc., 1997). Thus, high tissue concentrations of arsenic apparently are natural for this species.

In three of the four cases where there was a statistically significant difference in arsenic concentrations in fish tissues from paired discharge and reference sites, the highest mean concentration was in fishes collected near the produced water discharges (**Tables 4-8** and **4-9**). Muscle of sergeant major from HI356A (R) contained higher arsenic concentrations than muscle from the same species from the paired site EB165A (D) at the time of Cruise 3 (**Table 4-9**). Muscle of yellow chub from the vicinity of GC19A (D) contained significantly higher concentrations of arsenic than muscle of the same species from the paired reference site EI361A (R) at the time of both Cruise 2 and 3. However, the arsenic concentrations in yellow chub muscle from both the discharge and reference site were below the arithmetic mean for all fishes from the Gulf of Mexico (**Table 4-6**) and both the arithmetic and geometric mean arsenic concentrations in marine fishes worldwide (**Table 4-5**). Thus, the concentrations of arsenic in yellow chub from the vicinity of GC19A (D) should be considered normal.

All other comparisons were not statistically significant. None of the differences in arsenic concentrations in fishes from reference and discharge sites, even when statistically significant, were large. In no case was the arsenic concentration in edible tissue from a fish species from a discharge site more than twice as high as the concentration in muscle of the same species of fish from the paired reference site. Thus, bioaccumulation of arsenic from produced water by fishes, if it occurs, is of a low order of magnitude and all tissues contained arsenic concentrations within the range expected in marine fishes.

4.2.2 Barium

There are relatively few published data on concentrations of barium in soft tissues of marine organisms. The available data indicate that concentrations of barium in tissues of marine animals range from 0.007 µg/g dry weight in muscle of bluefin tuna *Thunnus thynnus* from Japan (Başari, 1994) to more than 30,000 µg/g dry weight in xenophyophoran protozoans from the open North Atlantic Ocean (Gooday and Nott, 1982). The average concentration of barium in tissues of all the marine animals for which data are available is 246 µg/g dry weight (geometric mean 2.13 µg/g) (**Table 4-10**). The large standard deviations of the arithmetic means and the small geometric means compared to arithmetic means indicate that concentrations of barium in tissues of most marine organisms are very low, but a few taxa contain very high concentrations of barium.

As a general rule, concentrations of barium decrease as one proceeds from lower to higher trophic levels (**Table 4-10**). Phytoplankton and macroalgae contain the highest concentrations. Soft tissues of corals also are rich in barium (Howard and Brown, 1986), perhaps accumulated by their symbiotic algae. Soft tissues of bivalves and crustaceans generally contain similar concentrations. The range of published barium concentrations in bivalves from throughout the world is 0.091 to 179 µg/g (Neff, 1997a). The highest concentration was in a jewel box from a production platform off Louisiana (Naito, 1994).

Some bivalves from the Gulf of Mexico, particularly from the vicinity of development and production platforms, contain higher concentrations of barium in soft tissues than bivalves from marine areas where there is no offshore oil development and production (Boesch and Rabalais, 1989; Naito, 1994). The bivalves probably are accumulating particulate barite, either from drilling fluids or precipitated from produced water, as Jenkins *et al.* (1989) have reported for benthic bivalves from the vicinity of drilling fluid discharges to the Santa Barbara Channel, CA.

Soft tissues of fishes have the lowest concentrations of barium of the marine organisms analyzed to date. Barium concentrations in muscle and organ tissues of marine fishes from throughout the world range from 0.007 µg/g in muscle of bluefin tuna from Japan (Başari, 1994) to 49 µg/g in whole striped bass from San Francisco Bay, CA (Saiki and Palawski, 1990). The mean concentration of barium in edible muscle tissue of fishes collected in this investigation was 0.61 µg/g.

In marine fishes, highest concentrations of barium usually are observed in gills, followed by bone (Patterson and Settle, 1977; Başari, 1994). The barium in gills may be present as barite granules in encapsulated in vacuoles in gill epithelium. Organ tissues, such as liver, kidney, and ovary, do not accumulate barium to concentrations higher than those in muscle tissue (Patterson and Settle, 1977; Hellou *et al.*, 1992b; Başari, 1994). Top carnivorous fishes, such as tuna (Başari, 1994), and marine mammals, such as polar bears (Norstrom *et al.*, 1986), do not accumulate barium in their tissues to higher concentrations than animals at lower trophic levels do, indicating that barium is not biomagnified in marine food webs.

Jewel box and thorny oyster from the produced water discharge sites and reference sites sampled in this study contained 11 to 220 µg/g dry weight barium in soft tissues (**Table 4-11**). The arithmetic mean concentration of barium in soft tissues of both species combined from the four discharge and reference sites was 31.3 µg/g (± 35.1 µg/g); the geometric mean was 23.4 µg/g (**Table 4-10**). Thus, bivalves from offshore production platforms in the Gulf contain higher concentrations of barium in soft tissues than bivalves from other locations.

Highest concentrations of barium are in jewel box collected during Cruises 2 and 3 from GC19A (D) (**Table 4-11**). However, there was not a statistically significant difference in barium concentrations in bivalves from discharge sites and their paired reference sites when examined by cruise. When data for the two cruises were combined, jewel box from GC19A (D) contained statistically significantly higher concentrations of barium than jewel box from the paired reference site, EI361A (R). Jewel box and thorny oyster from HI356A (R) contained statistically significantly higher concentrations of barium than bivalves from the paired platform, EB165A (D), when data for the two cruises were combined. Thus, it is doubtful that the elevated concentrations of barium in the jewel box from platform legs on GC19A (D) was derived from the produced water discharge.

The five species of fishes from the vicinity of the paired reference and discharge sites sampled in this study contained 0.020 to 3.1 µg/g barium in edible muscle tissue (**Tables 4-12** and **4-13**). Fishes sampled in this study contained lower arithmetic mean

concentrations of barium than fishes from elsewhere (**Table 4-10**). However, the geometric mean concentration was higher for fishes from this study than for fishes from elsewhere, indicating a more normal distribution of barium concentrations in fishes from this study. Thus, fishes from the vicinity of offshore platforms in the Gulf of Mexico do not contain higher than expected concentrations of barium in their edible tissues.

For the three species of fishes for which comparative data are available, barium concentrations in muscle were much higher in the spring (Cruise 2) than in the fall (Cruise 3) (**Figures 4-3** and **4-4**). Mean concentration differences were about 10-fold in yellow chub and creole-fish. The reason for this seasonal difference in barium concentrations in fish tissues in not known. It may be related to seasonal mobilization of bone calcium during the annual reproductive cycle. Barium, an alkaline earth element like calcium, often is present at high concentrations in skeletal structures of fishes and invertebrates. The slightly elevated barium concentrations in fishes collected in the spring are well within the natural range for barium in fish muscle and probably have no toxicological significance to the fish.

With one exception, there was no statistically significant difference in barium concentrations in muscle tissue of fishes from produced water discharge and reference sites (**Tables 4-12** and **4-13**). Sergeant major collected from HI356A (R) on Cruise 3 contained a significantly higher concentration of barium than the same species from the paired discharge site. In all cases for all other species, ranges of barium concentrations were comparable in fishes from the paired discharge/reference sites in each season. Therefore, there is no evidence that fishes were bioaccumulating barium from produced water.

4.2.3 Cadmium

Concentrations of cadmium in the muscle or whole tissues of marine plants, invertebrates, fishes, birds, and mammals generally fall in the range of 0.001 to 277 µg/g dry weight (**Table 4-14**). There is no consistent trend in tissue residues based on taxonomic position or trophic status. However, in some marine environments, such as coastal Greenland, there is a tendency for tissue concentrations of cadmium to increase with increasing trophic level (Dietz *et al.*, 1996). The largest jump in tissue residues of cadmium is in the trophic step from water-breathing prey to air-breathing predators. Much of the cadmium in tissues of higher trophic level marine animals is sequestered in immobile forms in kidney and liver (Neff, 1997a).

High concentrations of cadmium often are observed in mollusks, particularly snails, scallops, and oysters (**Table 4-14**). Mussels and oysters are used extensively worldwide to monitor contamination of coastal environments and often contain elevated concentrations of cadmium. The “high” concentration of cadmium in soft tissues of oysters and mussels from the U.S. National Status and Trends Mussel Watch Program is 5.7 µg/g dry weight (O’Connor and Beliaeff, 1995). Scallops, even from remote areas, such as Antarctica, may contain high concentrations of cadmium, primarily in their kidneys and digestive glands (Berkman and Nigro, 1992; Viarengo *et al.*, 1993). There is a tendency for concentrations of cadmium in mollusk tissues to increase with

the age and size of the animal (Swaileh and Adelung, 1994), reflecting the slow release of accumulated cadmium from mollusk tissues. Marine algae and seagrasses also often contain elevated concentrations of cadmium.

Muscle tissue of marine fishes, birds, and mammals usually contains low concentrations of cadmium (**Table 4-14**). Highest reported concentrations of cadmium in fish muscle are for menhaden (*Brevoortia patronus*) from the Calcasieu River, Louisiana (Ramelow *et al.*, 1989). Highest cadmium concentrations in muscle of marine mammals are for narwhals (*Monodon monoceros*) from west Greenland (Hansen *et al.*, 1990).

Concentrations of cadmium in tissues of marine animals from the Gulf of Mexico are similar to those in tissues of marine animals from other marine areas of the world (**Table 4-15**). Concentration ranges of cadmium are slightly higher in tissues of clams and oysters, but substantially lower in tissues of shrimps and fishes from the Gulf of Mexico than in the corresponding taxa from elsewhere in the world. The differences probably are due primarily to species-specific differences in bioaccumulation and retention of cadmium by these taxa in different parts of the world. The general similarity of cadmium residues in tissues of marine animals from the Gulf of Mexico and elsewhere indicates that the Gulf is not more severely contaminated with cadmium than other marine waters of the world.

Concentrations of cadmium in soft tissues of jewel box and thorny oyster from discharge and reference sites sampled in this study were in the range of 3.4 to 11 µg/g and 13 to 36 µg/g, respectively (**Table 4-16**). Most of the concentrations in individual composite samples are above the NOAA “high” value and the geometric mean concentrations for clams and oysters in the Gulf of Mexico and elsewhere in the world (**Table 4-15**). Thorny oysters, in particular, may be natural bioaccumulators of cadmium, as are several species of scallops.

Jewel box sampled on Cruise 3 from GC19A (D) contained statistically significantly lower concentrations of cadmium than jewel box from the paired reference site, EI361A (R) (**Table 4-16**). All other paired comparisons by cruise were not statistically significant. However, when data for the two cruises were combined, thorny oyster from EB165A (D) contained statistically significantly higher concentrations of cadmium than oyster from the paired site, HI356A (R). Concentrations of cadmium in individual samples of thorny oyster from all four sampling sites varied by a factor of less than three, suggesting that, although some paired comparisons were statistically significant, they probably were within the natural variability of cadmium concentrations in bivalve tissues and were not biologically significant. Although there was no consistent trend, concentrations of cadmium in soft tissues of jewel box from GC19A (D) declined significantly between the spring (Cruise 2) and fall (Cruise 3) surveys. This decline may have been caused by the decline in cadmium concentrations in ambient seawater at GC19A (D) between Cruises 2 and 3 (**Table 4-1**).

Although concentrations of cadmium in soft tissues of the two species of bivalves from the underwater structures on the four offshore platforms were higher than typical concentrations in bivalves from elsewhere in the Gulf of Mexico, there is no clear

indication that the excess cadmium came all or in part from the produced water discharges from two of the platforms. Tissue residues of cadmium in the bivalve tissues were roughly comparable at discharge sites and reference sites, indicating that the bivalves probably were not bioaccumulating cadmium from produced water.

Five species of marine fishes collected from the four study sites contained <0.002 µg/g (ND) to 0.029 µg/g cadmium in edible muscle tissues (**Tables 4-17** and **4-18**). The geometric mean concentration of cadmium in all 131 samples of fishes analyzed in this study was 0.009 µg/g. All these concentrations were below the geometric mean concentrations of cadmium in tissues of fishes from the Gulf of Mexico (0.06 µg/g) and elsewhere in the world (0.16 µg/g) (**Table 4-15**).

There was no consistent seasonal trend in cadmium concentrations in fish tissues. Cadmium concentrations in muscle tissue of yellow chub declined between the spring and fall surveys at each platform pair (**Figures 4-5** and **4-6**). However, cadmium concentrations in muscle tissue of gray triggerfish increased between the spring and fall surveys at the platform pair GC19A (D)/EI361A (R).

There was not a statistically significant difference in cadmium concentrations in yellow chub, creole-fish, and rockhind collected from discharge and reference sites (**Tables 4-17** and **4-18**). Cadmium concentrations in muscle of gray triggerfish from GC19A (D) were statistically significantly higher than those in muscle of gray triggerfish from the paired reference site EI361A (R) at the time of the third cruise, but not at the time of the second cruise. Muscle tissue of sergeant major collected during the third cruise from EB165A (D) also contained statistically significantly more cadmium than muscle tissue of sergeant major from the paired reference site, HI356A (R). The differences, although statistically significant in both cases, were very small and probably of no biological significance.

One of the two instances where cadmium concentrations were statistically significantly higher in fishes from the discharge than from the reference site was for the discharge/reference pair GC19A (D)/EI361A (R). GC19A (D) had the produced water discharges with the highest cadmium concentrations (**Table 4-1**). It is possible that some of the cadmium in tissues of fishes from the vicinity of this discharge could have been bioaccumulated from these produced water discharges. However, cadmium concentrations in these fishes are in the low, natural range. Therefore, if bioaccumulation of cadmium did occur from produced water discharged from GC19A (D), the bioaccumulation was minimal and restricted to one species. Jewel box and thorny oyster collected from this discharge site on the third cruise did not contain elevated concentrations of cadmium. Therefore, it is probable that the slightly elevated concentrations in the gray triggerfish muscle may have been from another source than produced water.

4.2.4 Mercury

Concentrations of total (inorganic plus organic) mercury in the whole soft tissues or muscle of marine organisms from throughout the world generally fall in the range of

0.003 to 264 µg/g dry weight (**Table 4-19**). There is a general but inconsistent trend for concentrations of total mercury in tissues of marine organisms to increase from lower taxa to higher taxa. Muscle tissues of some sharks, teleost fishes, marine birds, and marine mammals contain higher concentrations of total mercury than soft tissues and muscle of some polychaetes, mollusks, and crustaceans. Highest geometric mean concentrations are in muscle of sharks, followed by muscle tissues of marine mammals and birds (**Table 4-19**). Marine algae also have a high geometric mean concentration of total mercury.

Within a taxonomic category, animals at higher trophic levels often contain higher concentrations of total mercury than species at lower trophic levels (Neff, 1997a). However, this apparent trend is confounded by the wide variation of mercury concentrations in tissues of marine animals from the same or closely related species, and the role of proximity to sources of water-column and sediment contamination with bioavailable forms of mercury. The trend is seen best in oceanic species. For example, albatrosses (fish eaters) contain much higher concentrations of total mercury in muscle and other tissues than do puffins and murres (zooplankton eaters) (Honda *et al.*, 1990). Several tissues of dolphins, beluga whales, and pilot whales (carnivores) contain substantially higher concentrations of total mercury than similar tissues of several species of baleen whales (mostly plankton-eaters) (Neff, 1997a).

Bivalves (mussels, oysters, scallops, and clams) usually contain low concentrations of total mercury in their tissues, even when collected from contaminated environments; concentration ranges of mercury in soft tissues of the different taxonomic groups of bivalves are in the range of 0.005 to 85 µg/g dry weight (**Table 4-19**). Snails and cephalopods often contain slightly higher concentrations of mercury than bivalves.

Concentrations of total mercury in muscle tissues of sharks and teleost fishes vary widely. It is unclear if habitat contamination or trophic status is the major factor contributing to variability in mercury concentrations in elasmobranch and teleost fishes tissues. The highest concentration of mercury measured in shark muscle (52.5 µg/g dry weight) is from a draughtboard shark (*Cephaloscyllium laticeps*) from waters off Tasmania (Thomson, 1985). Muscle tissue from draughtboards from the OCS off southeastern Australia contained 0.4 to 15.5 µg/g total mercury (Walker, 1988). Well-known top predator sharks from southeast Australia, such as the white-tipped shark (*Carcharodon carcharias*) and the Port Jackson shark (*Heterodontus portusjacksoni*) contained 0.6 to 6.5 µg/g total mercury in their muscles (Walker, 1988).

Among teleost fishes, the highest concentration of total mercury in muscle (115 µg/g dry weight) was reported from *Nibea schlegeli* from Minamata Bay, Japan, a location heavily contaminated with organic mercury from a vinyl chloride plant (Fujiki and Tajima, 1992). Several species of flatheads (*Platycephalus* spp.), as well as tommy ruff (*Arripis georgianuis*) and brown-spotted wrasse (*Pseudolabrus parilus*) from Princess Royal Harbor, Western Australia, contain elevated concentrations of total mercury (>35 µg/g) in their muscle tissues (Francesconi and Lenanton, 1992). Other species of teleosts from the same harbor generally contain much lower concentrations of total mercury (≤2 µg/g) in their muscles. Muscles of swordfish (*Xiphius gladius*), blue marlin (*Makaira*

nigricans), and bluefin tuna (*Thunnus thynnus*) from oceanic waters of the Atlantic, Pacific, and Mediterranean often contain more than 1 µg/g dry weight total mercury and occasionally up to 9 µg/g (Monteiro and Lopes, 1990; Bloom, 1992; Hellou *et al.*, 1992a; Pastor *et al.*, 1994). This mercury probably is derived from the methylmercury generated by bacterial activity in the oxygen minimum layer in the open ocean (Rolfhus and Fitzgerald, 1995).

Muscle tissues of demersal feeders, such as cod (*Gadus morhua*) (Clark and Topping, 1989; Hellou *et al.*, 1992b) and plaice (*Pleuronectes platessa*) (Clark and Topping, 1989) usually contain less than 1 µg/g total mercury. Muscles of plankton-feeders, such as anchovies (*Engraulis* spp.) (Buzina *et al.*, 1989; Pastor *et al.*, 1994) and herring (*Clupea harengus*) (Braune, 1987; Buzina *et al.*, 1989) also often contain low concentrations of total mercury. However, there are many exceptions; top predators with low concentrations of mercury in muscles and lower trophic level species with high concentrations of muscle mercury are common (Neff, 1997a). The variability may be related to size/age-dependent changes in tissue residues of mercury and to local variation in organic mercury concentrations in different food organisms.

For all the taxa of marine animals for which comparative data were available, concentrations of total mercury in whole soft tissues or muscle of marine animals from the Gulf of Mexico are lower than in marine animals from other marine and coastal waters of the world (**Table 4-20**). However, the comparison may be biased by the relatively small numbers of analyses of tissues of animals, particularly clams, shrimps, and fishes, from the Gulf of Mexico. Oysters with the highest concentration of total mercury are from the Mississippi coast (Lytle and Lytle, 1982). The source of this mercury contamination is not known. Other mercury contaminated oysters come from Lavaca Bay, TX (Palmer *et al.*, 1993), an area with known mercury contamination. Most of the data for mercury residues in fishes from the Gulf of Mexico is from the Calcasieu River estuary, LA (Ramelow *et al.*, 1989). Highest mercury concentrations are in muscle of southern flounder (*Paralychthys lethostigma*) and spotted gar (*Lepisosteus oculatus*) (1.0 µg/g and 1.0 to 2.0 µg/g, respectively).

Mercury may be present in the tissues of marine organisms as inorganic mercury or as various organo-mercury compounds. The fraction of total mercury that is organic tends to increase in muscle or whole soft tissues with higher taxonomic position. Only a small fraction, generally 10% or less, of the mercury in marine algae and seagrasses is organic (Francesconi and Lenanton, 1992). Somewhat less than 50% of the mercury in tissues of polychaetes and clams is organic (Najdek and Sapunar, 1987; Francesconi and Lenanton, 1992). About 50% of the mercury in tissues of snails, crabs, and sharks is organic. More than 50% of the mercury in cephalopods, some crustaceans, and teleost fishes is organic (Bloom, 1992; Pastor *et al.*, 1994). The organic mercury/total mercury ratio may approach 1.0 in muscle tissues of several species of marine crustaceans and fishes (Grieb *et al.*, 1990; Lasorsa and Allen-Gil, 1995).

Concentrations of organic mercury in tissues of marine organisms range from about 0.01 µg/g dry weight to more than about 125 µg/g (Neff, 1997a). There is a slight tendency for concentrations of organic mercury, but not inorganic mercury, in tissues of

marine organisms to be higher at higher trophic levels in marine food chains, suggesting that organic mercury has a tendency to biomagnify to some extent in marine food webs. Inorganic mercury does not biomagnify.

This distribution of inorganic and organic mercury in marine food webs suggests that organisms, such as plants, at lower levels in the food web accumulate primarily inorganic mercury and convert it to organic forms that are transferred efficiently to higher levels in the food web by trophic transfer. An alternative explanation is that trophic transfer and retention is much more efficient for organomercury compounds than for inorganic mercury, resulting in biomagnification of organomercury but not inorganic mercury. The latter explanation is gaining considerable empirical support (Neff, 1997a), whereas there is little empirical evidence that marine plants and animals can methylate inorganic mercury.

Concentrations of total mercury in tissues of the jewel box from the legs of several offshore production platforms with produced water discharges are in the range of 0.046 to 0.11 µg/g dry weight, compared to a mean of 0.051 µg/g in soft tissues of jewel box from a reference (no produced water discharge) platform (Trefry *et al.*, 1995, 1996). The mean concentration of total mercury in soft tissues of eastern oyster near a discharging platform off Louisiana is 0.06 µg/g, compared to a mean concentration of 0.13 µg/g in oyster from a nearby non-discharging platform. Concentrations of total mercury are slightly higher in muscle of red snapper (*Lutjanus campechanus*) from a non-discharging platform (mean, 0.72 µg/g) than from two discharging platforms (means, 0.37 and 0.28 µg/g). However, the concentrations of mercury in muscle tissue of gray triggerfish from a discharging platform (mean, 1.1 µg/g) are higher than those in muscle of gray triggerfish from a reference platform (mean, 0.47 µg/g) and another discharging platform (mean, 0.44 µg/g) off Louisiana. These concentrations of mercury in muscle tissues of fishes from the vicinity of offshore produced water discharges are in the same range as mercury concentrations in muscle of fishes from the Calcasieu River estuary, LA (Ramelow *et al.*, 1989). These results suggest that there is not a significant bioaccumulation of mercury by marine mollusks and fishes from the vicinity of these produced water discharges.

In the present study, concentrations of total mercury in soft tissues of jewel box from two discharge/reference platform pairs ranged from 0.049 to 0.120 µg/g (**Table 4-21**). Mercury concentrations in soft tissues of thorny oyster from the same locations were slightly higher, ranging from 0.098 to 0.33 µg/g (**Table 4-21**). The geometric mean concentration of mercury in soft tissues of samples of jewel box and thorny oyster combined was 0.12 µg/g (**Table 4-20**). All these concentrations in jewel box and most of the concentrations in thorny oyster are lower than the geometric mean concentrations for mercury in bivalves from the Gulf of Mexico and elsewhere in the world (**Table 4-20**). All the means are lower than the “high” concentration of mercury (0.24 µg/g) in bivalve tissues from the NOAA Mussel Watch Program (O’Connor and Beliaeff, 1995).

There was no statistically significant difference in concentrations of total mercury in soft tissues of jewel box and thorny oyster collected from produced water and paired reference sites (**Table 4-21**). All concentrations were low and typical of mercury

concentrations in bivalves from clean marine environments. Therefore, there is no evidence of bioaccumulation of mercury from produced water by bivalves.

Concentrations of total mercury in muscle tissue of five species of marine fishes from the vicinity of the paired discharge and reference platforms sampled in this study ranged from 0.042 to 0.67 µg/g (**Tables 4-22** and **4-23**). Concentrations were quite variable from one species to another. Rockhind had the highest mean concentration of mercury in its muscle tissue (means, 0.32 and 0.54 µg/g); gray triggerfish also contained relatively high concentrations of total mercury. Lowest concentrations were in muscle tissues of yellow chub (range of means, 0.059 to 0.12 µg/g). All but a few of these concentrations were lower than geometric mean concentrations of total mercury in muscle tissues of fishes from the Gulf of Mexico and elsewhere in the world (**Table 4-20**). Thus, it is highly likely that mercury in tissues of fishes near offshore platforms in the northwestern Gulf of Mexico are normal or typical and are not causing harm to the fishes or their consumers.

In two cases, there was a statistically significant difference in mercury concentrations in muscle of a species of fishes from paired discharge and reference platforms (**Table 4-23**). The mean concentration of mercury in rockhind muscle from HI356A (R), collected on Cruise 2, was significantly higher than the mean concentration in rockhind from the paired platform EB165A (D). The highest measured concentration for any fish in this study (0.67 µg/g mercury) was for rockhind from HI356A (R). Sergeant major collected from EB165A (D) on Cruise 3 contained significantly higher mercury concentrations in muscle tissue than sergeant major from the paired platform HI356 (R). Thus, the only two statistically significant differences were for two species of fishes from the same platform pair, and the direction of the difference is opposite. Mercury could not be detected in this study by sensitive analytical methods in either produced water or ambient seawater.

These results support the conclusion that fishes from the vicinity of these two offshore produced water discharges are not bioaccumulating mercury from produced water. Concentrations of total mercury in muscle tissues of fishes from both discharge sites and reference sites are low and typical of background concentrations in marine teleosts from clean ocean waters.

4.2.5 Radium

There is very little published information about concentrations (activity) of ^{226}Ra and ^{228}Ra in the tissues of marine organisms. Most of the published literature on this subject has been summarized by Snavely (1989a,b), Bonotto (1990), Iyengar (1990), and Iyengar and Rao (1990). These data, plus more recent determinations in marine invertebrates from the U.S. Gulf of Mexico (Brookhaven National Laboratory, 1992; Hart *et al.*, 1995), are summarized in **Table 4-24**.

Generally, highest concentrations of ^{226}Ra and, to a lesser extent, ^{228}Ra are in marine plants and concentrations decrease in progressively higher taxonomic categories that roughly correspond to higher trophic levels. Soft tissues (usually edible muscle) of

fishes usually have the lowest ^{226}Ra concentrations. In most taxa for which comparative data are available, activity of ^{228}Ra is higher than that of ^{226}Ra. However, there are insufficient data on the concentrations of ^{228}Ra in tissues of marine organisms to allow a determination if this trend is actual.

Skeletal tissues of marine invertebrates, fishes, and marine mammals sometimes contain higher concentrations of radium than soft tissues do (**Table 4-24**). The differences often are not great. Radium and the other alkaline earths are considered bone-seeking. They can readily substitute for calcium in the calcium carbonate or calcium phosphate lattice of shell and bone. Teeth of an unidentified whale contain 0.044 to 0.332 pCi/g ^{226}Ra (Iyengar and Rao, 1990). The ratio of ^{226}Ra in the bone to that in muscle of the fish *Ophiocephalus* sp. from a freshwater environment contaminated with uranium mine tailings, is in the range of 5.0 to 7.9 (Iyengar, 1984).

Concentrations of ^{226}Ra and ^{228}Ra in mollusks, crabs, and fishes from the vicinity of produced water discharges in the northwestern Gulf of Mexico usually are comparable to concentrations in marine animals at reference locations away from the discharges (Brookhaven National Laboratory, 1992; Hart *et al.*, 1995) and in marine organisms from elsewhere in the world oceans (**Table 4-24**). However, concentrations of radium in the animals are highly variable and usually near the detection limit of the analytical method. Therefore, it usually is not possible to determine if there are small increases in radium concentrations in tissues of marine animals close to produced water discharges containing high concentrations of radium.

Jewel box and thorny oyster from the paired discharge and reference sites sampled in this study contained ND to 0.34 pCi/g dry weight ^{226}Ra and ND to 0.20 pCi/g ^{228}Ra (**Table 4-25**). Thorny oyster contained slightly higher concentrations ranging from 0.061 pCi/g to 0.34 pCi/g ^{226}Ra and ND to 0.20 pCi/g ^{228}Ra. Arithmetic and geometric mean concentrations of ^{226}Ra and ^{228}Ra in the two species of bivalves collected in this study were comparable to or lower than the mean tissue residues of these radioisotopes in marine mollusks worldwide (**Table 4-24**). Thus, concentrations of radium isotopes in soft tissues of bivalves from the vicinity of production platforms in the northwestern Gulf of Mexico were not elevated compared to concentrations in mollusks from elsewhere, despite the fact that the produced water from the two discharging platforms was enriched by more than 1,000-fold in ^{226}Ra and ^{228}Ra compared to ambient seawater (**Table 4-2**).

The concentration of ^{228}Ra was statistically significantly higher in tissues of jewel box from the discharging platform EB165A than those from the paired reference site HI356A (**Table 4-25**). This was because ^{228}Ra could not be detected in tissues of jewel box from the reference site. Three of the jewel box from EB165A (D) also did not contain detectable concentrations of ^{228}R; the other three samples contained 0.078, 0.091, and 0.145 pCi/g ^{228}Ra, all concentrations below the geometric mean concentration for marine mollusks worldwide. In all other cases there was no statistically significant difference in concentrations of ^{226}Ra or ^{228}Ra in tissues of jewel box and thorny oyster from discharge sites and their paired reference sites. Thus, jewel box and thorny oyster were not bioaccumulating radium isotopes from produced water.

Concentrations of radium isotopes were lower in five species of fishes than in the two species of bivalves, as expected from the scientific literature. Concentrations of ^{226}Ra ranged from below the MDL to 0.058 pCi/g dry weight. Concentrations of ^{228}Ra ranged from below the MDL to 0.22 pCi/g (**Tables 4-26** and **4-27**). These concentrations are comparable to or lower than concentrations in fish tissues from throughout the world (**Table 4-24**). For discharging and reference sites combined in this study, ^{226}Ra could not be detected (below MDL) in 1% of the bivalve tissues and in 44% of the fish tissues; ^{228}Ra could not be detected in 57% of the bivalve tissues and 61% of the fish tissues. Thus, radium concentrations in fishes near offshore produced water discharges and non-discharging platforms in the northwestern Gulf of Mexico are typical of natural concentrations of these radioisotopes in fishes from throughout the world.

There were no statistically significant differences in concentrations of ^{226}Ra or ^{228}Ra in tissues of any of the five species of fishes from discharge sites and their paired reference sites. Therefore, marine fishes near offshore produced water discharges were not accumulating ^{226}Ra and ^{228}Ra from produced water discharges containing elevated concentrations of these radioisotopes.

4.2.6 Phenol

There is very little published information on concentrations of phenol in tissues of marine organisms. This probably is due to two reasons. Phenol is not expected, based on its physical/chemical properties, to bioaccumulate to high concentrations in tissues of marine organisms, and so is rarely selected for analysis. In addition, as an ionizable compound, it is difficult to extract and recover quantitatively from tissues (Meyer and Linder, 1986; Daugherty, 1994). However, phenol may taint fishery products with an off odor and taste. Phenol has occasionally been identified as a contributor to tainting of fish.

Muscle tissues of rainbow trout *Oncorhynchus mykiss* from tailings ponds at a Canadian oil sands plant contained an average of 0.0463 µg/g wet weight (≈0.23 µg/g dry weight) phenol (Koning and Hrudey, 1992). The water in which the fish lived contained an average of 20.3 µg/L phenol, resulting in a wet weight BCF of 2.28. Eels *Anguilla anguilla* living in a French estuary influenced by refinery effluents rich in phenols contained 19 to 49 µg/g wet weight (≈ 95 to 245 µg/g dry weight) total phenols in muscle tissue (Grauby *et al.*, 1973). The phenols gave the fish flesh a strong foul smell.

Concentrations of phenol in soft tissues of jewel box and thorny oyster from paired discharge and reference sites in the northwest Gulf of Mexico ranged from below the MDL of 0.038 µg/g dry weight to 0.80 µg/g (**Table 4-28**). There are no comparative phenol data in marine bivalves with which to compare these results.

Phenol concentrations were slightly but statistically significantly higher in tissues of jewel box (0.28 to 0.45 µg/g dry weight) and thorny oyster (0.30 to 0.61 µg/g) from EB165A (D) than at its paired site HI356A (R) (0.091 to 0.33 µg/g and 0.11 to 0.21 µg/g, respectively) at the time of Cruise 3 (**Table 4-28**). Laboratory blanks analyzed with the tissue samples containing the highest concentrations of phenol also contained elevated

concentrations of phenol. Therefore, it is probable that part of the phenol detected in the bivalve tissues was laboratory artifact; actual phenol concentrations in the bivalve tissues probably were lower than measured values. For all other sampling times and discharge/reference pairs, there was no statistically significant difference between phenol residues in bivalves from discharge and reference sites. Therefore, there is no indication that phenol is bioaccumulated from produced water by marine bivalves.

Concentrations of phenol in muscle tissues of five species of fishes from the vicinity of offshore produced water discharges and nearby non-discharging reference platforms ranged from below the MDL to 1.0 µg/g (**Tables 4-29** and **4-30**). The highest concentration was in gray triggerfish from GC19A (D). Concentrations of phenol in gray triggerfish from this platform at the time of the third cruise were statistically significantly higher than those in gray triggerfish from the paired site EI361A (R) (**Table 4-30**). The concentration of phenol in muscle of creole-fish from HI356A (R) contained a statistically significantly higher concentration of phenol than muscle of creole-fish from the paired site EB165A (D). There were no other statistically significant differences in phenol concentrations in muscle tissue of fishes from discharge and reference sites. Apparently, gray triggerfish, which graze on the biofouling community of rocky reefs and submerged platform structures, are accumulating small amounts of phenol from some natural source. It is possible that some biofouling organisms on the submerged platform structures on GC19A (D) either bioaccumulate or synthesize phenol that is bioaccumulated by the triggerfish from their food. Phenol and alkyl phenols are biosynthesized by a wide variety of marine bacteria, fungi, and plants (Buikema *et al.*, 1979). The fish could also bioaccumulate the phenol directly from the produced water plume. However, the absence of phenol bioaccumulation by the other fish species is unexplained. Some species of fishes, such as gray triggerfish, and bivalves, such as jewel box and thorny oyster, may bioaccumulate small amounts of phenol from produced water.

4.2.7 BEHP

Because of its low solubility in seawater (about 0.6 µg/L) and high log K_{ow} (about 7), BEHP tends to bioaccumulate in the lipid-rich tissues of marine organisms (Boese, 1984). Bioaccumulation appears to be efficient from both water and food. However, most marine animals can metabolize and excrete accumulated BEHP rapidly.

Mussels *Mytilus edulis*, exposed for 28 days to 4.1 and 42.1 µg/L ^{14}C-BEHP in solution, accumulate BEHP in their soft tissues to concentrations of 61.5 and 612.5 µg/g dry weight (≈ 12.3 and 122.5 µg/g wet weight), respectively (Brown and Thompson, 1982). These bioaccumulations represent a wet weight BCF of approximately 3,000.

Equilibrium is reached after about 14 days. The half time for release of accumulated ^{14}C-BEHP activity from the mussels is about 3.5 days. Eastern oyster from the Gulf of Mexico are less efficient than shrimps and fishes in actively metabolizing and excreting BEHP (Wofford *et al.*, 1981). Therefore, depuration of BEHP by mollusks probably is primarily by passive partitioning.

There are very few published reports of concentrations of BEHP in the tissues of marine animals (**Table 4-31**). Usually, concentrations of BEHP in soft tissues of marine animals are low, rarely exceeding 1.0 µg/g dry weight. In a few cases, marine animals collected in heavily contaminated environments or near point sources of BEHP contain high concentrations of phthalates. Highest concentrations in marine environments are in polychaete worms and bivalves from contaminated estuaries. Freshwater fauna sometimes accumulate high concentrations of BEHP from contaminated stream sediments. For example, isopods *Asellus aquaticus* from the Ronnebyån River, Sweden, contain up to 72 µg/g BEHP (Thurén, 1986).

In this study, concentrations of BEHP in soft tissues of jewel box and thorny oyster from two produced water discharge sites and their paired reference sites ranged from below the MDL (0.136 µg/g dry weight) to 3.60 µg/g dry weight (**Table 4-28**). BEHP could not be detected in 70% of bivalve tissue samples. Highest measured concentrations were in jewel box and thorny oyster from EI361A (R) on both Cruise 2 and 3. BEHP frequently was detected in field and laboratory blanks at concentrations comparable to many of the concentrations in soft tissues of the two bivalves. Therefore, it is probable that much of the BEHP apparently detected in bivalve tissues was actually from contamination from collection, processing, and analysis of the samples.

There were no statistically significant differences in BEHP concentrations of either jewel box or thorny oyster from paired discharge and reference sites (**Table 4-28**). The only consistent trend, though not statistically significant, was for BEHP concentrations to be higher in both species from the reference than from the discharge site in the GC19A (D)/EI361A (R) pair. There is no evidence that jewel box and thorny oyster bioaccumulated any BEHP from produced water. As discussed above, BEHP is not a natural or intentionally added constituent of produced water; concentrations in produced water are below the MDL or comparable, in most cases, to concentrations in laboratory blanks. Therefore, there is no risk that bivalves attached to underwater platform structures near a produced water discharge are bioaccumulating BEHP from produced water.

Concentrations of BEHP in five species of marine fishes from the vicinity of paired discharge and reference platforms also contained very low concentrations of BEHP in edible muscle tissue (**Tables 4-29** and **4-30**). BEHP concentrations were below the MDL in 69% of the fish muscle samples. Highest measured concentrations were 2.8 µg/g dry weight in yellow chub collected at EB165A (D) on Cruise 3 and 3.0 µg/g in creole-fish collected from HI356A (R) on Cruise 3. Generally, rockhind, gray triggerfish, and sergeant major contained lower concentrations of BEHP in their muscle tissues than did yellow chub and creole-fish.

In no case was there a statistically significant difference in the concentration of BEHP in muscle tissue of fishes from paired discharge and reference sites (**Tables 4-29** and **4-30**). There were no seasonal or site comparison trends in BEHP residues in fish tissues. Therefore, fishes were not bioaccumulating BEHP from produced water. Any measured residues of this ubiquitous industrial contaminant probably came from

background levels in the ambient seawater or from contamination introduced during sampling, processing, or analysis of the samples.

4.2.8 Monocyclic Aromatic Hydrocarbons

Monocyclic aromatic compounds have moderate aqueous solubilities and high lipid solubilities. Therefore, they bioaccumulate rapidly in the lipid-rich tissues of marine organisms. They tend to partition between the ambient seawater and tissue lipids of marine organisms in direct relation to their hydrophobicities and lipophilicities, which are proportional to their log K_{ow}s. Because of this relationship, the wet weight BCFs of these compounds can be estimated by the regression equation of Veith and Kosian (1983) or other similar regressions (Neff and Burns, 1996). Estimated wet weight BCFs of BTEX compounds are summarized in **Table 4-32**. Estimated BCFs range from 19 for benzene to 134 for *m*-xylene. However, concentrations of BTEX in tissues of marine animals rarely, if ever, reach the concentrations estimated by their BCFs. Although bioaccumulated rapidly from water, BTEX also are lost from the animal tissues very rapidly when concentrations in the ambient seawater decline (Struhsaker, 1977). Because of their volatility, BTEX do not persist long in seawater, even near point sources such as produced water outfalls. Therefore, one would not expect to encounter high concentrations of BTEX compounds in tissues of marine animals collected from natural marine environments, even those containing some BTEX from point sources.

There are very few published values for the concentrations of BTEX in the tissues of marine organisms. Whelan *et al.* (1982) analyzed low molecular weight aromatic compounds in tissues of four species of macroalgae grown in large culture tanks at Woods Hole Oceanographic Institution. Two species, *Ulva latuca* and *Hypnea musciformis*, each contained 0.020 µg/g dry weight of benzene. The other two species, *Gracilaria tikvahiae* and *Ascophyllum nodosum*, did not contain detectable concentrations of benzene. No other monocyclic aromatic hydrocarbons were sought. It is uncertain if the two algae accumulated benzene from the water or biosynthesized it. Several others of the C_1 through C_8 organic compounds detected in the algae definitely were products of biosynthesis.

Benzene, toluene, and ethylbenzene were analyzed in the tissues of several species of benthic and demersal marine invertebrates and fishes from the vicinity of the outfall for the Palos Verdes sewage treatment plant in the Southern California Bight (Gossett *et al.*, 1983). Benzene was detected in the livers of three species of fishes and one composite invertebrate sample (**Table 4-33**). Toluene and ethylbenzene were detected in the liver of two species of fishes. Only dover sole *Microstomus pacificus* and white croaker *Genyonemus lineatus* contained quantifiable residues of all three monoaromatics in liver. Concentrations of individual and total BTEX were below 0.3 µg/g in all cases.

In this study, individual BTEX analytes were detected (concentration above MDL) in 62 sample replicates of soft tissues of bivalves and edible tissues of fishes; 95% of analytical results for individual analytes were below the MDL. Either benzene (Cruise 2) or toluene (Cruise 3), but not both, was detected in bivalve and fish tissues. Of the

62 analytical results above MDL, 16 (26%) were above the PQL [five times the MDL]). Xylenes, C_3-benzenes, and C_4-benzenes were not detected in any tissue samples.

Benzene was detected in two jewel box samples from EI165A (D), two thorny oyster samples from HI356A (R), and two yellow chub muscle samples from GC19A (D), all collected on Cruise 2 (**Table 4-34**). Benzene concentrations in tissues ranged from 0.005J µg/g dry weight to 0.009J µg/g.

No benzene was detected in any tissue samples collected during Cruise 3. Fifty-six tissue samples collected during Cruise 3 contained toluene at concentrations above the MDL. Sixteen tissue samples contained toluene concentrations above the PQL; the highest concentration was 0.068 µg/g dry weight in tissues of thorny oyster from EI361A (R) (**Table 4-34**). Toluene was detected in 12 samples each of jewel box from discharging and reference platforms. Twelve thorny oyster samples from reference sites and seven thorny oyster samples from discharge platforms contained detectable concentrations of toluene.

Eleven muscle tissue samples of yellow chub, creole-fish, and gray triggerfish from reference platforms and two muscle samples from gray triggerfish from a discharging platform contained toluene. No toluene or benzene were detected in any specimens of rockhind and sergeant major. Thus, presence of benzene or toluene in tissues of bivalves and fishes seemed to be random and not related to proximity to a produced water discharge. None of the observed concentrations were high enough to represent a health threat to the marine animals.

Concentrations of benzene and toluene detected in this study in tissues of bivalves and fishes are very low. In the few cases where enough samples contained concentrations above the MDL for comparisons to be made, there was not a statistically significant difference in the concentration of benzene or toluene between samples from a paired discharge and reference site. Benzene or toluene was detected 25 times in a tissue sample from a discharging platform and 37 times in a tissue sample from a reference site. Therefore, there is no evidence that these volatile aromatic hydrocarbons are being bioaccumulated by marine animals near offshore platforms, or that the traces of benzene or toluene detected in some animals near platforms was derived from produced water discharges.

4.2.9 Polycyclic Aromatic Hydrocarbons

Concentrations of total PAHs in the tissues of marine organisms collected from natural marine environments throughout the world are highly variable, ranging from 0.0005 µg/g dry weight to more than 1,700 µg/g (**Table 4-35**). Much higher concentrations may be observed in soft tissues of marine invertebrates, particularly bivalves, from oil spill sites; data for marine organisms from oil spill sites are not included in **Table 4-35**. Only a few taxa of marine organisms are adequately represented in the recent published data on PAH residues in tissues of marine organisms. Most analytical results, based on analysis by advanced GC/MS methods, are for bivalves (mostly from the U.S. National Status and Trends Mussel Watch Program; NOAA, 1995) and for muscle tissue of

teleost fishes. Therefore, statements about the taxonomic distribution of PAH residues must be made with caution.

Based on the data available for quantified concentrations (concentrations above the MDL) of PAHs in tissues of marine organisms (**Table 4-35**), highest concentrations of total PAHs are in tissues of bivalves. The geometric mean concentration of total PAHs in soft tissues of bivalves is 0.65 µg/g (range 0.003 to 1,729 µg/g). Highest concentrations are in mussels *Mytilus edulis* from the vicinity of an aluminum smelter in Saudafjord, Norway (Naes *et al.*, 1995). Several other species of bivalves and snails from the vicinity of Norwegian aluminum smelters contain elevated concentrations of PAHs (Naes *et al.*, 1995).

Eastern oyster *Crassostrea virginica* from coastal waters of the Gulf of Mexico contain 0.02 to 18.62 µg/g total PAHs (NOAA, 1995). Highest concentrations are in oysters from Watson Bayou, St. Andrews Bay, Florida, and the Houston Ship Channel, Galveston Bay, Texas. PAH concentrations in oysters from the coastal waters of the Gulf of Mexico are, on the average, higher than PAH concentrations in tissues of oysters from the U.S. Atlantic coast. However, oysters from southern Chesapeake Bay near sites of former creosote plants along the Elizabeth River contain up to 15.35 µg/g total PAHs (Pittinger *et al.*, 1985). Oyster *Ostrea sandvicensis* from Keehi Lagoon, Honolulu Harbor, Hawaii, contain up to 28.4 µg/g total PAHs. Clams *Rangia cuneata* from Bayou Bonfouca, Louisiana, the site of a large creosote spill, contain up to 16.2 µg/g total PAHs (DeLeon *et al.*, 1988).

Jewel box and thorny oyster collected from the legs of offshore production platforms in this study contained up to 0.8 µg/g total PAHs (**Table 4-35**). The PAH concentrations in bivalves from the platforms generally were lower than those in bivalves collected by others from shallow coastal environments. The "high" concentration of total PAHs in tissues of mussels and oysters from the National Status and Trends Mussel Watch Program was 1.02 µg/g dry weight (O'Connor and Beliaeff, 1995).

Fishes usually contain low concentrations of total PAHs in their tissues (**Table 4-35**). Concentrations sometimes are higher in liver than in muscle. For example, liver of tilefish *Lopholatilus chamaeleonticeps* from the OCS off New York contains 0.013 to 0.026 µg/g total PAHs, compared to 0.002 to 0.004 µg/g in muscle of the same fish (Steimle *et al.*, 1990). Often, muscle tissues of demersal fishes such as flounder and cod contain higher concentrations of total PAHs than does muscle of pelagic species such as mackerel. However, anchovies *Engraulis enchrasicholus* from the Bay of Naples, Italy, contain an average of 9.65 µg/g (Amodio-Cocchieri *et al.*, 1993). The highest concentration of total PAHs observed in muscle of a marine teleost (23.45 µg/g) was in dab *Limanda limanda*, a demersal flatfish, from the British North Sea near the Beatrice oil production platform (McGill *et al.*, 1987). Muscle tissue of fishes collected in this study contained <0.001 to 0.12 µg/g dry weight total PAHs (**Table 4-35**). This concentration range is in the lower part of the range reported for fishes from other areas of the world's oceans.

The taxonomic distribution of total PAHs in soft tissues of marine animals undoubtedly is attributable to the large interspecies differences in the activity of the mixed function oxidase system used to oxidize and conjugate PAHs and some other nonpolar organic contaminants, speeding their excretion (Meador *et al.*, 1995). Bivalves have a low level of mixed function oxidase activity and tend to release accumulated PAHs slowly (Stegeman, 1985). Crustaceans and fishes usually have a high level of inducible mixed function oxidase activity and are able to metabolize and excrete accumulated PAHs rapidly (Lee, 1981; Stegeman, 1981). Fishes tend to metabolize high molecular weight PAHs more rapidly than low molecular weight PAHs (Varanasi and Stein, 1991), possibly accounting for the higher concentrations of low molecular weight PAHs sometimes encountered in fish tissues (Hellou *et al.*, 1994, 1995). Because PAHs are accumulated inefficiently from food and are metabolized and excreted rapidly from tissues of most species of marine animals, they do not biomagnify in marine food webs (Neff, 1997a). In fact, PAH concentrations tend to decrease with increasing trophic level in marine food webs (Broman *et al.*, 1990).

Fluorene is an EPA bioaccumulation target analyte. It is a low molecular weight PAH, more typical of petrogenic than pyrogenic PAH assemblages. It usually is less abundant in petroleum and produced water than other 2- and 3-ring petroleum PAHs. Its distribution in the tissues of marine organisms can be used as an indication of petroleum PAH contamination. There are many fewer published measured concentrations of fluorene in tissues of marine organisms than there are of total PAHs (**Table 4-36**). This is because fluorene is rarely detected in tissues of marine animals, even when other low molecular weight PAHs are. Fluorene was not detected at a concentration higher than the MDL of 0.004 µg/g in tissues of any bivalves or fishes sampled in this study (**Table 4-36**). Concentrations of fluorene in tissues of marine animals in which it was detected in other studies range from 0.0005 to 1.56 µg/g dry weight. As with total PAHs, highest concentrations often are in tissues of bivalves. Overall, concentrations usually are very low, with geometric mean concentrations for different taxa ranging from 0.005 µg/g for bird muscle to 0.043 µg/g for soft tissues of bivalves. The low concentrations of this low molecular weight PAH in tissues of marine mammals may be caused by the more rapid passive excretion of low molecular weight PAHs than high molecular weight PAHs by marine animals (Meador *et al.*, 1995).

BAP also is a target analyte selected by EPA for bioaccumulation testing. It is the best known of the higher molecular weight PAH carcinogens. Most of the BAP in the environment comes from combustion of organic matter, though small amounts are present in coal and petroleum (Neff, 1979). It is a good indicator of the presence of pyrogenic PAHs in environmental samples. Concentrations of BAP in tissues of marine organisms (when it is present at a concentration above the detection limit) are in the range of 0.000003 µg/g dry weight (in the starfish *Diplasterias meridionalis* from King Edward Cove, Australia: Platt and Mackie, 1981) to 146 µg/g dry weight (in soft tissues of mussels *Mytilus edulis* from Saudafjord, Norway, near an aluminum smelter) (**Table 4-37**). As with other PAHs, highest concentrations of BAP usually are found in soft tissues of bivalves; lowest concentrations usually are found in muscle tissues of fishes. The highest concentrations of BAP are in soft tissues of mussels *Mytilus edulis* from a Norwegian fjord heavily contaminated with pyrogenic PAHs from an aluminum

smelter (Naes *et al.*, 1995). High concentrations of BAP also were detected in digestive glands of lobsters *Homarus americanus* from the vicinity of coal coking facilities in Nova Scotia, Canada (Sirota *et al.*, 1983; King *et al.*, 1993). Muscle tissues of fishes usually contain very low or nondetectable concentrations of BAP. Muscle of two species of fishes from the Gulf of Naples, Italy, and one species from the Gulf of Oman, Oman, contained more than 0.20 µg/g BAP (Amodio-Cocchieri *et al.*, 1993; Badawy, 1990).

Bivalves collected in this study from the legs of offshore production platforms contained <0.003 to 0.021 µg/g BAP (**Table 4-37**). Only 21 of 96 bivalve samples analyzed (22%) contained concentrations of BAP above the MDL of 0.003 µg/g. These concentrations are in the lower part of the range reported for bivalves from elsewhere in the world. Oyster *Crassostrea virginica* sampled from coastal waters of the U.S. Gulf of Mexico in the National Status and Trends Mussel Watch Program contain ND to 0.225 µg/g BAP (NOAA, 1995). BAP was not detected at a concentration above MDL in muscle tissue of any of the 144 fish samples analyzed in this study. Thus, the level of contamination by BAP and other high molecular weight PAHs of bivalves from the legs of offshore platforms and fishes in the vicinity of produced water discharges is low.

Fluorene was not detected at a concentration above the MDL (0.004 µg/g) in tissues of any bivalves or fishes from discharge and reference sites (**Tables 4-38** through **4-41**). Therefore, it is not bioaccumulated by marine animals from produced water.

BAP, the other EPA target PAH, was present a low concentrations in the tissues of jewel box and thorny oyster from the two produced water discharging/reference platform pairs (**Tables 4-38** through **4-41**). All BAP concentrations in thorny oyster were below the PQL (0.015 µg/g) and ranged from <0.003 µg/g (<MDL) to 0.012J µg/g. The highest concentration was at the GC19A (D), but differences in BAP concentrations in tissues of oyster from discharging and reference platforms were not statistically significant. Jewel box from the two platform pairs collected on the two cruises contained <0.003 to 0.021 µg/g BAP. The highest concentrations were in jewel box from both discharging platform GC19A and its paired reference site, EI361A. There were no statistically significant differences between paired discharging and reference platforms. BAP was not detected in edible muscle tissues of any of the fishes. Therefore, bivalves and fishes are not bioaccumulating fluorene or BAP from the two offshore produced water discharges.

In the present study, concentrations of individual PAHs in tissues of jewel box and thorny oyster ranged from below the MDL for the individual compounds to 0.18 µg/g (**Tables 4-38** through **4-41**). Most concentrations of all measured PAHs in all species were below the MDLs, which ranged from 0.0013 to 0.016 µg/g dry weight. Highest concentrations were for C_3-phenanthrenes in soft tissues of thorny oyster from GC19A (D) from Cruise 3.

Jewel box and thorny oyster collected at paired discharge and reference sites EB165A (D) and HI356A (R) contained low concentrations of several PAHs (**Tables 4-38** and **4-41**). Alkyl homologues of naphthalene (C_1-, C_2-, and occasionally C_3- and C_4-naphthalenes) were present in most bivalve samples. C_2- and C_3-dibenzothiophenes, C_1-fluorenes, and C_1-phenanthrenes also were present at

measurable concentrations in some bivalve samples. These PAHs all are typical of petroleum sources. Several bivalves from the EB165A (D)/HI356A (R) platform pair contained small amounts of the predominantly pyrogenic PAHs, benzo(e)pyrene, BAP, and perylene. Thorny oyster from the HI356A (R) collected on Cruise 3 contained elevated concentrations of several PAHs, probably of a petroleum origin. However, there were only a few statistically significant differences in concentrations of individual PAHs in tissues of thorny oyster, but not jewel box, from the EB165A (D)/HI356A (R) pair. Anthracene (primarily pyrogenic) and C_2-dibenzothiophenes (primarily petrogenic) were present at slightly but significantly higher concentrations in thorny oyster from EB165A that in oyster from the paired reference site. 2,6-Dimethylnaphthalene and C_4-naphthalenes were present at slightly but significantly higher concentrations in thorny oyster from the reference platform than in those from EB165A (D). Therefore, there was no real evidence of bioaccumulation of PAHs from the produced water discharge at EB165A.

PAH concentrations in tissues of jewel box and thorny oyster from the discharge/reference platform pair GC19A (D)/EI361A (R) were, in a few cases, higher than those in bivalves from the other platform pair (**Tables 4-39** and **4-41**). Some jewel box from this platform pair contained detectable concentrations of alkylnaphthalenes, biphenyl, C_1-fluorenes, C_1- and C_2-phenanthrenes, C_1-, C_2-, and C_3-dibenzothiophenes, all primarily petrogenic, and benzo(e)pyrene, BAP, and perylene, all primarily pyrogenic. The only PAHs that were present at a statistically significantly higher concentration in jewel box from the discharge site GC19A than at the paired reference site were C_2- and C_3-dibenzothiophenes (**Table 4-39**). The differences were statistically significant for both Cruises 2 and 3. The highest concentration of C_3-dibenzothiophenes in jewel box from GC19A (D) was 0.064 µg/g.

Thorny oyster from the GC19A (D)/EI361A (R) platform pair contained higher concentrations of several PAHs than do jewel box (**Table 4-41**). The most abundant PAHs in the thorny oyster tissues were alkylnaphthalenes, C_1-fluorenes, alkylphenanthrenes, alkyldibenzothiophenes, alkylchrysenes, primarily petrogenic, and benzo(e)pyrene, BAP, and perylene, primarily pyrogenic. Several of these PAHs were present at statistically significantly higher concentrations in thorny oyster from GC19A (D) than from the paired reference site EI361A (R). These include 2-methylnaphthalene, 2,6-dimethylnaphthalene, 2,3,5-trimethylnaphthalene, total C_1-, C_2-, C_3-, and C_4-naphthalenes, C_1-, C_2-, C_3-, and C_4-phenanthrenes, C_1-, C_2-, and C_3-dibenzothiophenes, C_2-fluoranthenes/pyrenes, C_1- and C_2-chrysenes, and perylene (**Table 4-41**). In most cases, these PAHs were present at statistically significantly higher concentrations in thorny oyster collected at GC19A (D) on Cruise 2 than on Cruise 3. C_1-naphthalenes were present at statistically significantly higher concentration at the reference platform during the third cruise and at the discharge platform during the second cruise. However, none of the concentrations of individual PAHs in thorny oyster tissues were high and several of the PAHs were present oyster tissues from both platforms at concentrations less than five times the MDL.

The PAH profile in the tissues of most of the thorny oyster collected from GC19A (D) during the second cruise resembles that of petroleum. The source of these PAHs in the

thorny oyster tissues probably was produced water or a light refined petroleum product. Thorny oyster, but not jewel box, may be bioaccumulating PAHs from produced water from GC19A (D).

The five species of fishes sampled in this study contained only traces of a relatively few PAHs in their edible muscle tissue (**Tables 4-42** and **4-43**). Only PAHs that were detected in muscle tissue of one or more species of fishes were the two EPA target PAHs are included in **Tables 4-42** and **4-43**. Concentrations of all other target PAHs were always below MDLs. The PAHs detected most frequently in fish tissues were alkylnaphthalenes, biphenyl, C_1-fluorenes, and phenanthrene. The two EPA target PAHs, fluorene and BAP, were not detected at concentrations above the MDLs in any fish muscle samples.

At the time of the second or third cruise, yellow chub from the vicinity of EI361A (R) contained significantly higher concentrations of 2-methylnaphthalene, total C_1-naphthalenes, total C_2-naphthalenes, anc biphenyl than did yellow chub from the paired platform GC19A (D). Based on a concentration just above the MDL in one sample, yellow chub from GC19A collected on the second cruise contained a slightly but significantly higher concentration of phenanthrene than yellow chub from the reference site. There were no other statistically significant differences between discharging and reference sites with respect to concentrations of any individual PAHs in muscle tissue of any of the five species of fishes. Therefore, the five species of fishes are not bioaccumulating PAHs from produced water from the two offshore produced water discharge sites.

4.2.10 Effect of Small Produced Water Discharge at Reference Platform on Interpretation of Concentration Differences

The study team discovered during Cruise 3 that HI356A (R) discharged a small amount of produced water (approximately 85 bbl/d: **Figure 3-1**). The discharge started in mid-January, 1995, between Cruises 1 and 2 and stopped in mid-October, 1995, just before Cruise 3. As a result of this situation, the hypothesis to be statistically tested for the EB165A (D)/HI356A (R) platform pair was modified to read:

> "The mean concentration of a specific target compound in the tissue of a species living at the high discharge rate platform is statistically equivalent to the corresponding mean concentration in tissues of the same species living at the low discharge rate platform."

The results of a statistical comparison of tissue residue data for the EB165A (D)/HI356A (R) platform pair showed that the hypothesis could not be rejected for almost all analytes and species. There were statistically significant differences in tissue concentrations within a single cruise and species in only 4% of comparisons for the EB165A (D)/HI356A (R) platform pair. For the comparisons showing significant differences, the percentage of comparisons showing D>R and R>D were identical.

The 85 bbl/d produced water discharge is too small and of too short a duration to elevate concentrations of produced water chemicals in the ocean anywhere except within a few meters of the discharge point. As a result, it is believed that the potential exposure of organisms to produced water components at HI356A (R) is very low. However, the potential exposures at HI356A (R) and EB165A (D) cannot be quantitatively compared in the absence of analytical data on the chemical composition of the HI356A (R) effluent.

The possibility of an unknown, but probably small, exposure of organisms from the vicinity of HI356A (R) to produced water indicated that it would be appropriate to make additional comparisons of concentrations of target chemicals in tissues of bivalves and fishes from EB165A (D) and HI356A (R) and from a platform that was not discharging produced water. Accordingly, tissue concentrations of target analytes at EB165A (D) were compared statistically to tissue concentrations at EI361A (R). These comparisons showed significant differences in concentrations in 7% of comparisons. For the comparisons showing significant differences, the percentage of comparisons showing D>R and R>D were nearly identical at 3% and 4%, respectively. Comparison of tissue concentrations of target analytes in marine animals from HI356A (R) with those in animals from another reference platform, EI361A (R) showed significant differences in 4% of comparisons. For comparisons showing significant differences, the percentage of comparisons showing concentrations in animals from HI356A (R) higher than concentrations in animals from EI361A (R) was identical to the percentage with concentrations at EI361A (R) higher than concentrations at HI356A (R).

This analysis indicates that concentrations of target analytes in tissues of bivalves and fishes at HI356A (R) were not influenced by the small produced water discharge from that platform. Substitution of EI361A (R) for HI356A (R) as the reference platform for discharging platform EB165A did not change the results of the assessment of the probability of bioaccumulation of produced water chemicals, because only very small changes were noted in the fraction of comparisons showing significant differences in tissue concentrations. Based on these results, the study team decided to keep the tissue concentration data from the EB165A (D)/HI356A (R) platform pair in the overall data set used to examine the effects of produced water discharges on concentrations of target chemicals in edible tissues of bivalve mollusks and fishes.

4.2.11 Summary of the Probability of Bioaccumulation of Chemicals from Produced Water

Nine chemicals or groups of chemicals were analyzed in produced water, ambient seawater, and in the tissues of marine bivalves and fishes from offshore platforms. All of these chemicals, with the exception of BEHP and mercury, were present in produced water from the two offshore produced water discharges at concentrations higher than their background concentrations in ambient seawater. However, nearly all the marine animals collected and analyzed for these chemicals from the immediate vicinity of the two produced water discharges did not contain residues of these chemicals in their tissues that were markedly higher than concentrations of these chemicals in marine bivalves and fishes from elsewhere in the Gulf of Mexico and elsewhere in the world.

Therefore, the best approach for estimating whether marine animals from the vicinity of the offshore produced water discharges were bioaccumulating these chemicals from the produced water was to statistically compare concentrations of all nine chemicals or chemical groups in the same species from closely paired discharge and reference sites. This was done in the present study. When a statistically significant difference was detected, an assessment was made, based on tissue residue information from the scientific literature, whether the higher tissue residue was typical for marine animals from elsewhere in the Gulf of Mexico and in the world's oceans. Results of this analysis were used to classify each target chemical for each species of animal into one of four categories:

Category 1: Strong evidence for bioaccumulation to biologically significant tissue concentrations.

A. Tissue concentrations significantly higher at the discharging platform of both platform pairs and both surveys; and
B. Tissue residues for chemical at discharging platforms exceed the "typical" range for the chemical in marine animals from uncontaminated environments.

Category 2: Weak or inconclusive evidence for bioaccumulation.

A. Tissue concentrations significantly greater at one discharging platform (compared to the paired reference) on both surveys, but no significant differences at the other platform pair; or
B. Tissue concentrations significantly greater at one or both discharging platforms in comparison to their paired reference platforms, but only on one survey; and
C. Differences in concentrations in tissues of marine animals from discharge and reference platforms are small and within the "typical" range for marine animals from uncontaminated marine environments.

Category 3: Doubtful or contradictory evidence for bioaccumulation.

A. Tissue concentrations significantly higher at one discharging platform on one occasion (compared to the paired reference); and
B. Tissue concentrations significantly higher at one or both reference platforms than at the paired discharging platform on one or both cruises; and
C. Differences in concentrations in tissues of marine animals from discharge and reference platforms are small and within the "typical" range for marine animals from uncontaminated marine environments.

Category 4: No evidence of bioaccumulation from produced water.

A. No significant differences between paired produced water discharging and reference platforms for either cruise or concentrations significantly higher more frequently in marine animals from the reference than from the discharging platform; and
B. All concentrations within the "typical" range for uncontaminated marine environments.

The results of this evaluation are summarized in **Table 4-44**.

Concentrations of arsenic were significantly higher in tissues of jewel box and thorny oyster than in bivalves of other species from nearshore waters of the Gulf of Mexico. This probably is the result of higher natural concentrations of arsenic in oceanic than coastal seawater. However, arsenic concentrations were significantly higher in jewel box from reference than from discharge platforms; therefore, jewel box was placed in Category 4 for arsenic. Thorny oyster from one discharge site contained significantly higher concentrations of arsenic than oyster from the paired reference site when the data for the two cruises were combined, but not when the data for the two cruises were statistically evaluated separately. Differences in tissue residues were small; therefore, thorny oyster was placed in Category 3 for arsenic. In 8 of 12 comparisons, there was not a significant difference in arsenic concentrations in edible tissues of fishes of the same species from paired discharging and reference platforms. In the remaining four cases, the concentration of arsenic was significantly higher in muscle of a species of fishes from the discharge site compared to concentrations in muscle from the same species from the reference site. In one case, the concentration of arsenic was significantly higher in fish tissues from the reference than from the paired discharge site. All concentrations of arsenic in fish muscle tissue were in the natural range for offshore species and differences between discharging and reference platforms were small and probably related to natural environmental factors and not produced water discharges. Therefore, fishes were placed in Category 3 for arsenic.

There was little evidence of bioaccumulation of barium by either bivalves or fishes. Jewel box from one discharging platform contained significantly higher concentrations of barium when data for both cruises were combined, but not when the cruises were treated separately. There was no difference for the other platform pair and concentrations of barium in all jewel box were in the upper part of the range expected for bivalves from a clean natural environment. Therefore, jewel box was placed in Category 3 for barium. Barium concentrations in tissues of thorny oyster and fishes generally were significantly higher in animals from the reference than from the discharge sites. Therefore, thorny oyster and fishes were placed in Category 4.

There was no evidence of cadmium bioaccumulation from produced water by jewel box and three species of fishes (yellow chub, creole-fish, and rockhind); therefore, they were placed in Category 4 for cadmium. Cadmium was present at a slightly, but significant, higher concentration in thorny oyster from one discharge site compared to the paired reference site when data for the two cruises were combined. No other statistical

comparisons were significant and differences in concentrations were small and within the typical range for bivalves from the Gulf of Mexico. Therefore, thorny oyster was placed in Category 3 for cadmium. Muscle tissues of gray triggerfish and sergeant major from one discharge site on one cruise contained significantly higher concentrations of cadmium than muscle of fishes from the reference site. All other comparisons were not significant and these fishes contained low concentrations of cadmium. Therefore, these two species of fishes were placed in Category 3 for cadmium.

There were no statistically significant differences between paired discharging and reference sites in concentrations of total mercury in tissues of jewel box, thorny oyster, and muscle tissues of five species of marine fishes. Therefore, all species monitored in this investigation were placed in Category 4 for mercury.

Activities of ^{226}Ra and ^{228}Ra were similar in tissues of thorny oyster and all five species of fishes from paired discharging and reference sites. There were no statistically significant differences. Therefore, thorny oyster and fishes were placed in Category 4 for radium isotopes. Radium isotopes were present at a significantly higher mean concentration in soft tissues of jewel box from one discharging platform on one cruise, compared to tissues of animals from the paired reference site. There were no other significant differences and, in the one case where a difference was detected, it was small. Therefore, jewel box was placed in Category 3 for radium isotopes.

Phenol concentrations were significantly higher in tissues of jewel box, thorny oyster, and gray triggerfish from one discharging platform than at the paired reference site on one cruise. However, blank samples analyzed concurrently contained elevated concentrations of phenol, preventing a determination of whether the differences were real. The differences in concentrations between the discharging and reference platform were small. Therefore, these three species were placed in Category 3 for phenol. Phenol concentrations in muscle of the other four species of fishes were not significantly different at discharging and paired reference platforms. Therefore, these four species of fishes were placed in Category 4.

There were no statistically significant differences in BEHP concentrations in tissues of bivalves and fishes from paired discharging and reference sites. Therefore, all species were placed in Category 4 for BEHP.

There were no statistically significant differences between paired discharging and reference sites with respect to concentrations of fluorene and BAP in tissues of bivalves and fishes. Fluorene was not detected in any tissue samples. Therefore, both species of bivalves and all five species of fishes were placed in Category 4 for fluorene and BAP.

None of the five species of fishes bioaccumulated total PAHs to higher than trace concentrations in muscle tissue. Therefore, fishes were placed in Category 4 for total PAHs. There were no statistically significant differences between paired discharging and reference sites with respect to tissue residues of any single PAH. However, jewel

box from one discharging platform did contain slightly higher numerical concentrations, but statistically significantly higher concentrations of a few PAHs than bivalves from the paired reference site for both cruises. A few PAHs were present at significantly higher concentrations in tissues of jewel box from reference platforms than in animals from the discharging platforms. Therefore, jewel box was placed in Category 3 for PAHs. At one platform pair, but not the other, and during Cruise 2, thorny oyster from the discharging platform contained significantly higher concentrations of several PAHs than thorny oyster from the paired reference site. The PAH assemblage in the thorny oyster tissues resembled that of a petroleum source. Concentrations of individual PAHs generally were low and not unusual for soft tissues of bivalves. Therefore, because bioaccumulation of petroleum-derived PAHs was demonstrated, but source(s) of the PAHs was unclear and the bioaccumulation occurred only once, thorny oyster was placed in Category 2 for PAHs.

4.3 ECOLOGICAL RISK ASSESSMENT

Produced waters of the types discharged to offshore waters of the Gulf of Mexico contain a wide variety of chemicals in solution at concentrations higher than their concentrations in clean natural seawater from the Gulf. Although these chemicals are diluted rapidly in the receiving waters following discharge of produced water to the ocean, concentrations of some chemicals may remain at elevated concentrations (compared to background) in the water column in the immediate vicinity of the discharge. The chemicals that are present in seawater near the produced water discharge at elevated concentrations could cause harm to the local marine ecosystem if their concentrations are above toxic levels for extended periods of time. The risk to the local marine ecosystem from produced water discharges to the ocean can be estimated by comparing concentrations of target chemicals in ambient seawater near the discharge (exposure assessment) to concentrations that are known to produce chronic or sublethal biological effects in marine organisms of the types living near the platform (effects assessment). If estimated exposure concentrations of chemicals individually or in sum in the ambient seawater approach or exceed estimated chronic toxicity concentrations, there is a risk to the local ecosystem. The magnitude of this risk can be estimated as the difference between the estimated or measured ambient concentrations of chemicals and the chronic toxicity values. In a similar fashion, residues of the chemicals of concern in the tissues of marine organisms living near the produced water discharges can be used as indices of possible exposure to chemicals from the produced water. The difference between concentrations of the target chemicals in tissues of marine animals near the outfalls and tissue concentrations associated with adverse acute or chronic effects can also be used as an indication of ecological risk from the discharge. These two approaches were used here to evaluate the ecological risk of the chemicals targeted by EPA for bioaccumulation evaluation from produced water.

4.3.1 Produced Water Chemicals in Ambient Seawater

No measurements were made of concentrations of produced water-associated chemicals in ambient seawater near (within the direct influence of the diluting produced water plume) the two produced water discharges sampled in this study. Concentrations

of chemicals measured in surface waters 2,000 m from the outfalls are considered to represent natural ambient concentrations for the northwestern Gulf of Mexico. As discussed above, produced water and the chemicals in it are diluted very rapidly following discharge of produced water to well-mixed ocean waters. It is unlikely that any marine animals would be exposed to less than a 100-fold dilution of the produced water. Therefore, a 100-fold dilution of produced water was used as the estimated maximum chronic exposure concentration for this evaluation.

Estimated one-hundred-fold dilutions of produced water from the two discharge sites sampled during Cruises 2 and 3 generally contained low concentrations of target analytes (**Table 4-45**). Several chemicals were present at concentrations approaching or even lower than natural concentrations in ambient seawater. These concentrations are all substantially lower than marine chronic water quality criterion values. The range of estimated toxic units or hazard quotient (estimated exposure concentration divided by chronic criterion: Suter, 1993) all are less than 0.01. The target compounds with the highest estimated maximum toxic units were cadmium, benzene, and BEHP. However, even these chemicals were present in diluted produced water at concentrations approximately 100 times lower than their chronic values. The maximum estimated total toxic units for the sum of the 11 target chemicals, for which EPA has water quality criteria, in a 100-fold dilution of produced water is 0.06. Actual concentrations of these chemicals in solution in the 100-fold dilution of the produced water in the ocean is substantially higher than can be accounted for by physical dilution alone because of effects of evaporation and precipitation. Thus, these chemicals in produced water from the two produced water discharges sampled in this study should be completely non-toxic to marine animals in the immediate vicinity of the produced water discharge.

4.3.2 Produced Water Chemicals in Tissues of Marine Bivalves and Fishes

Considerable progress has been made in recent years in developing quantitative structure activity relationships (QSARs) that relate physical/chemical properties of non-specific toxicants to biological end points, such as acute or chronic toxicity and bioaccumulation.

The major focus of these studies has been on nonpolar and slightly polar organic chemicals whose mode of toxic action is through accumulation in and swelling of lipid-rich biological membranes resulting in narcosis (McCarty, 1986; Abernethy *et al.*, 1988; Warne *et al.*, 1991; Connell and Markwell, 1992; Dillon and Gibson, 1992; Mackay *et al.*, 1992; McCarty *et al.*, 1992, 1993; Van Leeuwen *et al.*, 1992; Sijm *et al.*, 1993). There has been little success to date in defining critical body residues (CBRs) for highly polar organic chemicals, organic chemicals with site-specific modes of toxic action (e.g., pesticides and enzyme inhibitors), or metals. A small amount of data is available about the relationship between tissue residues of some of the EPA target chemicals evaluated in this study and toxic responses in marine organisms.

Limited data are available about tissue residue/toxic effects of cadmium, mercury, and the nonpolar organic compounds, phenol, BEHP, VOCs, and PAHs. No data are available for arsenic (an essential trace nutrient), barium, and radium.

Interpretation of the toxicological significance of metal concentrations in the tissues of marine organisms is difficult (Rainbow *et al.*, 1990). Nearly all the elements in the periodic table are present in solution in seawater at concentrations ranging from a fraction of a nanogram per liter to grams per liter; all these elements are present in the marine environment in bioavailable forms. Specific physiological requirements are known for at least 27 elements (Simkiss and Taylor, 1989). Most of the essential elements and micronutrients are regulated in the tissues of marine invertebrates and fishes by controls on either or both accumulation and excretion (Chapman *et al.*, 1996). Toxic tissue residues often are only slightly higher than biologically regulated tissue residues. For example, the shrimp *Palaemon elegans* regulates whole tissue residues of zinc and copper at about 90 and 110 µg/g, respectively (Rainbow, 1988). Lethal body residues of zinc and copper in this shrimp are approximately 200 and 700 µg/g, respectively. On the other hand, some marine animals, such as barnacles and many bivalves, can tolerate extremely high tissue residues of some metals such as zinc (up to at least 150,000 µg/g) without apparent toxicological effects (Rainbow *et al.*, 1990). The metals may be bound in non-bioavailable forms to specific metal-binding proteins, such as metallothionein (Roesijadi, 1992), or sequestered in insoluble concretions in the tissues (Simkiss and Taylor, 1989).

It generally is thought that toxic effects of metals are caused when their free ions interact with or bind to tissue macromolecules, including enzymes, or cell membranes. Detoxification often involves complexation or precipitation of the free ions, sometimes followed by excretion, to maintain free metal ion concentrations low in the cytoplasm of cells. It is generally difficult or impossible to quantify the concentration of the reactive metals in cells and tissues or to correlate the total concentration of a metal in tissues to the fraction of the total that is reactive. Therefore, estimates of tissue residues of metals that are associated with toxic responses in marine animals are extremely variable.

Arsenic is present in tissues of marine animals at high and highly variable concentrations (Neff, 1997b). Most of the arsenic in bivalves and fishes is in various organic forms, primarily nontoxic arsenobetaine. Marine animals from estuaries heavily contaminated with arsenic from mine drainage may contain very high concentrations of arsenic in their tissues with no apparent adverse effects. In the present study, concentrations of arsenic in tissues of bivalves from discharge and reference locations were in the range of 42 to 121 µg/g dry weight. Fishes contained much lower concentrations in edible muscle tissues, 2.3 to 35 µg/g. The concentrations of arsenic in tissues of bivalves from the offshore platforms are in the higher part of the range for bivalves worldwide. This may be due to the naturally higher concentration of total arsenic in oceanic water than in most nearshore waters. It is highly unlikely that the tissue residues of arsenic are having any adverse effects on the bivalves. Arsenic concentrations in the fish tissues are well within the range reported worldwide for fish muscle. This probably reflects the ability of the fish to regulate concentrations of arsenic in their tissues. The arsenic levels in the fish are normal and, so, are not likely to be harmful to the fish.

Very little information is available about the typical concentrations of barium in tissues of marine animals. Barium is abundant in seawater and may compete with calcium in various tissue functions (Neff and Sauer, 1995). For this reason, its concentration probably is regulated to some extent in tissues of marine animals. Concentrations of barium in bivalves and fishes evaluated in this study were low and probably are not causing any harm to marine animals.

Dillon and Gibson (1987) reported that water fleas (*Daphnia magna*) were not adversely affected by tissue residues of 1.9 µg/g wet weight mercury (following exposure to dissolved inorganic mercury) or 6.6 µg/g cadmium. Tissue residues of 5.5 µg/g mercury or 11.8 µg/g cadmium were associated with diminished survival, growth, and reproduction.

Dillon and Gibson (1985) reviewed the published scientific literature on relationships between toxic responses (mostly sublethal effects on reproduction) and tissue residues of metals and organic contaminants in freshwater and marine organisms. Tissue residues in whole fishes and invertebrates ranging from 3.5 µg/g to as high as 33,077 µg/g cadmium caused reproductive effects. Tissue residues between 0.04 and about 10 µg/g cadmium were without reproductive effects in several species. However, the percent hatch and hatching rate of flounder eggs containing 0.06 to 0.16 µg/g cadmium were reduced.

Tissue residues of mercury (following exposure to dissolved inorganic mercury) in aquatic animals ranging from 4.5 µg/g to as high as 293 µg/g caused reproductive effects in aquatic animals (Dillon and Gibson, 1985). In some species, tissue residues between 1 and 16 µg/g mercury were without reproductive effects. Niimi and Kissoon (1994) evaluated the critical body burden of inorganic and organic mercury in rainbow trout *Oncorhynchus mykiss*. They could not identify a critical body burden for inorganic mercury. The threshold body burden for organic mercury was in the range of 1 to 5 µg/g wet weight (5 to 25 µg/g dry weight). The data summarized by Dillon and Gibson (1985) show that tissue residues of metals associated with adverse effects are extremely variable from one species to another, particularly for different species of marine invertebrates, and from one metal to another. Thus, the lowest effects concentrations reported by Dillon and Gibson (1985) are of limited value in interpreting the results of bioaccumulation monitoring.

In summary, tissue concentrations of cadmium associated with adverse effects on reproduction in freshwater and marine organisms were in the range of 3.5 to 33,077 µg/g wet weight (17.5 to 165,385 µg/g dry weight). Effects concentrations for inorganic mercury were in the range of 1 to 293 µg/g wet weight (5 to 1,465 µg/g dry weight). Concentrations of 17.5 µg/g dry weight cadmium and 5 µg/g dry weight mercury can be used as conservative estimates of the threshold body burdens for these metals in tissues of marine animals. Tissue concentrations below these values are unlikely to be associated with harmful effects in marine organisms.

Concentrations of cadmium in tissues of the two species of bivalves sampled in this study ranged from 3.4 to 36 µg/g dry weight. All jewel box had tissue residues below

the threshold value of 17.5 µg/g. The highest cadmium concentration was 13 µg/g in a jewel box from EI361A (R). Thus, the risk to jewel box of cadmium residues in tissues is very low.

Thorny oyster contained higher concentrations of cadmium in their tissues. Most oysters contained more than the threshold concentration. This cadmium probably is natural. Several species of oysters and scallops contain naturally high concentrations of cadmium, as discussed above. Most of the cadmium in the bivalves is present as insoluble, inert granules in the kidney (Simkiss and Taylor, 1989). These cadmium-rich concretions are not toxic to the bivalves or their consumers. It is highly likely that the cadmium in thorny oyster soft tissues are natural and are not harmful to the oysters themselves or their consumers.

Cadmium concentrations in edible tissues of five species of marine fishes from the vicinity of the discharging and reference platforms ranged from below the MDL to 0.029 µg/g dry weight. The highest body residue in the fishes was 600 times lower than the threshold value of 17.5 µg/g. Therefore, marine fishes from the vicinity of offshore produced water discharges are not at risk from cadmium residues in their edible muscle tissues.

Mercury concentrations in two species of bivalves sampled in this study were in the range of 0.16 to 0.33 µg/g dry weight. All these concentrations are well below the threshold concentration of 5 µg/g dry weight by a factor of at least 15. Therefore, the bivalves near the two produced water discharges are not at risk of injury from bioaccumulation of mercury in their soft tissues.

The five species of fishes sampled in this study contained 0.042 to 0.67 µg/g total mercury in their edible muscle tissues. These concentrations were all well below the criterion concentration of 5 µg/g dry weight. The highest measured tissue residue was more than seven times lower than the threshold value. Mercury concentrations in the fish muscle were actually in the lower part of the normal range for marine fishes worldwide. Therefore, fishes in the vicinity of offshore produced water discharges are not bioaccumulating mercury to potentially toxic concentrations.

Concentrations of total radium in tissues of jewel box and thorny oyster from the vicinity of offshore oil platforms ranged from below the detection limit to about 0.35 pCi/g dry weight (sum of ^{226}Ra and ^{228}Ra). Concentrations in five species of marine fishes were somewhat lower, ranging from below the MDL to about 0.20 pCi/g dry weight. Because 1 pCi of radium is equivalent to a mass approximately one picogram of radium, these concentrations of radium in marine animal tissues are extremely low, many orders of magnitude below any concentration that might lead to systemic toxicity, assuming that radium behaved toxicologically like its fellow alkaline earth barium.

The only potential hazard to marine organisms arising from radium in the ocean is from the effects of the alpha and beta emissions from it on marine animals themselves or their consumers. Marine invertebrates and fishes are extremely tolerant to radiation toxicity. Generally there is an inverse relationship between taxonomic position and

sensitivity to radiation. Algae and protozoa are adversely affected by doses of 10,000 to 100,000 rad; fishes respond to doses of 1,000 rad or higher; man and other mammals may be affected by doses as low as 100 to 500 rad (Santschi and Honeyman, 1989). These doses are much higher than might be encountered from radium in even the most contaminated marine environment or in tissues of marine animals. Thus, radium does not pose a radiation risk to marine organisms.

EPA targeted seven nonpolar organic compounds for bioaccumulation monitoring in this program: benzene, toluene, ethylbenzene, phenol, BEHP, fluorene, and BAP. All of these chemicals are non-specific narcotic agents. Benzene, BEHP, and BAP also are suspect or known carcinogens in mammals. BAP, but probably not benzene and BEHP, may be carcinogenic at high exposure concentrations in marine invertebrates and (Neff, 1979).

Non-specific toxicants do not have a specific tissue site or mode of toxic action (such as inhibition of an enzyme or binding to a particular membrane protein or DNA) (Warne *et al.*, 1991). Instead, they exert a toxic effect by mass action. They accumulate in the lipid (nonpolar organic chemicals) or aqueous (polar compounds) phase of tissues to a concentration that, simply by its mass, interferes with normal cellular functions. Non-specific nonpolar organic chemicals are thought to accumulate in the lipid fraction of biological membranes, causing the membranes to swell, eliciting narcosis and eventually death in the affected animal. The narcotic effect is dependent solely on the volume fraction of the toxicant in the membrane lipids (Abernethy *et al.*, 1988). Although the molar volume of toxicant in tissues seems to best describe the relationship between exposure concentration and biological effects in aquatic animals (Abernethy *et al.*, 1988; Warne *et al.*, 1991), molar concentration (mMol/kg or mMol/L) is used more frequently because it is more easily measured. Because the mode and site of action of non-specific toxicants is the same, their toxicity can be considered to be additive. That is, the sum of the concentrations of all the non-specific organic toxicants in the tissues of an experimental animal will equal approximately 4.4 mMol/kg at the point where toxic responses are observed.

Several classes of nonpolar or slightly polar organic chemicals behave as non-specific toxicants in aquatic animals. Parent (unmetabolized) PAHs and polychlorinated biphenyls (PCBs) behave as non-specific toxicants. However, their metabolites are highly reactive and bind, often irreversibly, to tissue macromolecules. Most acute and chronic effects of PAHs and PCBs measured in aquatic animals can be attributed to non-specific toxicity and not to specific effects of metabolites (Neff, 1979). Mackay *et al.* (1992) proposed that "the mode of action measured in many typical chronic aquatic bioassays is not different from that measured in acute bioassays; it is rather being estimated at an alternative response end point, about 0.01% mortality rather than 50%."

The CBR is relatively constant for neutral organic chemicals with log octanol/water partition coefficients (K_{ow}s) between about 1.5 and 6.0 (McCarty *et al.*, 1992). More polar organic chemicals with low log K_{ow}s partition primarily into aqueous phases of tissues and do not selectively accumulate in membrane lipids. Chemicals with log K_{ow}

greater than about 6.0 bioaccumulate so slowly that equilibrium is reached very slowly, if at all. The CBR for neutral organic chemicals is about 4.4 mMol/kg wet weight.

CBRs for the seven EPA target chemicals range from 344 µg/g wet weight for benzene to 1,718 µg/g wet weight for BEHP (**Table 4-46**). By comparison, the highest concentrations of these chemicals in bivalves and fishes from produced water discharge and reference sites in the northwest Gulf of Mexico range from <0.0009 µg/g wet weight (fluorene) to 0.64 µg/g wet weight (BEHP). The lowest safety factor (CBR/measured concentration) is 44.5 for toluene. Therefore, these nonpolar organic chemicals, at the concentrations at which they occur in tissues of marine animals, either singly or in sum, are not producing any toxic responses in the marine animals.

In summary, none of the EPA target chemicals identified for bioaccumulation monitoring were present in soft tissues of bivalves and fishes from produced water discharges and nearby reference sites at concentrations that might be harmful to the animals themselves. Cadmium concentrations were elevated in bivalves, particularly thorny oyster from both discharging and reference sites. However, natural concentrations of cadmium are elevated in many populations of oysters and scallops from uncontaminated marine environments. These cadmium residues are tightly bound to solid concretions, mostly in the kidneys, and are not toxic to the bivalves. It is probable that thorny oyster also sequester large amounts of cadmium in inert tissue granules and are not harmed by such accumulations.

4.4 HUMAN HEALTH ASSESSMENT

The only feasible way that chemicals discharged to the ocean in produced water from offshore platforms may adversely affect the health of humans is through bioaccumulation to toxic concentrations in the tissues of marine animals consumed by man. In this study, concentrations of several chemicals associated with produced water were determined in the soft tissues of two bivalves and five species of fishes. The bivalves collected in this study are not species usually consumed by man; they should not be presumed to behave like oysters and clams that are human foods. The fishes all could be consumed by humans, but most are not. The rockhind and gray triggerfish are included in the NOAA (1991) management unit for the Gulf and frequently appear in commercial and recreational landings reports; they probably are consumed by man. The other three species are small and are not ordinarily consumed. Nevertheless, the most straightforward way to estimate if bivalves and fishes from the vicinity of offshore produced water discharges could pose a health risk to human consumers is to assume that all the bivalves and fishes sampled in this study are edible and compare concentrations of the target chemicals in their edible tissues to screening level concentrations (risk-based concentrations [RBCs]) established to protect human consumers from toxic effects of chemically contaminated fisheries products.

This was done using the RBCs estimated by formulas provided by EPA (1995). EPA (1995) has provided formulas for estimating the RBC for carcinogenic and non-carcinogenic in tissues of fishery products consumed by man. The RBC for carcinogens is estimated by the formula:

$$RBC(\frac{mg}{kg}) = \frac{TR * BWa * ATc}{EFr * EDtot * \frac{IRF}{1000\frac{g}{kg}} * CPSo}$$

The RBC for non-carcinogens is estimated by the formula:

$$RBC(\frac{mg}{kg}) = \frac{THQ * RfDo * BWa * ATn}{EFr * EDtot * \frac{IRF}{1000\frac{g}{kg}}}$$

where TR is the target cancer risk set at 10^{-5}: see below); BWa is adult body weight (set at 70 kg); ATc is averaging time for carcinogenic effects (set at 25,550 days: 70 years): EFr is exposure frequency (set at 175 days/year: see below); EDtot is exposure duration (set at 30 years); IRF is fish ingestion rate (set at 54 g/day); CPSo is the published carcinogenic slope factor for the particular carcinogen; THQ is the target hazard quotient (set at 1); RfDo is the published reference oral dose for the particular non-carcinogen; and ATn is the averaging time for non-carcinogenic effects (set at 10,950 days: 30 years).

The default values for many of the parameters in the equation are extremely conservative and are based on the assumption that a large human population (millions of people) will be exposed on a daily basis to the chemicals of concern in their food. In the exposure scenario modeled here, a small number of fishermen (no more than a few hundred per platform) may fish regularly for fishes and possibly (doubtful) shellfish from the immediate vicinity of the offshore platforms. Platform crews are the most likely regular fishermen, though party boats and even small private vessels fish near some offshore platforms on a regular basis. Platform crew members who fish rotate off the platforms on a regular basis and so do not fish there daily; nor do most recreational fishermen who might visit an offshore platform. Because of the small population of people likely to fish regularly near a particular offshore platform, the target cancer risk (TR) was set at 10^{-5}, representing the risk of one additional cancer per 100,000 individuals who regularly ingest fishes from the site. Because daily consumption of fishes from a given platform site is unlikely, the exposure frequency (EFr) was set at 175 days/year (equivalent to every other day). All other parameters in the equations were left at their default values. Thus, the RBCs calculated here represent extremely conservative (protective) estimates of actual risk from consumption of fishery products from these offshore platforms.

Measured concentrations of most of the target chemicals were substantially lower in bivalve soft tissues and edible muscle tissues of fishes than the RBC values (**Table 4-47**). Only arsenic in bivalve and fish tissues and cadmium in bivalve tissues exceeded their respective RBCs. The RBCs for arsenic are based on the systemic

toxicity and human carcinogenicity of inorganic arsenite (Neff, 1997b). Generally less than 50% (and usually less than 10%) of the total arsenic in soft tissues of marine bivalves and fishes is inorganic and only a small fraction of the inorganic arsenic is in the reduced trivalent (arsenite) form. The organic arsenic is primarily arsenobetaine which is not toxic to human consumers and is not converted to inorganic arsenite in human tissues. Most of the organic arsenic ingested by man in marine seafoods is excreted unchanged within 12 h (Neff, 1997b). Therefore, the RBC for arsenic in edible tissues of marine animals is overly conservative, and should be applied only to the small fraction of the total arsenic in marine invertebrate and fish tissue that is present as trivalent inorganic arsenic. Nearly all marine tissues consumed by man contain arsenic concentrations higher than the carcinogenicity RBC, and most have concentrations of total arsenic approaching or exceeding the non-carcinogenic RBC value (Neff, 1997b).

The high concentrations of cadmium were restricted to soft tissues of thorny oyster. As discussed above, several species of oysters and scallops contain naturally high concentrations of cadmium in their tissues. The cadmium is in inert granules, primarily in the kidneys and is not bioavailable to consumers of fishery products, including humans (Nott and Nicloaidou, 1993, 1994). Therefore, it is highly probable that the elevated concentrations of cadmium in soft tissues of thorny oyster is natural and does not pose a health hazard to human consumers of shellfish products.

The other chemicals analyzed in bivalve and fish tissues all are well below the applicable RBC values. These chemicals do not pose any health risk to human consumers of fishery products harvested from the vicinity of the offshore produced water discharges.

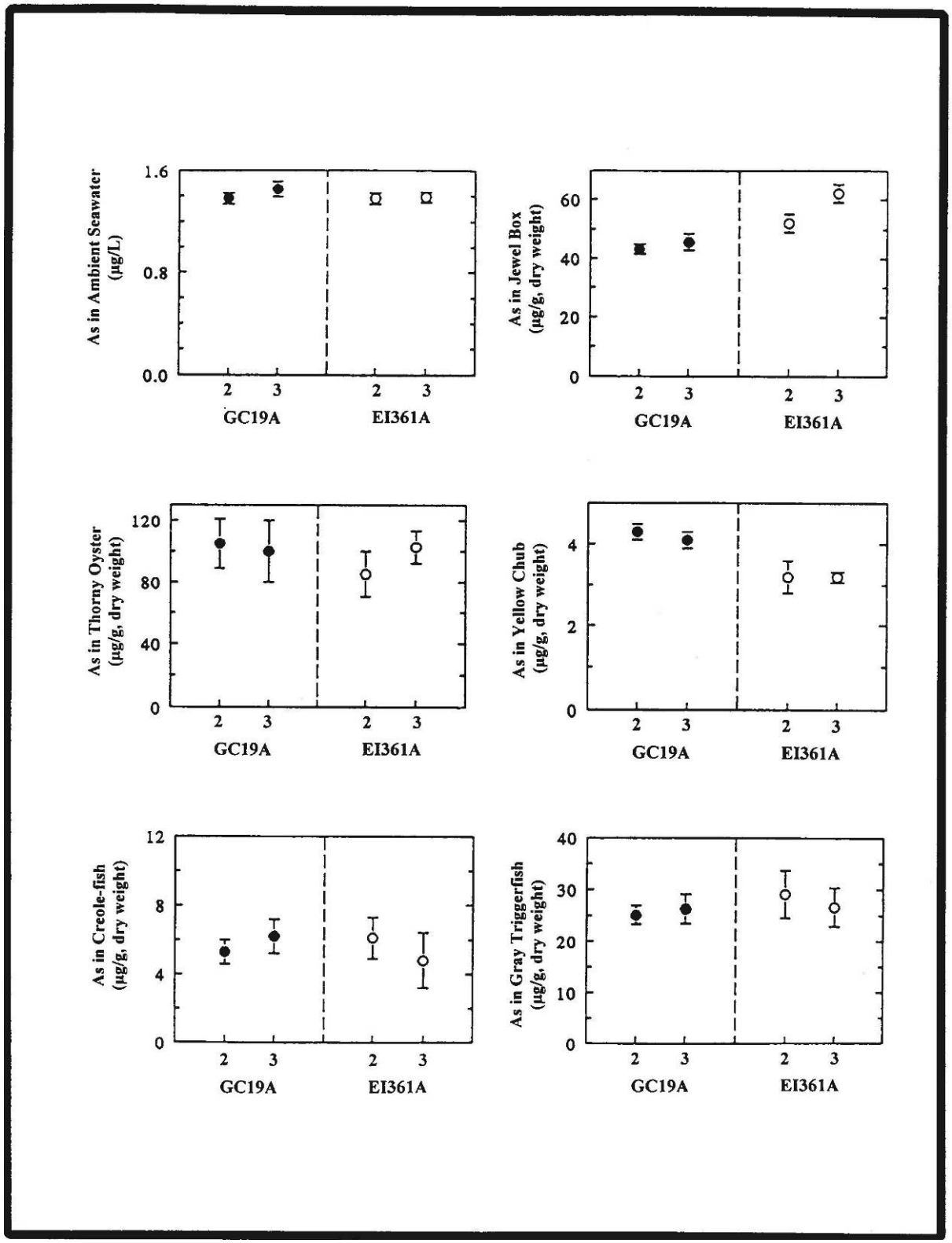

Figure 4-1. Concentrations of arsenic (As) in ambient seawater, two species of bivalves (jewel box and thorny oyster), and three species of fish from produced water discharging site Green Canyon (GC) 19A and its paired reference site, Eugene Island (EI) 361A. Samples were collected curing Cruises 2 and 3.

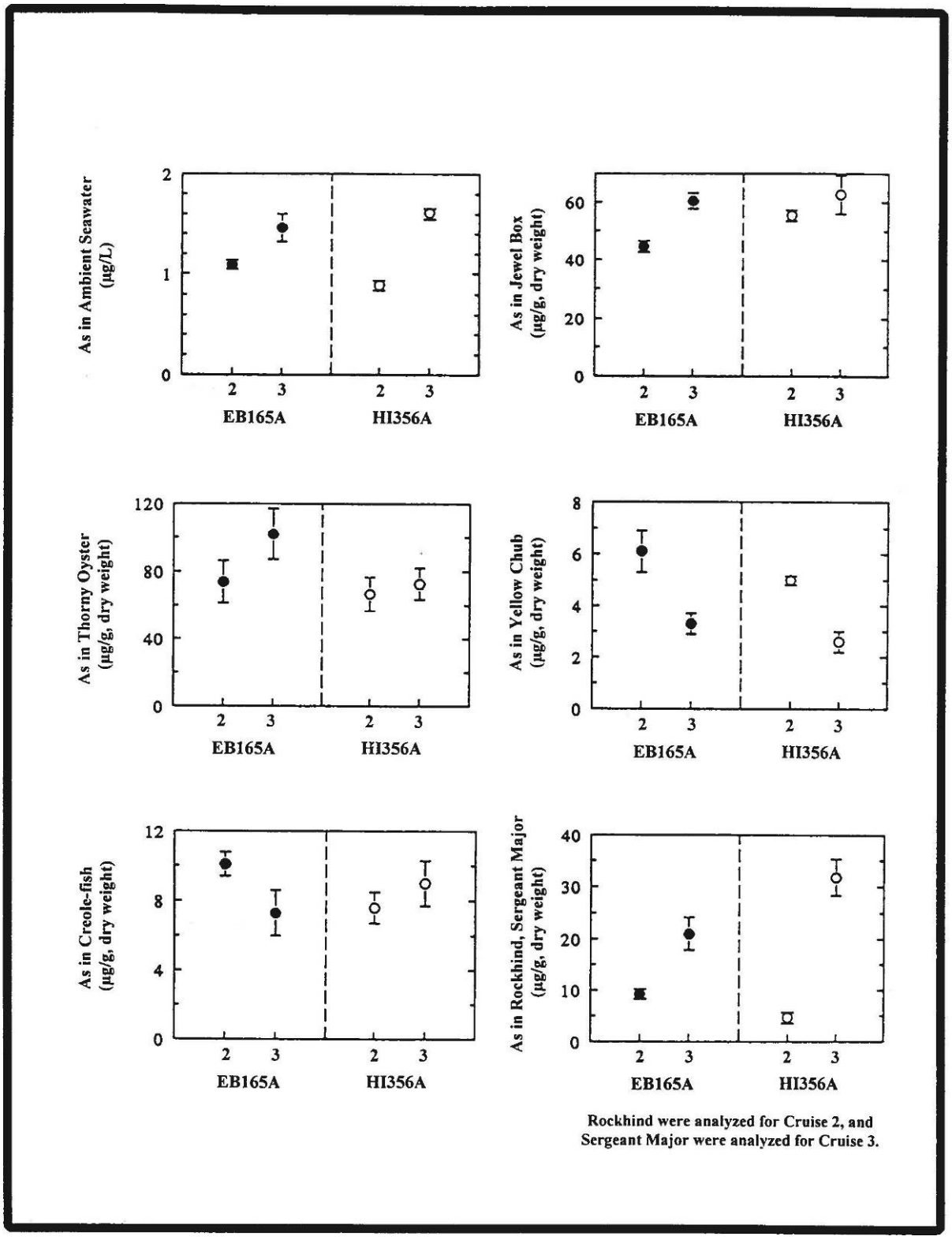

Figure 4-2. Concentrations of arsenic (As) in ambient seawater, two species of bivalves (jewel box and thorny oyster), and three species of fish from produced water discharging site East Breaks (EB) 165A and its paired reference site, High Island (HI) 356A. Samples were collected during Cruises 2 and 3.

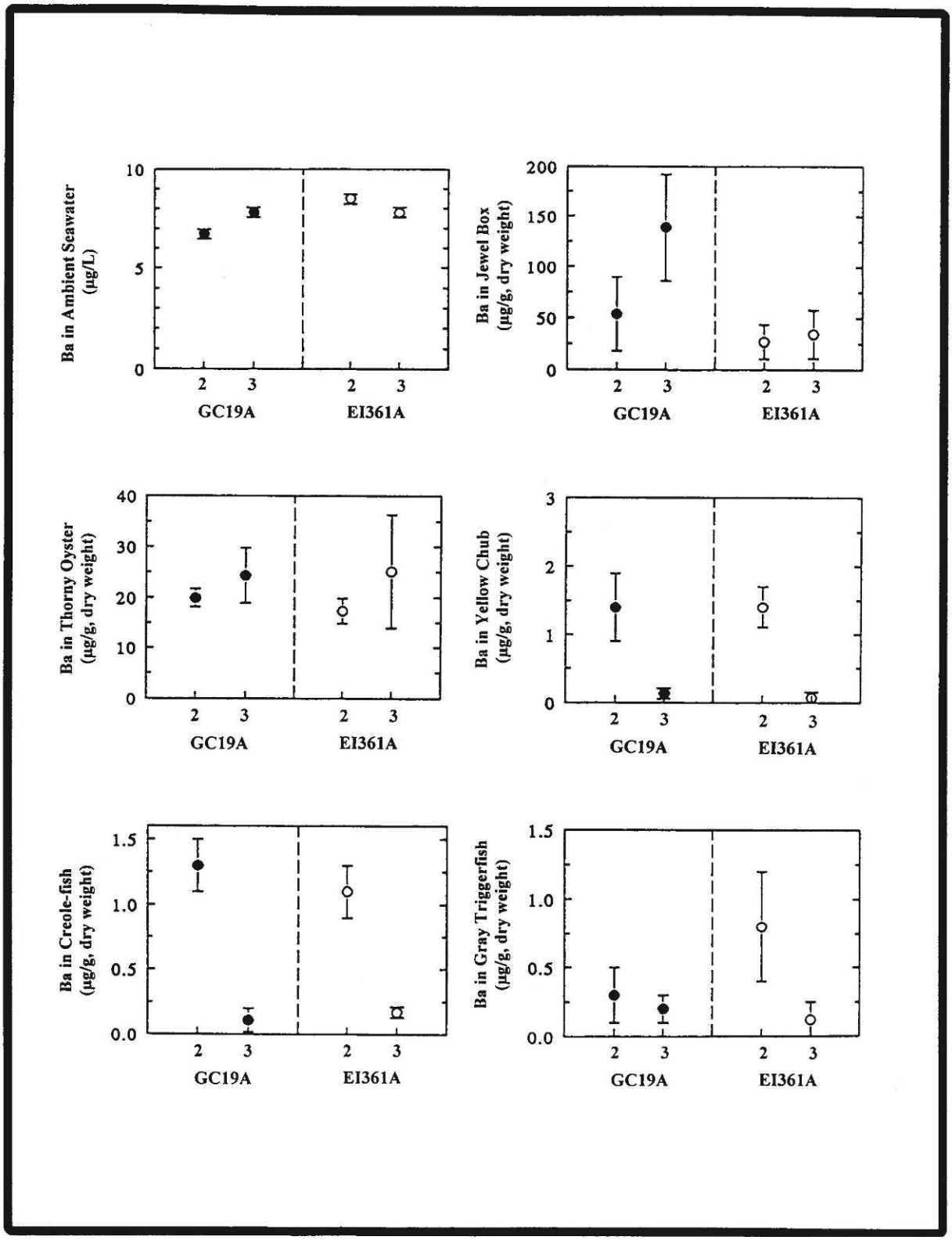

Figure 4-3. Concentrations of barium (Ba) in ambient seawater, two species of bivalves (jewel box and thorny oyster), and three species of fish from produced water discharging site Green Canyon (GC) 19A and its paired reference site, Eugene Island (EI) 361A. Samples were collected during Cruises 2 and 3.

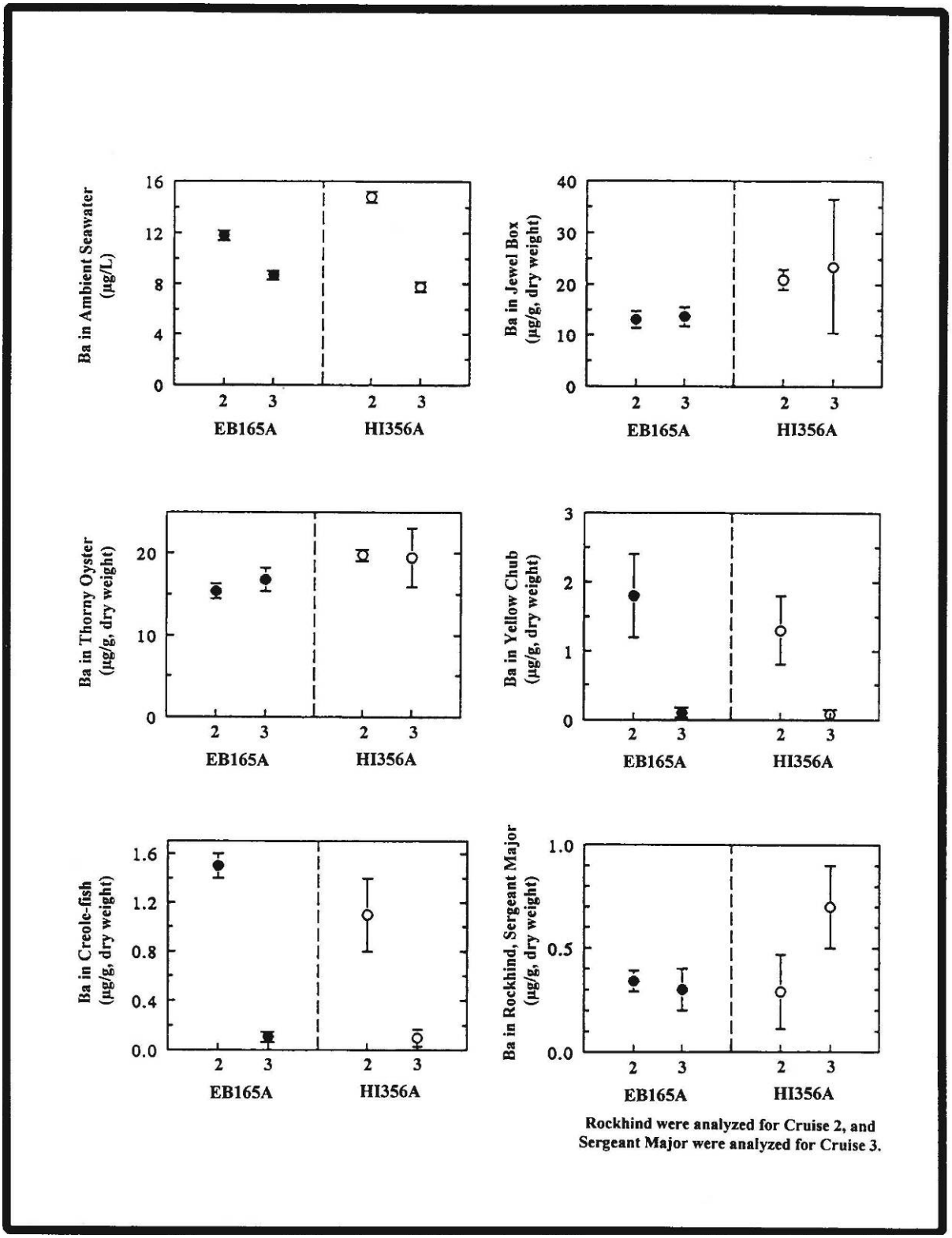

Figure 4-4. Concentrations of barium (Ba) in ambient seawater, two species of bivalves (jewel box and thorny oyster), and three species of fish from produced water discharging site East Breaks (EB) 165A and its paired reference site, High Island (HI) 356A. Samples were collected during Cruises 2 and 3.

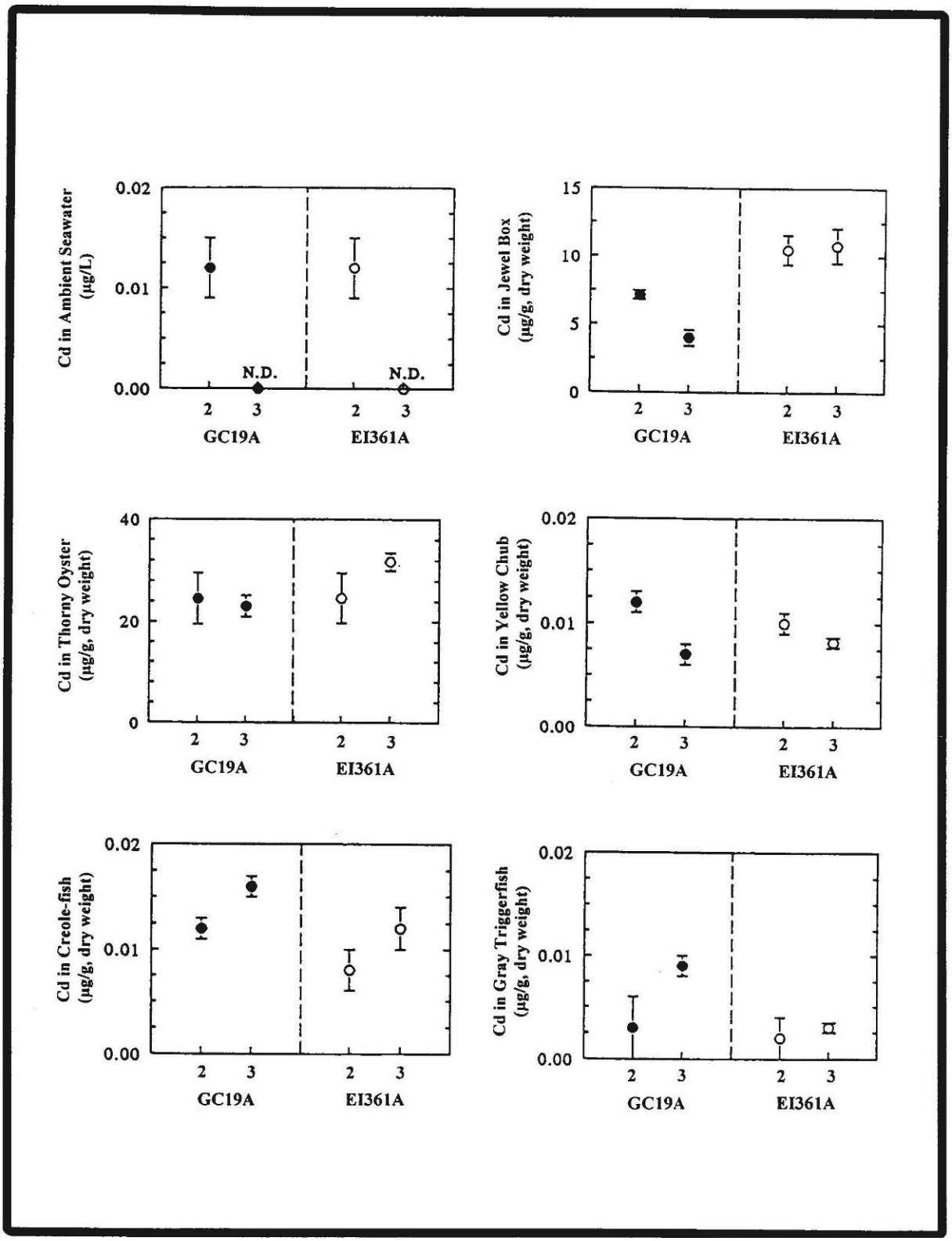

Figure 4-5. Concentrations of cadmium (Cd) in ambient seawater, two species of bivalves (jewel box and thorny oyster), and three species of fish from produced water discharging site Green Canyon (GC) 19A and its paired reference site, Eugene Island (EI) 361A. Samples were collected during Cruises 2 and 3.

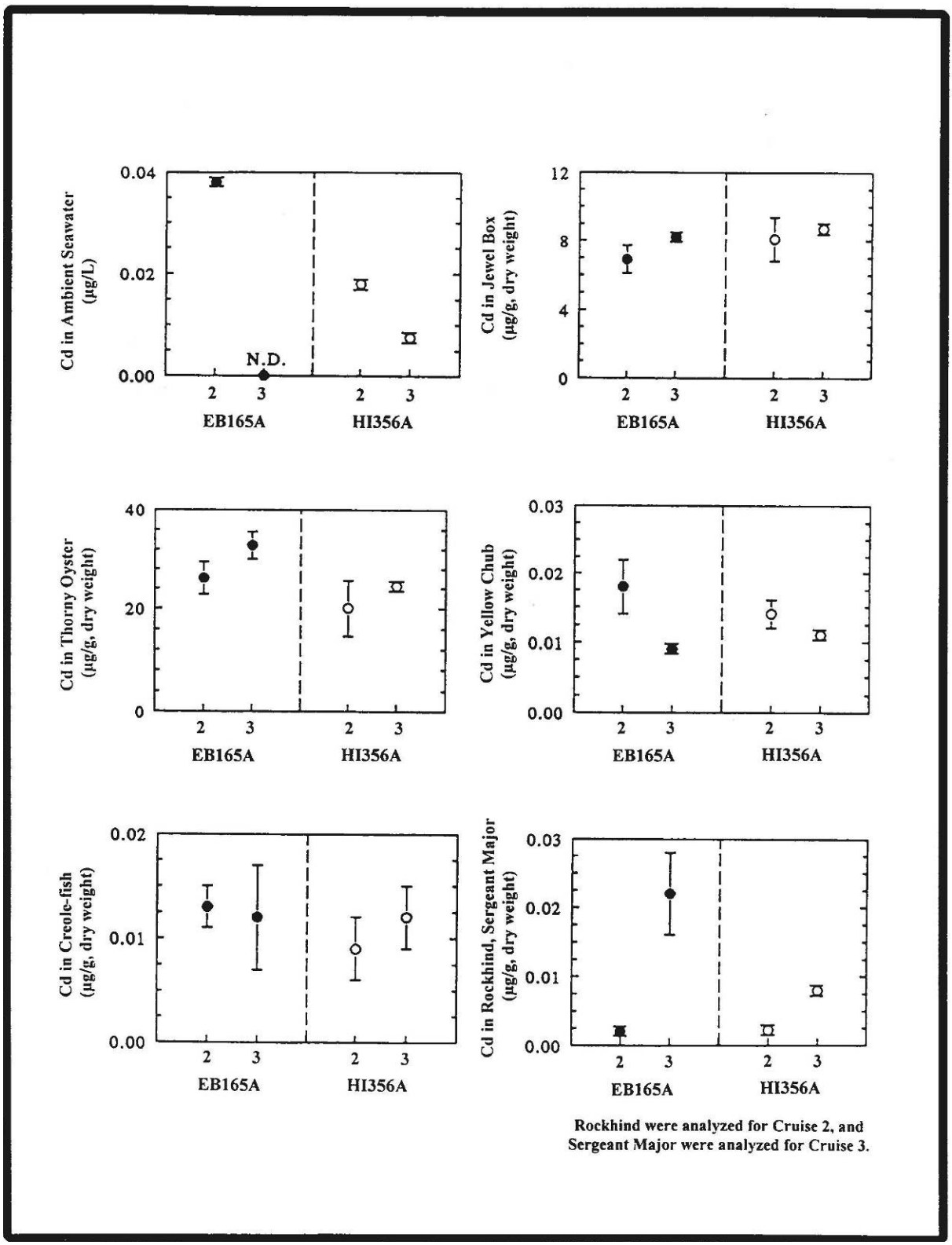

Figure 4-6. Concentrations of cadmium (Cd) in ambient seawater, two species of bivalves (jewel box and thorny oyster), and three species of fish from produced water discharging site East Breaks (EB) 165A and its paired reference site, High Island (HI) 356A. Samples were collected during Cruises 2 and 3.

Table 4-1. Mean concentrations of metals in produced water from two offshore produced water (PW) discharges to the Gulf of Mexico, in discharge site ambient seawater (DAS), and reference site ambient seawater (RAS). Enrichment factors (concentration in produced water/concentration in ambient seawater [unitless]) also are given. Concentrations of metals in produced water and ambient seawater from a U.S. Department of Energy Study (Continental Shelf Associates, Inc., 1997) are included for comparison. Concentrations are µg/L.

Location	Cruise	Mean Metal Concentration			
		Arsenic	Barium	Cadmium	Mercury
EB165A (PW)	2	5.8	240,000	0.32	<0.01
EB165A (DAS)	2	1.1	12	<0.005	<0.01
HI356A (RAS)	2	0.89	15	<0.005	<0.01
Enrichment	**2**	**5.2**	**20,000**	**>64**	**---**
EB165A (PW)	3	4.8	250,000	<0.3	<0.01
EB165A (DAS)	3	1.5	8.7	<0.005	<0.01
HI356A (RAS)	3	1.6	8.9	<0.005	<0.01
Enrichment	**3**	**3.3**	**29,000**	**<60**	**---**
GC19A[a] (PW)	2	27.2	150,000	0.48	<0.01
GC19A (D) (DAS)	2	1.4	6.7	<0.005	<0.01
EI361A (RAS)	2	1.4	8.5	<0.005	<0.01
Enrichment	**2**	**19.7**	**22,000**	**>96**	**---**
GC19A[a] (PW)	3	22	130,000	0.8	<0.01
GC19A[b] (PW)	3	4.6	89,000	14	<0.01
GC19A (DAS)	3	1.4	7.8	<0.005	<0.01
EI361A (RAS)	3	1.4	7.8	<0.005	<0.01
Enrichment[a]	**3**	**15.2**	**17,000**	**>160**	**---**
Enrichment[b]	**3**	**3.2**	**11,000**	**>2,800**	**---**
DOE (PW)	---	0.74-24.79	86,778-320,375	0.10-0.62	0.01-0.08
DOE (DAS)	---	0.64-1.58	14.63-88.35	0.01-0.03	<0.02-0.04
DOE (RAS)	---	0.81-1.18	12.82-20.45	0.01-0.02	<0.01-0.02

[a] Primary discharge from GC19A.
[b] Secondary discharge from GC19A.

Table 4-2. Mean concentrations of ^{226}Ra and ^{228}Ra in produced water from two offshore produced water (PW) discharges to the Gulf of Mexico, in discharge site ambient sea water (DAS), and reference site ambient seawater (RAS). Enrichment factors (concentration in produced water/concentration in ambient seawater [unitless]) also are given. Concentrations are in pCi/L.

Location	Cruise	Mean Radium Concentration		
		^{226}Ra	^{228}Ra	Total Radium
EB165A (PW)	2	260	900	1,200
EB165A (DAS)	2	0.07	0.02	0.09
HI356A (RAS)	2	0.03	0.90	0.93
Enrichment	**2**	**3,700**	**45,000**	**13,000**
EB165A (PW)	3	350	750	1,100
EB165A (DAS)	3	0.01	0.03	0.04
HI356A (RAS)	3	0.09	ND	0.09
Enrichment	**3**	**35,000**	**25,000**	**27,500**
GC19A (PW)	2	250	830	1,080
GC19A (DAS)	2	0.19	0.11	0.30
EI361A (RAS)	2	0.18	0.28	0.46
Enrichment	**2**	**1,300**	**7,600**	**3,600**
GC19A[a] (PW)	3	260	460	720
GC19A[b] (PW)	3	370	890	1,260
GC19A (DAS)	3	0.02	0.12	0.14
EI361A (RAS)	3	0.01	ND	0.01
Enrichment[a]	**3**	**13,000**	**3,800**	**5,100**
Enrichment[b]	**3**	**18,500**	**7,400**	**9,000**

ND = Concentration below method detection limit.
[a] Primary discharge from GC19A.
[b] Secondary discharge from GC19A.

Table 4-3. Mean concentrations of total volatile organic compounds (VOCs) in produced water, ambient seawater, and in blanks from produced water discharging (D) and reference (R) platforms on Cruises 2 and 3. All detected VOCs in ambient seawater are benzene or toluene. Concentrations are µg/L.

Platform	Produced Water	Ambient Seawater	Lab/Field Blanks
Cruise 2			
EB165A (D)	1,900	ND	ND - 0.22J
HI356A (R)	---	ND - 0.15J	
GC19A (D)	1,300	ND	
EI361A (R)	---	ND - 0.16J	
Cruise 3			
EB165A (D)	2,100	ND - 0.75J	ND - 3.10
HI356A (R)	---	ND	
GC19A (D)	2,600	ND	
GC19A (D)[a]	1,000	---	
EI361A (R)	---	ND	

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).
ND = Concentration below MDL.
[a] Produced water from a temporary secondary discharge.

Table 4-4. Concentration ranges of total PAHs, phenol, and bis(2-ethylhexyl)phthalate in produced water, ambient seawater, and blanks from Cruises 2 and 3 at discharging (D) and reference (R) platforms. Concentrations are µg/L.

Compound/Platform	Produced Water	Ambient Seawater	Lab/Field Blanks
Total PAH			
EB165A (D)	40.0 - 44.0	ND - 0.01J	ND - 0.01J
HI356A (R)	---	ND- 2.24	
GC19A (D)	47.0 - 55.0 (121 - 149)[a]	ND - 0.07J	
EI361A (R)	---	ND - 0.01J	
Phenol			
EB165A (D)	370 - 610	0.02J - 0.25B	<0.002 - 0.260
HI356A (R)	---	0.02J - 0.08J	
GC19A (D)	320 - 580 (350 - 400)[a]	0.03J - 0.11B	
EI361A (R)	---	0.03J - 0.24B	
Bis(2-ethylhexyl) phthalate			
EB165A (D)	0.11 - 0.57	<0.09 - 0.18J	<0.09 - 0.35J
HI356A (R)	---	0.10J - 1.80B	
GC19A (D)	<0.09 - 0.15 (0.11 - 1.00)[a]	<0.09 - 0.19J	
EI361A (R)	---	0.14J - 0.68B	

B = Analyte detected in the blank.
J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).
ND = Concentration below MDL.
[a] Produced water from the temporary secondary discharge.

Table 4-5. Concentration ranges of total arsenic in the whole or muscle tissues of marine organisms from throughout the world. Concentrations are in µg/g dry weight (ppm) (From: Neff, 1997a).

Taxon	Number of Samples	Concentration Range
All taxa	544	0-2,739
Algae	50	0.1-382
Seagrass	5	0.16-0.59
Zooplankton	4	0.2-24.4
Polychaetes	18	5.0-2,739
Crustaceans	96	<0.1-270.5
Crustacean larvae	7	26.95-79.90
Bivalves	151	<0.6-214
Snails	41	8.0-533
Cephalopods	7	4.0-49.5
Fish	156	0.05-449.5
Marine Mammals	6	0.05-0.90

Table 4-6. Concentration ranges of total arsenic in whole or muscle tissues of marine organisms from the Gulf of Mexico. Concentrations of arsenic in soft tissues of bivalves and fish collected in this study are included for comparison. Concentrations are in µg/g dry weight (From: Neff, 1997a).

Taxon	Number of Samples	Concentration Range
All taxa	83	0-126
Phytoplankton	2	0.2-50.4
Zooplankton	2	0.2-24.4
Polychaetes	1	5.6
Crustaceans	12	0.2-10.0
Bivalves	43	0-126
Fish	22	0.1-114
This Study		
Bivalves	98	42 - 121
Fish	146	2.3 - 35

Table 4-7. Concentrations of arsenic in marine bivalve mollusks from two produced water discharge sites and paired reference sites. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in µg/g dry weight.

Species	Site	Cruise	Concentration		Significant[a] Difference?
			Mean (SD)	Range	
Jewel box	EB165A (D)	2	45 (1.5)	43 - 46	No
	HI356A (R)	2	55 (1.1)	54 - 57	
	EB165A (D)	3	60 (2.8)	57 - 64	No
	HI356A (R)	3	63 (6.7)	54 - 69	
	GC19A (D)	2	43 (1.9)	42 - 46	R>D
	EI361A (R)	2	52 (3.1)	49 - 55	
	GC19A (D)	3	46 (2.8)	42 - 48	R>D
	EI361A (R)	3	62 (3.1)	58 - 66	
Thorny oyster	EB165A (D)	2	74 (12)	60 - 87	No
	HI356A (R)	2	67 (9.9)	56 - 77	
	EB165A (D)	3	101 (12)	91 - 120	No
	HI356A (R)	3	73 (9.2)	63 - 84	
	GC19A (D)	2	105 (16)	88 - 121	No
	EI361A (R)	2	85 (15)	73 - 103	
	GC19A (D)	3	100 (19)	77 - 120	No
	EI361A (R)	3	103 (11)	90 - 120	

[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-8. Concentrations of arsenic in two species of marine fish collected from two produced water discharge sites and paired reference sites on Cruises 2 and 3. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in µg/g dry weight.

Species	Site	Cruise	Concentration		Significant[a] Difference?
			Mean (SD)	Range	
Yellow chub	EB165A (D)	2	6.1 (0.76)	5.1 - 7.0	No
	HI356A (R)	2	5.0 (0.14)	4.8 - 5.3	
	EB165A (D)	3	3.3 (0.42)	2.5 - 3.9	No
	HI356A (R)	3	2.6 (0.37)	2.3 - 3.2	
	GC19A (D)	2	4.3 (0.20)	4.1 - 4.6	D>R
	EI361A (R)	2	3.2 (0.39)	2.7 - 3.7	
	GC19A (D)	3	4.1 (0.17)	3.7 - 4.4	D>R
	EI361A (R)	3	3.2 (0.051)	2.8 - 3.6	
Creole-fish	EB165A (D)	2	10 (0.73)	9.1 - 11	No
	HI356A (R)	2	7.6 (0.94)	6.9 - 8.9	
	EB165A (D)	3	7.3 (1.3)	5.8 - 8.2	No
	HI356A (R)	3	9.0 (1.3)	7.4 - 10	
	GC19A (D)	2	5.3 (0.67)	4.5 - 6.0	No
	EI361A (R)	2	6.1 (1.2)	5.1 - 7.5	
	GC19A (D)	3	6.2 (0.96)	5.2 - 7.3	No
	EI361A (R)	3	4.8 (1.6)	3.6 - 6.6	

[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-9. Concentrations of arsenic in three species of marine fish collected from one produced water discharge/reference site pair or on just one cruise. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are µg/g dry weight.

Species	Site	Cruise	Concentration		Significant[a] Difference?
			Mean (SD)	Range	
Rockhind	EB165A (D)	2	9.2 (0.058)	8.9 - 9.6	D>R
	HI356A (R)	2	4.6 (0.61)	3.7 - 5.3	
Gray triggerfish	GC19A (D)	2	25 (1.8)	23 - 27	No
	EI361A (R)	2	29 (4.6)	22 - 33	
	GC19A (D)	3	26 (2.9)	23 - 29	No
	EI361A (R)	3	27 (3.8)	22 - 31	
Sergeant major	EB165A (D)	3	21 (3.1)	17 - 24	R>D
	HI356A (R)	3	32 (3.5)	28 - 35	

[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-10. Concentration ranges of barium in the soft tissues of marine organisms from throughout the world. Concentrations in soft tissues of bivalve mollusks and edible muscle tissues of fish sampled in this study are included for comparison. Concentrations are in µg/g dry weight (From: Neff, 1997a).

Taxon	Number of Analyses	Concentration Range
Phytoplankton	5	34 - 503
Macroalgae	15	0.25 - 10,000
Corals	5	6.5 - 17.8
Bivalve Mollusks	27	0.09 - 179
Crustaceans	16	0.02 - 202
Fish	33	<0.01 - 49
This Study		
Bivalves	98	11 - 220
Fish	146	0.013 - 3.1

Table 4-11. Concentrations of barium in marine bivalve mollusks from two produced water discharge sites and paired reference sites. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are µg/g dry weight.

Species	Site	Cruise	Concentration		Significant[a] Difference?
			Mean (SD)	Range	
Jewel box	EB165A (D)	2	13 (1.7)	12 - 16	No
	HI356A (R)	2	21 (2.0)	17 - 29	
	EB165A (D)	3	14 (1.9)	11 - 17	No
	HI356A (R)	3	23 (13)	14 - 41	
	GC19A (D)	2	54 (36)	25 - 126	No
	EI361A (R)	2	27 (17)	14 - 51	
	GC19A (D)	3	139 (54)	75 - 220	No
	EI361A (R)	3	34 (24)	18 - 64	
Thorny oyster	EB165A (D)	2	15 (0.88)	13 - 17	No
	HI356A (R)	2	20 (0.34)	18 - 21	
	EB165A (D)	3	17 (1.4)	14 - 20	No
	HI356A (R)	3	20 (3.6)	16 - 25	
	GC19A (D)	2	20 (1.8)	18 - 22	No
	EI361A (R)	2	17 (2.5)	15 - 23	
	GC19A (D)	3	24 (5.4)	17 - 31	No
	EI361A (R)	3	25 (11)	17 - 44	

[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-12. Concentrations of barium in two species of marine fish collected from two produced water discharge sites and paired reference sites on Cruises 2 and 3. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are µg/g dry weight.

Species	Site	Cruise	Concentration		Significant[a] Difference?
			Mean (SD)	Range	
Yellow chub	EB165A (D)	2	1.8 (0.59)	0.67 - 2.7	No
	HI356A (R)	2	1.3 (0.54)	0.58 - 3.1	
	EB165A (D)	3	0.13 (0.11)	0.046 - 0.44	No
	HI356A (R)	3	0.078 (0.057)	0.034 - 0.18	
	GC19A (D)	2	1.4 (0.47)	0.66 - 2.4	No
	EI361A (R)	2	1.4 (0.31)	0.75 - 2.0	
	GC19A (D)	3	0.13 (0.019)	0.056 - 0.24	No
	EI361A (R)	3	0.074 (0.008)	0.054 - 0.10	
Creole-fish	EB165A (D)	2	1.5 (0.11)	0.77 - 2.2	No
	HI356A (R)	2	1.1 (0.30)	0.71 - 1.6	
	EB165A (D)	3	0.024 (0.008)	0.013 - 0.038	No
	HI356A (R)	3	0.099 (0.070)	0.028 - 0.240	
	GC19A (D)	2	1.3 (0.18)	0.69 - 1.7	No
	EI361A (R)	2	1.1 (0.20)	0.61 - 1.7	
	GC19A (D)	3	0.11 (0.092)	0.044 - 0.230	No
	EI361A (R)	3	0.035 (0.008)	0.021 - 0.045	

[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-13. Concentrations of barium in three species of marine fish that were collected from one produced water discharge/reference site pair or on just one cruise. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in µg/g dry weight.

Species	Site	Cruise	Concentration		Significant[a] Difference?
			Mean (SD)	Range	
Rockhind	EB165A (D)	2	0.34 (0.05)	0.20 - 0.57	No
	HI356A (R)	2	0.29 (0.18)	0.10 - 0.76	
Gray triggerfish	GC19A (D)	2	0.29 (0.23)	ND - 0.67	No
	EI361A (R)	2	0.76 (0.41)	0.33 - 2.0	
	GC19A (D)	3	0.20 (0.10)	0.026 - 0.59	No
	EI361A (R)	3	0.12 (0.13)	0.020 - 0.48	
Sergeant major	EB165A (D)	3	0.33 (0.12)	0.21 - 0.53	R>D
	HI356A (R)	3	0.67 (0.17)	0.41 - 1.2	

ND = Concentrations below method detection limit.
[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-14. Concentration ranges of cadmium in muscle or whole soft tissues of marine organisms from throughout the world. Concentrations are in µg/g dry weight (From: Neff, 1997a).

Taxon	No. of Analyses	Concentration Range
All taxa	684	0.001 - 277
Phytoplankton	9	0.04 - 4.6
Macroalgae	69	0.1 - 29.8
Seagrass	2	1.0 - 4.9
Polychaetes	24	0.12 - 45.0
Zooplankton	11	0.10 - 1.5
Shrimp	50	0.001 - 13.3
Lobsters	9	0.05 - 13.45
Crabs	15	0.03 - 1.06
Other crustaceans	23	0.14 - 117
Clams	44	0.05 - 26.1
Scallops	7	0.58 - 36.3
Mussels	108	0.02 - 65.5
Oysters	99	0.03 - 144
Snails	32	0.15 - 277
Echinoderms	5	0.14 - 4.65
Fish	128	0.001 - 5.80
Marine birds	2	0.15 - 1.29
Marine Mammals	22	0.03 - 2.4

Table 4-15. Comparison of concentration ranges of cadmium in muscle or whole soft tissues of selected taxa from the Gulf of Mexico and other marine environments (Neff, 1997a). Concentrations in soft tissues of bivalve mollusks and edible muscle tissue of fish sampled in this study are included for comparison. Concentrations are in µg/g dry weight.

Taxon	Location	Number of Samples	Concentration Range
Shrimp	Gulf of Mexico Elsewhere	24 26	<0.001 - 0.42 0.001 - 13
Clams	Gulf of Mexico Elsewhere	11 33	<0.05 - 14 0.05 - 26
Oysters	Gulf of Mexico Elsewhere	61 38	0.1 - 79 0.03 - 144
Fish	Gulf of Mexico Elsewhere	45 83	<0.001 - 5.8 0.001 - 5.8
This Study			
Bivalves	NW Gulf of Mexico	98	3.4 - 36
Fish	NW Gulf of Mexico	131	<0.002 - 0.029

Table 4-16. Concentrations of cadmium in marine bivalve mollusks from two produced water discharge sites and paired reference sites. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in µg/g dry weight.

Species	Site	Cruise	Concentration		Significant[a] Difference?
			Mean (SD)	Range	
Jewel box	EB165A (D)	2	6.9 (0.81)	6.0 - 7.8	No
	HI356A (R)	2	8.1 (1.3)	6.3 - 9.0	
	EB165A (D)	3	8.2 (0.29)	7.8 - 8.8	No
	HI356A (R)	3	8.7 (0.30)	8.1 - 9.5	
	GC19A (D)	2	7.1 (0.52)	6.2 - 7.7	No
	EI361A (R)	2	10 (1.1)	9.2 - 11	
	GC19A (D)	3	4.0 (0.63)	3.4 - 4.8	R>D
	EI361A (R)	3	11 (1.3)	9.5 - 13	
Thorny oyster	EB165A (D)	2	26 (3.3)	22 - 30	No
	HI356A (R)	2	20 (5.5)	13 - 25	
	EB165A (D)	3	33 (2.8)	27 - 36	No
	HI356A (R)	3	25 (1.3)	23 - 26	
	GC19A (D)	2	24 (5.0)	18 - 32	No
	EI361A (R)	2	25 (4.9)	20 - 31	
	GC19A (D)	3	23 (2.1)	20 - 25	No
	EI361A (R)	3	32 (1.7)	28 - 33	

[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-17. Concentrations of cadmium in two species of marine fish collected from two produced water discharge sites and paired reference sites on Cruises 2 and 3. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in µg/g dry weight.

Species	Site	Cruise	Concentration		Significant[a] Difference?
			Mean (SD)	Range	
Yellow chub	EB165A (D)	2	0.018 (0.004)	0.013 - 0.021	No
	HI356A (R)	2	0.014 (0.002)	0.011 - 0.016	
	EB165A (D)	3	0.009J (0.001)	0.008J - 0.010	No
	HI356A (R)	3	0.011 (0.001)	0.009J - 0.012	
	GC19A (D)	2	0.012 (0.001)	0.011 - 0.013	No
	EI361A (R)	2	0.010 (0.001)	0.008J - 0.011	
	GC19A (D)	3	0.007J (0.001)	0.005J - 0.008J	No
	EI361A (R)	3	0.008J (0.0003)	0.008J - 0.009J	
Creole-fish	EB165A (D)	2	0.013 (0.002)	0.010 - 0.018	No
	HI356A (R)	2	0.009J (0.003)	0.006J - 0.012	
	EB165A (D)	3	0.012 (0.005)	0.006J - 0.018	No
	HI356A (R)	3	0.012 (0.003)	0.009J - 0.016	
	GC19A (D)	2	0.012 (0.001)	0.009J - 0.013	No
	EI361A (R)	2	0.008J (0.002)	ND - 0.010	
	GC19A (D)	3	0.016 (0.001)	0.014 - 0.020	No
	EI361A (R)	3	0.012 (0.002)	0.009J - 0.014	

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).
ND = Concentration below MDL.
[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-18. Concentrations of cadmium in three species of marine fish collected from one produced water discharge/reference site pair or on just one cruise. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are µg/g dry weight.

Species	Site	Cruise	Concentration		Significant[a] Difference?
			Mean (SD)	Range	
Rockhind	EB165A (D)	2	0.002J (0.001)	ND - 0.004J	No
	HI356A (R)	2	0.002J (0.000)	ND - 0.003J	
Gray triggerfish	GC19A (D)	2	0.003J (0.003)	ND - 0.005J	No
	EI361A (R)	2	0.003J (0.002)	ND - 0.005J	
	GC19A (D)	3	0.009J (0.001)	0.008J - 0.012	D>R
	EI361A (R)	3	0.003J (0.000)	0.002J - 0.004J	
Sergeant major	EB165A (D)	3	0.022 (0.007)	0.015 - 0.029	D>R
	HI356A (R)	3	0.008J (0.001)	0.007J - 0.010	

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).
ND = Concentration below MDL.
[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-19. Concentration ranges of total mercury in muscle or whole soft tissues of marine organisms from throughout the world. Concentrations are based on means or ranges of concentrations from the scientific literature. Concentrations are in µg/g dry weight (From: Neff, 1997a).

Taxon	Number of Analyses	Concentration Range
All	850	0.003 - 264
Macroalgae	15	0.1 - 46.8
Polychaetes	16	0.085 - 7.29
Snails	38	0.025 - 3.7
Mussels	60	0.004 - 11.7
Oysters	74	0.003 - 8.04
Scallops	5	0.05 - 0.35
Clams	32	0.005 - 85
Cephalopods	18	0.013 - 8.2
Shrimp	27	0.02 - 6.2
Lobsters	14	0.05 - 12.65
Crabs	20	0.015 - 2.3
Echinoderms	5	0.031 - 1.45
Sharks	57	0.035 - 52.5
Fish	379	0.01 - 115
Marine Birds	24	0.15 - 25.05
Marine Mammals	27	0.005 - 264

Table 4-20. Comparison of concentration ranges of total mercury in tissues of marine animals from the Gulf of Mexico and from marine environments elsewhere in the world. Concentrations in soft tissues of bivalve mollusks and edible muscle tissue of fish sampled in this study are included for comparison. Concentrations are in µg/g dry weight (From: Neff, 1997a).

Taxon	Location	Number of Analyses	Concentration Range
Oyster	Gulf of Mexico Elsewhere	43 74	<0.01 - 33 0.003 - 8.0
Clam	Gulf of Mexico Elsewhere	7 32	0.05 - 0.61 0.005 - 85
Shrimp	Gulf of Mexico Elsewhere	5 27	<0.02 - 0.4 0.02 - 6.2
Fish	Gulf of Mexico Elsewhere	15 379	<0.2 - 2.0 0.01 - 115
This Study			
Bivalves	NW Gulf of Mexico	98	0.049 - 0.33
Fish	NW Gulf of Mexico	146	0.042 - 0.67

Table 4-21. Concentrations of mercury in marine bivalve mollusks from two produced water discharge sites and paired reference sites. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in µg/g dry weight.

Species	Site	Cruise	Concentration		Significant[a] Difference?
			Mean (SD)	Range	
Jewel box	EB165A (D)	2	0.063 (0.013)	0.049 - 0.079	No
	HI356A (R)	2	0.072 (0.006)	0.064 - 0.079	
	EB165A (D)	3	0.072 (0.008)	0.061 - 0.080	No
	HI356A (R)	3	0.066 (0.006)	0.059 - 0.072	
	GC19A (D)	2	0.086 (0.006)	0.080 - 0.096	No
	EI361A (R)	2	0.073 (0.017)	0.056 - 0.097	
	GC19A (D)	3	0.085 (0.021)	0.068 - 0.120	No
	EI361A (R)	3	0.066 (0.004)	0.060 - 0.071	
Thorny oyster	EB165A (D)	2	0.13 (0.002)	0.10 - 0.14	No
	HI356A (R)	2	0.15 (0.009)	0.12 - 0.17	
	EB165A (D)	3	0.18 (0.030)	0.16 - 0.23	No
	HI356A (R)	3	0.20 (0.039)	0.14 - 0.24	
	GC19A (D)	2	0.20 (0.091)	0.13 - 0.33	No
	EI361A (R)	2	0.12 (0.010)	0.098 - 0.13	
	GC19A (D)	3	0.18 (0.021)	0.16 - 0.22	No
	EI361A (R)	3	0.17 (0.003)	0.16 - 0.18	

[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-22. Concentrations of mercury in two species of marine fish that were collected from two produced water discharge sites and paired reference sites on Cruises 2 and 3. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in µg/g dry weight.

Species	Site	Cruise	Concentration		Significant[a] Difference?
			Mean (SD)	Range	
Yellow chub	EB165A (D)	2	0.099 (0.012)	0.086 - 0.130	No
	HI356A (R)	2	0.091 (0.014)	0.076 - 0.110	
	EB165A (D)	3	0.059 (0.013)	0.042 - 0.072	No
	HI356A (R)	3	0.066 (0.006)	0.059 - 0.072	
	GC19A (D)	2	0.077 (0.016)	0.055 - 0.096	No
	EI361A (R)	2	0.077 (0.007)	0.068 - 0.086	
	GC19A (D)	3	0.120 (0.031)	0.097 - 0.160	No
	EI361A (R)	3	0.067 (0.005)	0.060 - 0.073	
Creole-fish	EB165A (D)	2	0.15 (0.024)	0.13 - 0.18	
	HI356A (R)	2	0.14 (0.013)	0.13 - 0.15	
	EB165A (D)	3	0.13 (0.022)	0.11 - 0.15	No
	HI356A (R)	3	0.12 (0.027)	0.086 - 0.15	
	GC19A (D)	2	0.17 (0.019)	0.15 - 0.20	No
	EI361A (R)	2	0.13 (0.006)	0.12 - 0.14	
	GC19A (D)	3	0.19 (0.022)	0.16 - 0.22	No
	EI361A (R)	3	0.16 (0.003)	0.15 - 0.17	

[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-23. Concentrations of mercury in three species of marine fish that were collected from one produced water discharge/reference site pair or on just one cruise. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in µg/g dry weight.

Species	Site	Cruise	Concentration		Significant[a] Difference?
			Mean (SD)	Range	
Rockhind	EB165A (D)	2	0.32 (0.049)	0.28 - 0.39	R>D
	HI356A (R)	2	0.54 (0.12)	0.36 - 0.67	
Gray triggerfish	GC19A (D)	2	0.28 (0.05)	0.22 - 0.34	No
	EI361A (R)	2	0.13 (0.037)	0.09 - 0.17	
	GC19A (D)	3	0.11 (0.012)	0.092 - 0.13	No
	EI361A (R)	3	0.45 (0.084)	0.35 - 0.58	
Sergeant major	EB165A (D)	3	0.27 (0.011)	0.25 - 0.28	D>R
	HI356A (R)	3	0.20 (0.021)	0.18 - 0.22	

[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-24. Concentration ranges of ^{226}Ra and ^{228}Ra in tissues of marine organisms from throughout the world. Concentrations in soft tissues of bivalve mollusks and edible muscle tissue of fish sampled in this study are included for comparison. Concentrations are in pCi/g dry weight (From: Neff, 1997a).

Taxon	Number of Analyses	Concentration Range
^{226}Ra		
Phytoplankton	6	0.028 - 9.0
Macroalgae	45	0.003 - 1.2
Seagrass	2	0.068 - 0.20
Zooplankton	8	0.011 - 2.44
Crustaceans	8	0.04 - 1.3
Mollusks	24	0.011 - 0.36
Fish	22	0.003 - 0.36
Fish (bone)	11	0.007 - 0.70
This Study		
Bivalves	98	ND - 0.34
Fish	146	ND - 0.058
^{228}Ra		
Phytoplankton	4	0.5 - 2.5
Macroalgae	12	0.12 - 3.51
Seagrass	2	0.20 - 1.35
Zooplankton	4	0.049 - 1.82
Crustaceans	8	0.016 - 3.51
Mollusks	5	0.047 - 1.9
Fish	11	0.036 - 2.7
Fish (bone)	5	0.063 - 4.5
This Study		
Bivalves	98	ND - 0.20
Fish	146	ND - 0.22

ND = Concentration below method detection limit.

Table 4-25. Concentrations of ^{226}Ra and ^{228}Ra in marine bivalve mollusks from two produced water discharge sites and paired reference sites. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in pCi/g dry weight.

Species	Site	Cruise	Concentration Range		Significant[a] Difference?
			^{226}Ra	^{228}Ra	
Jewel box	EB165A (D)	2	0.083 - 0.18	ND - 0.15	^{226}Ra: No
	HI356A (R)	2	0.027 - 0.26	ND	^{228}Ra: D>R
	EB165A (D)	3	0.035 - 0.11	ND - 0.03	No
	HI356A (R)	3	0.037 - 0.13	ND - 0.093	
	GC19A (D)	2	ND - 0.10	ND	No
	EI361A (R)	2	0.036 - 0.12	ND	
	GC19A (D)	3	0.057 - 0.10	ND - 0.058	No
	EI361A (R)	3	0.043 - 0.11	ND - 0.10	
Thorny oyster	EB165A (D)	2	0.13 - 0.19	ND	No
	HI356A (R)	2	0.078 - 0.14	ND - 0.15	
	EB165A (D)	3	0.074 - 0.12	ND - 0.13	No
	HI356A (R)	3	0.061 - 0.17	ND - 0.20	
	GC19A (D)	2	0.16 - 0.34	ND - 0.053	No
	EI361A (R)	2	0.068 - 0.33	ND - 0.024	
	GC19A (D)	3	0.078 - 0.10	ND - 0.005	No
	EI361A (R)	3	0.064 - 0.10	ND - 0.010	

ND = Concentration below method detection limit.
[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-26. Concentrations of ^{226}Ra and ^{228}Ra in two species of marine fish that were collected from two produced water discharge sites and paired reference sites on Cruises 2 and 3. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in pCi/g dry weight.

Species	Site	Cruise	Concentration Range		Significant[a] Difference?
			^{226}Ra	^{228}Ra	
Yellow chub	EB165A (D)	2	ND - 0.017	ND - 0.078	No
	HI356A (R)	2	ND - 0.023	ND - 0.14	
	EB165A (D)	3	ND - 0.009	ND - 0.026	No
	HI356A (R)	3	ND	ND - 0.022	
	GC19A (D)	2	ND - 0.028	ND - 0.19	No
	EI361A (R)	2	ND - 0.033	ND - 0.088	
	GC19A (D)	3	ND - 0.015	ND - 0.021	No
	EI361A (R)	3	ND - 0.008	ND - 0.040	
Creole-fish	EB165A (D)	2	ND - 0.026	ND - 0.092	No
	HI356A (R)	2	ND - 0.024	ND - 0.046	
	EB165A (D)	3	ND - 0.020	ND - 0.19	No
	HI356A (R)	3	ND - 0.010	ND - 0.029	
	GC19A (D)	2	ND - 0.051	ND - 0.22	No
	EI361A (R)	2	ND - 0.058	ND - 0.069	
	GC19A (D)	3	ND - 0.020	ND - 0.035	No
	EI361A (R)	3	ND - 0.010	ND - 0.078	

ND = Concentration below method detection limit.
[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-27. Concentrations of ^{226}Ra and ^{228}Ra in three species of marine fish that were collected from one produced water discharge/reference site pair or on just one cruise. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in pCi/g dry weight.

Species	Site	Cruise	Concentration Range		Significant[a] Difference?
			^{226}Ra	^{228}Ra	
Rockhind	EB165A (D)	2	0.010 - 0.054	ND - 0.13	No
	HI356A (R)	2	ND - 0.020	ND - 0.12	
Gray triggerfish	GC19A (D)	2	ND - 0.053	ND - 0.10	No
	EI361A (R)	2	ND - 0.024	ND - 0.097	
	GC19A (D)	3	ND - 0.005	ND - 0.039	No
	EI361A (R)	3	ND - 0.010	ND	
Sergeant major	EB165A (D)	3	ND - 0.006	ND - 0.008	No
	HI356A (R)	3	ND - 0.003	ND - 0.010	

ND = Concentration below method detection limit.
[a] Differences may not be statistically significant even when concentration ranges do not overlap.

Table 4-28. Concentration ranges of phenol and bis(2-ethylhexyl)phthalate (BEHP) in marine bivalve mollusks from two produced water discharge sites and paired reference sites. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in µg/g dry weight.

Species	Site	Cruise	Concentration Range		Significant[a] Difference?
			Phenol	BEHP	
Jewel box	EB165A (D)	2	ND - 0.18J	ND - 0.86	No
	HI356A (R)	2	0.083J - 0.28	ND - 0.33J	
	EB165A (D)	3	0.28 - 0.45B	ND - 0.98	Phenol: D>R
	HI356A (R)	3	0.091J - 0.33	ND - 0.79	BEHP: No
	GC19A (D)	2	0.20 - 0.47	ND - 0.90	No
	EI361A (R)	2	0.14J - 0.37	ND - 1.90	
	GC19A (D)	3	0.15J - 0.34	ND - 0.53J	No
	EI361A (R)	3	0.24 - 0.80	ND - 1.00	
Thorny oyster	EB165A (D)	2	0.10J - 0.13J	ND	No
	HI356A (R)	2	0.068J - 0.12J	ND - 0.54J	
	EB165A (D)	3	0.30 - 0.61B	ND - 1.0	Phenol: D>R
	HI356A (R)	3	0.11J - 0.21	ND - 0.94	BEHP: No
	GC19A (D)	2	0.12J - 0.22	ND - 0.43J	No
	EI361A (R)	2	0.075J - 0.12J	0.19 - 1.50	
	GC19A (D)	3	0.16J - 0.52	ND - 0.89	No
	EI361A (R)	3	0.11J - 0.22	ND - 3.60	

B = Analyte detected in the blank.
J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).
ND = Concentration below MDL.
[a] Produced water from the temporary secondary discharge.

Table 4-29. Concentration ranges of phenol and bis(2-ethylhexyl)phthalate (BEHP) in two species of marine fish that were collected from two produced water discharge sites and paired reference sites on Cruises 2 and 3. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in µg/g dry weight.

Species	Site	Cruise	Concentration Range		Significant[a] Difference?
			Phenol	BEHP	
Yellow chub	EB165A (D)	2	ND - 0.086J	ND - 1.7	No
	HI356A (R)	2	ND - 0.17J	ND - 0.20J	
	EB165A (D)	3	0.076J - 0.14J	ND - 2.8	No
	HI356A (R)	3	ND	ND	
	GC19A (D)	2	0.070J - 0.55	ND	No
	EI361A (R)	2	0.066J - 0.18J	ND - 0.83	
	GC19A (D)	3	0.081J - 0.13J	ND - 0.31J	No
	EI361A (R)	3	0.044J - 0.12J	ND - 0.22J	
Creole-fish	EB165A (D)	2	ND - 0.094J	ND	No
	HI356A (R)	2	ND - 0.13J	ND	
	EB165A (D)	3	ND - 0.11J	ND - 1.1	Phenol: R>D
	HI356A (R)	3	0.099J - 0.18J	ND - 3.0	BEHP: No
	GC19A (D)	2	0.076J - 0.28	ND	No
	EI361A (R)	2	ND - 0.11J	ND - 0.69J	
	GC19A (D)	3	ND - 0.071J	ND - 0.38J	No
	EI361A (R)	3	0.054J - 0.16J	ND - 0.49J	

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).
ND = Concentration below MDL.
[a] Produced water from the temporary secondary discharge.

Table 4-30. Concentrations of phenol and bis(2-ethylhexyl)phthalate (BEHP) in three species of marine fish that were collected from one produced water discharge/reference site pair or on just one cruise. Significant differences between discharge (D) and reference (R) sites are indicated. Concentrations are in µg/g dry weight.

Species	Site	Cruise	Concentration Range		Significant[a] Difference?
			Phenol	BEHP	
Rockhind	EB165A (D)	2	0.081J - 0.15J	ND - 0.27J	No
	HI356A (R)	2	0.050J - 0.19	ND - 0.20J	
Gray triggerfish	GC19A (D)	2	0.33 - 0.64	ND	No
	EI361A (R)	2	0.081J - 0.21	ND	
	GC19A (D)	3	0.31 - 1.0	ND - 0.29J	Phenol:D>R
	EI361A (R)	3	0.072J - 0.28	ND - 0.33J	BEHP: No
Sergeant major	EB165A (D)	3	0.045J - 0.094J	ND - 0.24J	No
	HI356A (R)	3	0.061J - 0.089J	ND - 0.75	

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).
ND = Concentration below MDL.
[a] Produced water from the temporary secondary discharge.

Table 4-31. Published concentrations of bis(2-ethylhexyl)phthalate (BEHP) in tissues of marine animals. Concentrations are in µg/g dry weight (From: Neff, 1997a).

Taxon	Location	BEHP Concentration	Reference
Polychaete *Neanthes virens*	Portland, ME	1.9 - 2.45	Ray *et al.*, 1983
Clam	Crouch Estuary, GB	0.046 - 1.07	Waldock, 1983
Clam	Portland, ME	0.55 - 0.85	Ray *et al.*, 1983
Blue crab *Callinectes sapidus* (muscle)	Gulf of Mexico	0.015	Giam *et al.*, 1975
Blue crab *C. sapidus* (gill)	Gulf of Mexico	0.10	Giam *et al.*, 1978
Mantis shrimp *Squilla empusa*	Gulf of Mexico	0.04	Giam *et al.*, 1978
Aquatic Invertebrates	Swedish Rivers	0.55 - 72	Thurén, 1986
Starfish *Luidia clathrata*	Gulf of Mexico	0.675	Giam *et al.*, 1978
3 spp. Elasmobranchs	Gulf of Mexico	0.01 - 0.06	Giam *et al.*, 1978
Shark *Carcharinus falciformis* (liver)	Gulf of Mexico	<0.005	Giam *et al.*, 1978
Several spp. Fish (muscle)	Gulf of Mexico	<0.005 - 0.10	Giam *et al.*, 1978
Spadefish *Chaetodipterus faber* (liver)	Gulf of Mexico	0.02	Giam *et al.*, 1978
Several spp. Fish (muscle)	Tees Estuary, UK	0.065 - 0.26	Waldock, 1983
Several spp. Fish (liver)	Tees Estuary, UK	0.22 - 0.43	Waldock, 1983

Table 4-32. Log K_{ow}s and BCFs, estimated by the regression equation of Veith and Kosian (1983), for BTEX compounds in marine organisms.

Compound	Log K_{ow}	Estimated BCF
Benzene	2.13	19
Toluene	2.65	49
Ethylbenzene	3.13	118
p-Xylene	3.18	129
m-Xylene	3.20	134
o-Xylene	3.13	118

Table 4-33. Concentrations of benzene, toluene, and ethylbenzene in sewage effluent, sediments, and tissues of demersal/benthic marine animals near the outfall for the Palos Verdes sewage treatment plant, California. Concentrations are in µg/l (effluent) and µg/g dry weight (sediments and tissues) (From: Gossett *et al.*, 1983).

Sample	Benzene	Toluene	Ethylbenzene
Effluent	220	210	14
Sediments	<0.001	<0.001	0.0005
Pacific sanddab *Citharichthys xanthostigma* liver	<0.005	<0.005	<0.0003
Scorpionfish *Scorpaena guttata* liver	0.080	<0.005	<0.0015
Dover sole *Microstomus pacificus* liver	0.260	0.005	0.0015
Croaker *Genyonemus lineatus*	0.075	0.125	0.020
Shrimp *Sicyonia ingentis*	<0.005	<0.005	<0.0015
Whole Invertebrates	0.040	<0.010	<0.0015

Table 4-34. Concentration ranges of benzene or toluene in those soft tissues of bivalves and edible muscle tissues of fish that contained concentrations above the method detection limit (MDL). Numbers of non-detects (below MDL) are included for comparison. Cases where all six replicates for a species/location yielded all non-detects are not included. Results of 96% of all analyses for individual VOCs in tissues were below the MDL. Concentrations are µg/g dry weight.

Species	Site	Cruise	Analyte	Number below MDL (ND)	Measured Concentrations
Jewel box	EB165A (D)	2	Benzene	4	0.006J - 0.007J
	EB165A (D)	3	Toluene	0	0.010J - 0.016J
	HI356A (R)	3	Toluene	0	0.018J - 0.043
	GC19A (D)	3	Toluene	0	0.006J - 0.020
	EI361A (R)	3	Toluene	0	0.040 - 0.064
Thorny oyster	HI356A (R)	2	Benzene	4	0.007J - 0.009J
	EB165A (D)	3	Toluene	5	0.022J
	HI356A (R)	3	Toluene	0	0.008J - 0.041
	GC19A (D)	3	Toluene	0	0.018J - 0.046
	EI361A (R)	3	Toluene	0	0.020 - 0.068
Yellow chub	GC19A (D)	2	Benzene	4	0.005J - 0.008J
	EI361A (R)	3	Toluene	3	0.008J - 0.011J
Creole-fish	EI361A (R)	3	Toluene	4	0.014J - 0.015J
Gray triggerfish	GC19A (D)	3	Toluene	4	0.010J - 0.011J
	EI361A (R)	3	Toluene	0	0.006J - 0.010J

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).

Table 4-35. Concentration ranges of total PAHs in tissues of marine organisms from throughout the world. Concentrations are in µg/g dry weight (From: Neff, 1997a).

Taxon	Tissue	Number of Samples	Range of Concentrations
All Species	Whole/Muscle	296	0.0005-1729
All Species Gulf of Mexico	Whole/Muscle	50	0.01 - 147.1
Macroalgae	Whole	10	0.26-4.66
Sponge	Whole	1	0.77
Polychaete	Whole	2	0.073-1.12
Crustacean	Whole/Muscle	18	0.004-13.35
Crustacean	Digestive Gland	5	1.4-440.5
Bivalve	Soft Tissue	153	0.003-1729
Snail	Soft Tissue	14	0.01-290
Octopus	Whole	2	0.46-0.73
Echinoderm	Whole	3	0.0005-0.458
Enteropneust	Whole	1	0.616
Fish	Muscle	84	0.002-23.45
Fish	Liver	12	0.013-3.5
Fish	Gonad	1	0.031
Marine Bird	Muscle	5	0.021-0.109
Marine Bird	Liver	1	0.008
Marine Mammal	Muscle	2	0.014-0.51
Marine Mammal	Liver	2	0.55-2.8
This Study			
Bivalves	Soft Tissue	96	<0.001 - 0.805[a]
Fish	Muscle	144	<0.001 - 0.117[b]

[a] Seven of the 14 analytes detected were ”J” values (<5 times method detection limit [MDL]).
[b] Four of the seven analytes detected were “J” values (<5 times MDL).

Table 4-36. Concentration ranges of fluorene in tissues of marine organisms from throughout the world. Concentrations are in µg/g dry weight (From: Neff, 1997a).

Taxon	Tissue	Number of Samples	Range of Concentrations
All Species	All/Muscle	70	0.0005 - 1.56
Crustacean	All/Muscle	3	0.007 - 0.035
Bivalve	Soft Tissue	47	0.0005 - 1.56
Fish	Muscle	12	0.001 - 0.10
Fish	Liver	2	0.045 - 0.11
Bird	Muscle	4	0.004 - 0.008
This Study			
Bivalves	Soft Tissue	96	<0.004
Fish	Muscle	144	<0.004

Table 4-37. Concentration ranges of benzo(a)pyrene in tissues of marine organisms from throughout the world. Concentrations are in µg/g dry weight (From: Neff, 1997a).

Taxon	Tissue	Number of Samples	Range of Concentrations
All Species	Whole/Muscle	148	0.000003-146
Macroalgae	Whole	5	0.0007 - 0.064
Crustacean	Muscle	2	0.004-0.20
Crustacean	Digestive Gland	3	0.01 - 5.0
Bivalve	Soft Tissue	99	0.0001 - 146
Bivalve	Gonad	2	0.021 - 0.25
Snail	Soft Tissue	10	0.01 - 3.1
Fish	Muscle	19	0.00004 - 0.263
This Study			
Bivalves	Soft Tissue	96	<0.003 - 0.021
Fish	Muscle	144	<0.003

Table 4-38. Concentration ranges of individual PAHs in tissues of jewel boxes from produced water discharge (D)/reference (R) platform pair EB165A (D)/HI356A (R) in the northwestern Gulf of Mexico. Concentrations are in µg/g dry weight. Values for a platform that were statistically significantly greater than the values for the corresponding paired samples were as follows: [a] - statistically significantly greater irrespective of cruise, [b] - statistically significantly greater for Cruise 2, [c] - statistically significantly greater for Cruise 3.

Compound	EB165A (D)	HI356A (R)
Naphthalene	<0.009	<0.009 - 0.016J
2-Methylnaphthalene	<0.002 - 0.012	0.004 - 0.032
1-Methylnaphthalene	<0.003 - 0.010J	<0.003 - 0.017
2,6-Dimethylnaphthalene	<0.002 - 0.009J	<0.002 - 0.019
2,3,5-Trimethylnaphthalene	<0.002 - 0.004J	<0.002 - 0.004J
C_1-Naphthalenes	0.005 - 0.012J	0.004 - 0.030
C_2-Naphthalenes	<0.005 - 0.031	<0.005 - 0.036
C_3-Naphthalenes	<0.005 - 0.042	<0.005 - 0.032
C_4-Naphthalenes	<0.005	<0.005 - 0.034
Acenaphthylene	<0.004	<0.004
Acenaphthene	<0.004	<0.004
Biphenyl	<0.002 - 0.006J	<0.002
Fluorene	<0.004	<0.004
C_1-Fluorenes	<0.004 - 0.028	<0.004 - 0.032
C_2-Fluorenes	<0.004	<0.004
C_3-Fluorenes	<0.004	<0.004
Anthracene	<0.002	<0.002
Phenanthrene	<0.004 - 0.006J	<0.004 - 0.008J
1-Methylphenanthrene	<0.002	<0.002 - 0.006J
C_1-Phenanthrenes	<0.006 - 0.015J	<0.006 - 0.023J
C_2-Phenanthrenes	<0.016J	<0.016 - 0.058J
C_3-Phenanthrenes	<0.016	<0.016
C_4-Phenanthrenes	<0.016	<0.016
Dibenzothiophene	<0.001	<0.001
C_1-Dibenzothiophenes	<0.001	<0.01
C_2-Dibenzothiophenes	<0.001 - 0.028	<0.001 - 0.028
C_3-Dibenzothiophenes	<0.01 - 0.023	<0.001 - 0.022
Fluoranthene	<0.003	<0.003 - 0.004J
Pyrene	<0.003	<0.003
C_1-Fluoranthenes/Pyrenes	<0.003	<0.003
C_2-Fluoranthenes/Pyrenes	<0.003	<0.003
Benz(a)anthracene	<0.002 - 0.058	<0.002
Chrysene	<0.002	<0.002
C_1-Chrysenes	<0.002	<0.002
C_2-Chrysenes	<0.002	<0.002
C_3-Chrysenes	<0.002	<0.002
C_4-Chrysenes	<0.002	<0.002
Benzo(b)fluoranthene	<0.002	<0.002
Benzo(k)fluoranthene	<0.004	<0.004
Benzo(e)pyrene	<0.002 - 0.025	<0.002 - 0.020
Benzo(a)pyrene	<0.003 - 0.008J	<0.003 - 0.009J
Perylene	<0.003 - 0.049	<0.003 - 0.034
Indeno(1,2,3-cd)pyrene	<0.002	<0.002
Dibenz(a,h)anthracene	<0.002	<0.002
Benzo(ghi)perylene	<0.003	<0.003

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).

Table 4-39. Concentration ranges of individual PAHs in tissues of jewel boxes from the produced water discharge (D)/reference (R) platform pair, GC19A (D)/EI36A (R) in the northwestern Gulf of Mexico. Concentrations are in µg/g dry weight. Values for a platform that were statistically significantly greater than the values for the corresponding paired samples were as follows: [a] - statistically significantly greater irrespective of cruise, [b] - statistically significantly greater for Cruise 2, [c] - statistically significantly greater for Cruise 3.

Compound	GC19A (D)	EI361A (R)
Naphthalene	<0.009	<0.009
2-Methylnaphthalene	0.005 - 0.020	0.006 - 0.020
1-Methylnaphthalene	<0.003 - 0.007J	<0.003 - 0.007J
2,6-Dimethylnaphthalene	<0.002 - 0.032	<0.002 - 0.013
2,3,5-Trimethylnaphthalene	<0.002 - 0.005J	<0.002
C_1-Naphthalenes	0.006 - 0.018	<0.003 - 0.013
C_2-Naphthalenes	<0.005 - 0.034	<0.005 - 0.025
C_3-Naphthalenes	<0.005 - 0.037	<0.005 - 0.024J
C_4-Naphthalenes	<0.005 - 0.054	<0.005
Acenaphthylene	<0.004	<0.004
Acenaphthene	<0.004	<0.004
Biphenyl	<0.002 - 0.006J	<0.002 - 0.005J
Fluorene	<0.004	<0.004
C_1-Fluorenes	<0.004 - 0.023	<0.004 - 0.016J
C_2-Fluorenes	<0.004	<0.004
C_3-Fluorenes	<0.004	<0.004
Anthracene	<0.002	<0.002
Phenanthrene	<0.004 - 0.009J	<0.004
1-Methylphenanthrene	<0.002	<0.002
C_1-Phenanthrenes	<0.006	<0.006 - 0.015J
C_2-Phenanthrenes	<0.016 - 0.044J	<0.016 - 0.038J
C_3-Phenanthrenes	<0.016	<0.016
C_4-Phenanthrenes	<0.016	<0.016
Dibenzothiophene	<0.001	<0.001
C_1-Dibenzothiophenes	<0.001 - 0.015	<0.001
C_2-Dibenzothiophenes	<0.001 - 0.040[b]	<0.001 - 0.019
C_3-Dibenzothiophenes	<0.001 - 0.064[a,b]	<0.001 - 0.018
Fluoranthene	<0.003	<0.003
Pyrene	<0.003	<0.003
C_1-Fluoranthenes/Pyrenes	<0.003	<0.003
C_2-Fluoranthenes/Pyrenes	<0.003	<0.003
Benz(a)anthracene	<0.002	<0.002
Chrysene	<0.002	<0.002
C_1-Chrysenes	<0.002	<0.002
C_2-Chrysenes	<0.002	<0.002
C_3-Chrysenes	<0.002	<0.002
C_4-Chrysenes	<0.002	<0.002
Benzo(b)fluoranthene	<0.002	<0.002
Benzo(k)fluoranthene	<0.004	<0.004
Benzo(e)pyrene	<0.002 - 0.041	<0.002 - 0.026
Benzo(a)pyrene	<0.003 - 0.021	<0.003 - 0.021
Perylene	<0.003 - 0.075	<0.003 - 0.041
Indeno(1,2,3-cd)pyrene	<0.002	<0.002
Dibenz(a,h)anthracene	<0.002	<0.002
Benzo(ghi)perylene	<0.003	<0.003

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).

Table 4-40. Concentration ranges of individual PAHs in tissues of American thorny oysters from produced water discharge (D)/reference (R) platform pair EB165A (D)/HI356A (R) in the northwestern Gulf of Mexico. Concentrations are in µg/g dry weight. Values for a platform that were statistically significantly greater than the values for the corresponding paired samples were as follows: [a] - statistically significantly greater irrespective of cruise, [b] - statistically significantly greater for Cruise 2, [c] - statistically significantly greater for Cruise 3.

Compound	EB165A (D)	HI356A (R)
Naphthalene	<0.009	<0.009
2-Methylnaphthalene	<0.002 - 0.008J	<0.002 - 0.009J
1-Methylnaphthalene	<0.003	<0.003 - 0.006J
2,6-Dimethylnaphthalene	<0.002 - 0.007J	<0.002 - 0.022[a]
2,3,5-Trimethylnaphthalene	<0.002 - 0.008J	<0.002 - 0.029
C_1-Naphthalenes	<0.003 - 0.009J	<0.003 - 0.010J
C_2-Naphthalenes	<0.005 - 0.028	<0.005 - 0.057
C_3-Naphthalenes	<0.005 - 0.032	<0.005 - 0.140
C_4-Naphthalenes	<0.005	<0.005 - 0.170[c]
Acenaphthylene	<0.004	<0.004
Acenaphthene	<0.004	<0.004
Biphenyl	<0.002	<0.002
Fluorene	<0.004	<0.004
C_1-Fluorenes	<0.004 - 0.024	<0.004 - 0.041
C_2-Fluorenes	<0.004	<0.004
C_3-Fluorenes	<0.004	<0.004
Anthracene	<0.002 - 0.010J[a,c]	<0.002 - 0.009J
Phenanthrene	<0.005	<0.004 - 0.014J
1-Methylphenanthrene	<0.002 - 0.004J	<0.002 - 0.014
C_1-Phenanthrenes	<0.006 - 0.019J	<0.006 - 0.080
C_2-Phenanthrenes	<0.016 - 0.044J	<0.016 - 0.120
C_3-Phenanthrenes	<0.016	<0.016
C_4-Phenanthrenes	<0.016	<0.016
Dibenzothiophene	<0.001	<0.001 - 0.006J
C_1-Dibenzothiophenes	<0.001	<0.001 - 0.036
C_2-Dibenzothiophenes	<0.001 - 0.033[b]	<0.001 - 0.070
C_3-Dibenzothiophenes	<0.001 - 0.026	<0.001 - 0.047
Fluoranthene	<0.003	<0.003
Pyrene	<0.003	<0.003
C_1-Fluoranthenes/Pyrenes	<0.003	<0.003 - 0.017
C_2-Fluoranthenes/Pyrenes	<0.003	<0.003
Benz(a)anthracene	<0.002	<0.002 - 0.058
Chrysene	<0.002 - 0.004J	<0.002
C_1-Chrysenes	<0.002 - 0.009J	<0.002
C_2-Chrysenes	<0.002 - 0.011	<0.002
C_3-Chrysenes	<0.002	<0.002
C_4-Chrysenes	<0.002	<0.002
Benzo(b)fluoranthene	<0.002	<0.002
Benzo(k)fluoranthene	<0.004	<0.004
Benzo(e)pyrene	<0.002 - 0.006J	<0.002 - 0.004J
Benzo(a)pyrene	<0.003 - 0.009J	<0.003 - 0.006J
Perylene	<0.003	<0.003 - 0.005J
Indeno(1,2,3-cd)pyrene	<0.002	<0.002
Dibenz(a,h)anthracene	<0.002	<0.002
Benzo(ghi)perylene	<0.003	<0.003

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).

Table 4-41. Concentration ranges of individual PAHs in tissues of American thorny oysters from produced water discharge (D)/reference (R) platform pair GC19A (D)/EI361A (R) in the northwestern Gulf of Mexico. Concentrations are in µg/g dry weight. Values for a platform that were statistically significantly greater than the values for the corresponding paired samples were as follows: [a] - statistically significantly greater irrespective of cruise, [b] - statistically significantly greater for Cruise 2, [c] - statistically significantly greater for Cruise 3.

Compound	GC19A (D)	EI361A (R)
Naphthalene	<0.009 - 0.017J	<0.009
2-Methylnaphthalene	0.005 - 0.011J[b]	<0.002 - 0.006J[c]
1-Methylnaphthalene	<0.003 - 0.006J	<0.003
2,6-Dimethylnaphthalene	<0.002 - 0.011[b]	0.004 - 0.006J[c]
2,3,5-Trimethylnaphthalene	<0.002 - 0.004J[b]	<0.002
C_1-Naphthalenes	<0.003 - 0.011J[b]	<0.003 - 0.008J[c]
C_2-Naphthalenes	<0.005 - 0.024J	<0.005 - 0.015J
C_3-Naphthalenes	<0.005 - 0.040[a,b]	<0.005 - 0.009J
C_4-Naphthalenes	<0.005 - 0.054[b]	<0.005
Acenaphthylene	<0.004	<0.004
Acenaphthene	<0.004	<0.004
Biphenyl	<0.002 - 0.007J	<0.002 - 0.019
Fluorene	<0.004	<0.003
C_1-Fluorenes	<0.004 - 0.023	<0.004 - 0.022
C_2-Fluorenes	<0.004	<0.004
C_3-Fluorenes	<0.004	<0.004
Anthracene	<0.002 - 0.010J	<0.002 - 0.006J
Phenanthrene	<0.004	<0.004
1-Methylphenanthrene	<0.002 - 0.004J	<0.002 - 0.011J
C_1-Phenanthrenes	<0.006 - 0.016J[b]	<0.006
C_2-Phenanthrenes	<0.016 - 0.057J[a,b]	<0.016 - 0.040J
C_3-Phenanthrenes	<0.016 - 0.18[b]	<0.016
C_4-Phenanthrenes	<0.016 - 0.055J[b]	<0.016
Dibenzothiophene	<0.001 - 0.002J	<0.001
C_1-Dibenzothiophenes	<0.001 - 0.016[b]	<0.001
C_2-Dibenzothiophenes	0.025 - 0.060[a,b,c]	<0.001 - 0.022
C_3-Dibenzothiophenes	0.041 - 0.10[a,b,c]	<0.001 - 0.025
Fluoranthene	<0.003 - 0.004J	<0.003 - 0.005J
Pyrene	<0.003	<0.003 - 0.011J
C_1-Fluoranthenes/Pyrenes	<0.003	<0.003
C_2-Fluoranthenes/Pyrenes	<0.003 - 0.016J[b]	<0.003 - 0.006J
Benz(a)anthracene	<0.002	<0.002 - 0.004J
Chrysene	<0.002	<0.002
C_1-Chrysenes	<0.002 - 0.012[a,b]	<0.002 - 0.005J
C_2-Chrysenes	<0.002 - 0.027[b]	<0.002
C_3-Chrysenes	<0.002	<0.002
C_4-Chrysenes	<0.002	<0.002
Benzo(b)fluoranthene	<0.002	<0.002
Benzo(k)fluoranthene	<0.004	<0.004
Benzo(e)pyrene	<0.002 - 0.011J	<0.002 - 0.004J
Benzo(a)pyrene	<0.003 - 0.012J	<0.003 - 0.005J
Perylene	<0.003 - 0.035[a,b,c]	<0.003
Indeno(1,2,3-cd)pyrene	<0.002	<0.002
Dibenz(a,h)anthracene	<0.002	<0.002
Benzo(ghi)perylene	<0.003 - 0.006[b]	<0.003

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).

Table 4-42. Concentration ranges of selected PAHs in tissues of yellow chub, creole-fish, rockhind, sergeant major, and gray triggerfish from produced water discharge (D)/reference (R) platform pair EB165A (D)/HI356A (R) in the northwestern Gulf of Mexico. Concentrations are in µ/g dry weight. Values for a platform that were statistically significantly greater than the values for the corresponding paired samples were as follows: [a] - statistically significantly greater irrespective of cruise, [b] - statistically significantly greater for Cruise 2, [c] - statistically significantly greater for Cruise 3.

Species/Compound	EB165A (D)	HI356A (R)
Yellow chub		
2-Methylnaphthalene	0.003 - 0.005J[a]	0.003 - 0.004J
1-Methylnaphthalene	<0.003	<0.003
C_1-Naphthalenes	0.003 - 0.005J	<0.003 - 0.005J
C_2-Naphthalenes	<0.005 - 0.006J	<0.005 - 0.017J
Biphenyl	<0.002	<0.002
Fluorene	<0.004	<0.004
C_1-Fluorenes	<0.004 - 0.009J	<0.004 - 0.021
Phenanthrene	<0.004	<0.004
Benzo(a)pyrene	<0.003	<0.003
Creole-fish		
2-Methylnaphthalene	<0.002 - 0.004J	<0.002 - 0.004J
C_1-Naphthalenes	0.003 - 0.005J	<0.003 - 0.004J
Fluorene	<0.004	<0.004
C_1-Fluorenes	<0.004	<0.004 - 0.010J
Phenanthrene	<0.004	<0.004
Benzo(a)pyrene	<0.003	<0.003
Rockhind		
2-Methylnaphthalene	<0.002 - 0.005J	<0.002 - 0.005J
C_1-Naphthalenes	<0.003 - 0.004J	<0.003 - 0.006J
Biphenyl	<0.002 - 0.003J	<0.002 - 0.003J
Fluorene	<0.004	<0.004
C_1-Fluorenes	<0.004 - 0.009J	<0.004 - 0.011J
Benzo(a)pyrene	<0.003	<0.003
Sergeant major		
2-Methylnaphthalene	<0.004 - 0.007J	0.003 - 0.004J
1-Methylnaphthalene	<0.003 - 0.005J	<0.003
C_1-Naphthalenes	0.004 - 0.007J	0.003 - 0.005J
Fluorene	<0.004	<0.004
Benzo(a)pyrene	<0.003	<0.003

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).

Table 4-43. Concentration ranges of selected PAHs in tissues of yellow chub, creole-fish, rockhind, sergeant major, and gray triggerfish from produced water discharge (D)/reference (R) platform pair GC19A (D)/EI361A (R) in the northwestern Gulf of Mexico. Concentrations are in µg/g dry weight. Values for a platform that were statistically significantly greater than the values for the corresponding paired samples were as follows: [a] - statistically significantly greater irrespective of cruise, [b] - statistically significantly greater for Cruise 2, [c] - statistically significantly greater for Cruise 3.

Species/Compound	GC19A (D)	EI361A (R)
Yellow chub		
2-Methylnaphthalene	<0.002 - 0.005J	0.004 - 0.016[a]
1-Methylnaphthalene	<0.003 - 0.003J	<0.003 - 0.008J
C_1-Naphthalenes	<0.003 - 0.007J	0.004 - 0.016[a]
C_2-Naphthalenes	<0.005 - 0.007J	0.005 - 0.016J[a,b,c]
Biphenyl	<0.002	<0.002 - 0.003J[b]
Fluorene	<0.004	<0.004
C_1-Fluorenes	<0.004 - 0.024	<0.004 - 0.012J
Phenanthrene	<0.004 - 0.004J[b]	<0.004
Benzo(a)pyrene	<0.003	<0.003
Creole-fish		
2-Methylnaphthalene	<0.002 - 0.004J	<0.002 - 0.005J
C_1-Naphthalenes	<0.003 - 0.005J	0.004 - 0.006J
Fluorene	<0.004	<0.004
C_1-Fluorenes	<0.004 - 0.005J	<0.004 - 0.013J
Phenanthrene	<0.004	<0.004
Benzo(a)pyrene	<0.003	<0.003
Gray triggerfish		
2-Methylnaphthalene	<0.002 - 0.004J	<0.002 - 0.004J
C_1-Naphthalene	<0.003 - 0.004J	<0.003 - 0.004J
Fluorene	<0.004	<0.004
C_1-Fluorene	<0.004 - 0.005J	<0.004 - 0.011J
Benzo(a)pyrene	<0.003	<0.003

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).

Table 4-44. Ranking of the evidence for bioaccumulation from produced water by marine bivalve mollusks and fish from the vicinity of offshore, high-volume produced water discharges. The ranking categories are 1) strong evidence for bioaccumulation; 2) weak or inconclusive evidence for bioaccumulation; 3) doubtful or contradictory evidence for bioaccumulation; and 4) no evidence for bioaccumulation.

Chemical	Jewel Box	Thorny Oyster	Fish
Arsenic	4	3	3
Barium	3	4	4
Cadmium	4	3	4 (YC, CF, RH) 3 (GT, SM)
Mercury	4	4	4
Radium Isotopes	3	4	4
Phenol	3	3	3 (GT) 4 (YC, CF, RH, SM)
BEHP	4	4	4
Fluorene	4	4	4
Benzo(a)pyrene	4	4	4
Total Polycyclic Aromatic Hydrocarbons	3	2	4

CF = Creole-fish.
GT = Gray triggerfish.
RH = Rockhind.
SM = Sergeant major.
YC = Yellow chub.

Table 4-45. U.S. Environmental Protection Agency (EPA, 1992) marine chronic water quality criteria, range of mean concentrations in a 100-fold dilution of produced water from discharge (D) platforms EB165A (D) and GC19A (D) on the two cruises, and estimated toxic units (concentration in water/chronic value) for 100-fold diluted produced water for chemicals targeted by EPA for bioaccumulation testing. Concentrations are in µg/l, except radium, which is pCi/l.

Discharge/Compound	Chronic Criterion	Estimated Concentration in 1/100 Produced Water	Range, Toxic Units
Arsenic	36	0.0048 - 0.27	0.00013 - 0.008
Cadmium	9.3	<0.006 - 0.14	<0.0006 - 0.015
Inorganic Mercury	1.106	<0.0001	0.00009
Radium	No Value	7.1 - 12	---
Benzene	700	4.4 - 10	0.006 - 0.014
Toluene	5,000	3.6 - 9.8	0.0007 - 0.002
Ethylbenzene	430[a]	0.64 - 1.1	0.0015 - 0.0026
Phenol	5,800[a]	3.6 - 5.8	0.0006 - 0.001
BEHP	360	0.50 - 4.2	0.001 - 0.012
Fluorene	300[b]	1.1 - 2.0	0.004 - 0.007
Benzo(a)pyrene	300[b]	<0.0028 - 0.0032	$<1 \times 10^{-5}$

[a] No chronic value available; acute value used.
[b] No chronic value available; acute value for total PAH used.

Table 4-46. Critical body residues (CBR) for nonpolar organic compounds in produced water, estimated according to the methods of McCarty *et al.* (1992). The CBR is equivalent to 4.4 mMol/kg wet weight. Concentrations in tissues are given in µg/g wet weight and compared to the highest concentrations in tissues of bivalves and fish from discharging and reference platforms.

Compound	Molecular Weight	Critical Body Residue (µg/g)	Maximum Measured Concentration in Tissue
Benzene	78.1	344	0.0013
Toluene	92.1	405	0.068
Ethylbenzene	106.2	466	<0.001
Fluorene	166.2	731	<0.0009
Benzo(a)pyrene	252.3	1,110	0.003
Phenol	94.1	414	0.24
BEHP	390.5	1,718	0.86

Table 4-47. Comparison of risk based concentrations (RBCs) to measured concentration ranges in bivalves and fish from produced water discharge and reference sites. Concentrations are in µg/g dry weight.

Chemical	Risk Based Concentration	Concentration Range in Bivalves	Concentration Range in Fish
Arsenic	4.05/0.18[a]	42 - 121	2.3 - 35
Barium	946	11 - 220	<0.020 - 3.1
Cadmium	6.75	3.4 - 36	<0.005 - 0.029
Mercury	4.05	0.049 - 0.33	0.042 - 0.67
Radium	1.4×10^{-6}	3.5×10^{-7}	2.7×10^{-7}
Benzene	10.85[a]	<0.002 - 0.009	<0.0032 - 0.008J
Toluene	2,705	<0.009 - 0.068	<0.0038 - 0.011J
Ethylbenzene	1,350	<0.006	<0.006
Fluorene	540	<0.004	<0.004
Benzo(a)pyrene	0.043[a]	<0.003 - 0.021	<0.003
Phenol	8,110	<0.038 - 0.80	<0.038 - 1.0
BEHP	22.55[a]	<0.138 - 3.6	<0.14 - 3.0

J = Qualifier indicating the value is between method detection limit (MDL) and practical quantitation level (defined as five times MDL).

[a] Based on carcinogenic response.

Section 5
REFERENCES

Abernethy, S.G., D. Mackay and L.S. McCarthy. 1988. "Volume Fraction" Correlation for Narcosis in Aquatic Organisms: The Key Role of Partitioning. *Environ. Toxicol. Chem*. 7:469-481.

Albright, S., L.R. Davis and J.R. Herron. 1986. *An Experimental Investigation into the Dynamic Collapse Phase of Drilling Fluid Discharged into a Stratified, Flowing Environment.* Paper 86-WA/HT-33. Presented at ASME Winter Meeting Anaheim, CA 12/7-12/86.

Amodio-Cocchieri, R., U. Del Prete, A. Arnese, M. Giuliano and A. Roncioni. 1993. Heavy Metals and Polycyclic Aromatic Hydrocarbons (PAHs) in Marine Organisms from the Ionian Sea (Italy). *Bull. Environ. Contam. Toxicol.* 50:618-625.

Andreae, M.O. 1979. Arsenic Speciation in Seawater and Interstitial Waters: the Influence of Biological-Chemical Interactions on the Chemistry of a Trace Element. *Limnol. Oceanogr.* 24:440-452.

Armstrong, H.W., K. Fucik, J.W. Anderson and J.M. Neff. 1979. Effects of Oilfield Brine Effluent on Sediments and Benthic Organisms in Trinity Bay, Texas. *Mar. Environ. Res.* 2:55-69.

Avanti Corporation. 1993. *Ocean Discharge Criteria Evaluation for the NPDES General Permit for the Western Gulf of Mexico OCS.* EPA Contract No. 68-C9-0009, Work Assignment S-4-49(P), Task 161. Prepared for USEPA Region VI, Dallas TX.

Badawy, M.I. 1990. Polyaromatic Hydrocarbons, Chlorinated Hydrocarbons and Heavy Metals in Biota & Sediments from Omani Coastal Waters. *Bull. NRC, Egypt* 15:73-92.

Başari, A. 1994. A Study on the Trace Element Concentrations of *Thunnus thynnus, Thunnus obesus and Katsuwonus pelamis* by Means of ICP-AES. *Toxicol. Environ. Chem.* 44:123-127.

Berkman, P.A. and M. Nigro. 1992. Trace Metal Concentrations in Scallops Around Antarctica. *Mar. Pollut. Bull.* 24:322-323.

Bloom, N.S. 1992. On the Chemical Form of Mercury in Edible Fish and Marine Invertebrate Tissue. *Can. J. Fish. Aquat. Sci.* 49:1,010-1,017.

Boesch, D.F. and N.N. Rabalais. 1989. Produced Water Discharges in the Northwestern Gulf of Mexico Region. *in*: D.F. Boesch and N.N. Rabalais, eds., *An Analysis of Impacts. Produced Waters in Sensitive Coastal Habitats. Central Gulf of Mexico.* OCS Study MMS 89-0031. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Regional Office, New Orleans, LA. pp. 13-30.

Boese, B.L. 1984. Uptake Efficiency of the Gill of English Sole (*Parophrys vetulus*) for Four Phthalate Esters. *Can. J. Fish. Aquat. Sci.* 41:1,713-1,718.

Bonotto, S. 1990. Radium Uptake by Marine Plants. *in: The Environmental Behaviour of Radium*. Vol. 1. Tech. Rept. Ser. No. 310. International Atomic Energy Acency, Vienna, Austria. pp. 451-466.

Brandsma, M.G. and J.P. Smith. 1996. Dispersion Modeling Perspectives on the Environmental Fate of Produced Water Discharges. *in*: M. Reed and S. Johnsen, eds., *Produced Water 2: Environmental Issues and Mitigation Technologies.* Plenum Press, New York, NY.

Brandsma, M.G., J.P. Smith, J.E. O'Reilly, R.C. Ayers, Jr. and A.L. Holmquist. 1992. Modeling Offshore Discharges of Produced Water. *in*: J.P. Ray and R. Englehardt (eds.), *Produced Water: Technological/Environmental Issues and Solutions.* Plenum Press, New York, NY. pp. 59-71.

Braune, B.M. 1987. Mercury Accumulation in Relation to Size and Age of Atlantic Herring (*Clupea harengus harengus*) from the Southwestern Bay of Fundy, Canada. *Arch. Environ. Contam. Toxicol.* 16:311-320.

Broman, D., C. Näf, I. Lundberg and Y. Zebühr. 1990. An *In Situ* Study on the Distribution, Biotransformation and Flux of Polycyclic Aromatic Hydrocarbons (PAHs) in an Aquatic Food Chain (Seston-*Mytilus edulis* L.-*Somateria mollissima*) from the Baltic: An Ecotoxicological Perspective. *Environ. Toxicol. Chem.* 9:429-442.

Brookhaven National Laboratory. 1992. *Human Health Risk Assessment for Radium Discharged Offshore in Produced Waters* (Interim report). Report to the U.S. Department of Energy, New Orleans, LA. BNL-47390. Brookhaven National Laboratory, Biomedical and Environmental Assessment Group, Upton, NY.

Brooks, J.M., E.L. Estes, D.A. Wiesenburg, C.R. Schwab and H.A. Abdel-Rheim. 1980. Investigations of Surficial Sediments, Suspended Particulates, and Volatile Hydrocarbons at Buccaneer Gas and Oil Field. *in*: W.B. Jackson and E.P. Wilkens, eds., *Environmental Assessment of the Buccaneer Gas and Oil Field in the Northwestern Gulf of Mexico, 1978-1980*. Vol. 1. NOAA Technical Memorandum NMFS-SEFC-47. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Galveston, TX. 98 pp.

Brown, D. and R.S. Thompson. 1982. Phthalates and the Aquatic Environment: Part II. The Bioconcentration and Depuration of Di-2-ethylhexyl Phthalate (DEHP) and Di-isodecyl Phthalate (DIDP) in Mussels (*Mytilus edulis*). *Chemosphere* 11:427-435.

Brown, J.S., T.C. Sauer, Jr., M.J. Wade and J.M. Neff. 1992. Chemical and Toxicological Characterization of Produced Water Freon Extracts. *in*: J.P. Ray and F.R. Engelhardt, eds. *Produced Water. Technological/Environmental Issues and Solutions*, Plenum Press, New York, NY. pp. 113-131.

Buikema, A.L., Jr., M.J. Mcginniss and J. Cairns. 1979. Phenolics in Aquatic Ecosystems: A Selected Review of Recent Literature. *Mar. Environ. Res.* 2:87-181.

Burns and Roe Industrial Services Corp. 1983. *Evaluation of Analytical Data Obtained from the Gulf of Mexico Sampling Program.* Vol. 1. Discussion (*30 Platform Study*). Report to the U.S. Environmental Protection Agency, Effluent Guidelines Division, Washington, DC.

Buzina, R., K. Bubotičanec, J. Vukušić, J. Sapunar, K. Antonić and M. Zorica. 1989. Effect of Industrial Pollution on Seafood Content and Dietary Intake of Total and Methylmercury. *Sci. Tot. Environ.* 78:45-67.

Chapman, P.M., H.E. Allen, K. Godfredsen and M.N. Z'Graggen. 1996. Evaluation of Bioaccumulation Factors in Regulating Metals. *Environ. Sci. Technol.* 30:448A-452A.

Chung, Y. 1980. Radium-Barium-Silica Correlations and a Two-dimensional Radium Model for the World Ocean. *Earth Planet. Sci. Lett.* 49:309-318.

Clark, G. and G. Topping. 1989. Mercury Concentrations in Fish from Contaminated Areas in Scottish Waters. *J. Mar. Biol. Ass. U.K.* 69:437-445.

Cohen, J. 1977. *Statistical Power Analysis for the Behavioral Sciences, Revised Edition.* Academic Press, New York, NY.

Connell, D. and R. Markwell. 1992. Mechanism and Prediction of Nonspecific Toxicity to Fish Using Bioconcentration Characteristics. *Ecotoxicol. Environ. Saf.* 24:247-265.

Conover, W.J. 1980. *Practical Nonparametric Statistics*, 2nd Edition. John Wiley & Sons Inc., New York, NY. 493 pp.

Continental Shelf Associates, Inc. 1993. *Measurements of Naturally Occurring Radioactive Materials at Two Offshore Production Platforms in the Northern Gulf of Mexico.* Final Report to the American Petroleum Institute, Washington, DC.

Continental Shelf Associates, Inc. 1997. *Radionuclides, Metals, and Hydrocarbons in Oil and Gas Operational Discharges and Environmental Samples Associated with Offshore Production Facilities on the Texas/Louisiana Continental Shelf with an Environmental Assessment of Metals and Hydrocarbons.* Draft Report to the U.S. Department of Energy, Bartlesville, Oklahoma.

Daugherty, R.C. 1994. Phenols and Chlorophenols. *in*: J.M. Kiceniuk and S. Ray, eds., *Analysis of Contaminants in Edible Aquatic Resources*. VCH Publishers, New York, NY. pp. 453-465.

DeLeon, I.R., C.J. Byrne, E.A. Peuler, S.R. Antoine, J. Schaeffer and R.C. Murphy. 1986. Trace Organic and Heavy Metal Pollution in the Mississippi River. *Chemosphere* 15:795-805.

DeLeon, I.R., J.B. Ferrario and C.J. Byrne. 1988. Bioaccumulation of Polynuclear Aromatic Hydrocarbons by the Clam, *Rangia cuneata*, in the Vicinity of a Creosote Spill. *Bull. Environ. Contam. Toxicol.* 41:872-879.

Dietz, R., F. Riget and P. Johansen. 1996. Lead, Cadmium, Mercury, and Selenium in Greenland Marine Animals. *Sci. Tot. Environ.* 186:67-93.

Dillon, T.M. and A.B. Gibson. 1985. *Bioaccumulation and Effects on Reproduction in Aquatic Organisms: An Assessment of the Current Literature.* Long-Term Effects of Dredging Program. Misc. Paper D-85-2. Department of the Army, Waterways Experiment Station, Corps of Engineers, Vicksburg, MS.

Dillon, T.M. and A.B. Gibson. 1987. *Use of Daphnia magna to Predict Consequences of Bioaccumulation.* Environmental Effects of Dredging Technical Notes. EEDP-01-7. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. 13 pp.

Dillon, T.M. and A. Gibson. 1992. *Critical Body Residue (CBR) Approach for Interpreting the Consequences of Bioaccumulation of Neutral Organic Compounds.* Environmental Effects Dredging Technical Notes. EEDP-04-17. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. 12 pp.

Doneker, R.L. and G.H. Jirka. 1993. *Expert System for Hydrodynamic Mixing Zone Analysis of Conventional and Toxic Submerged Single Port Discharges (CORMIX1).* U.S. EPA Report EPA/600/3-90/012 (PB90-187196).

Easley, D. M., R. D. Kleopfer and A. M. Carasea. 1981. Gas Chromatographic-Mass Spectrometric Determination of Volatile Organic Compounds in Fish. *J. Assoc. Off. Anal. Chem.* 64:653-656.

Edmonds, J.S. and K.A. Francesconi. 1993. Arsenic in Seafoods: Human Health Aspects and Regulations. *Mar. Pollut. Bull.* 26:665-674.

Ehrhardt, M.G. and K.A. Burns. 1990. Petroleum-Derived Dissolved Organic Compounds Concentrated from Inshore Waters in Bermuda. *J. Exp. Mar. Biol. Ecol.* 138:35-47.

Ehrhardt, M.G. and A. Douabul. 1989. Dissolved Petroleum Residues and Alkylbenzene Photo-Oxidation Products in the Upper Arabian Gulf. *Mar. Chem.* 26:363-370.

EPA. 1985. *Development Document for Effluent Limitations Guidelines and Standards for the Offshore Segment of the Oil and Gas Extraction Point Source Category.* Proposed. EPA 440/1-85/055. U.S. Environmental Protection Agency, Industrial Technology Division, WH-562, Washington, DC.

EPA. 1987. *Water Quality Criteria Summary.* Office of Water Regulation, Criteria and Standards.

EPA. 1989. *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance.* EPA/530/SW-89/026. Office of Solid Waste, Washington, DC. 148 pp.

EPA. 1991. *Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual.* Athens, GA. 245 pp. + app.

EPA. 1992. *Quality Criteria for Water 1992.* U.S. Environmental Protection Agency, Office of Water, Criteria and Standards Division, Washington, DC.

EPA. 1993a. *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories. Volume 1: Fish Sampling and Analysis.* Office of Science and Technology, Office of Water, Washinton, DC. EPA 823-R-93. 254 pp. + app.

EPA. 1993b. *Produced Water Radioactivity Study.* Office of Science and Technology.

EPA. 1995. *Risk-based Concentration Table, January - June 1995.* U.S. Environmental Protection Agency, Region III, Philadelphia, PA.

Fan, L-H. 1967. *Turbulent Buoyant Jets into Stratified or Flowing Ambient Fluids.* Available from NTIS PB 229 942. W.M. Keck Laboratory of Hydraulics and Water Resources. Cal. Inst. Technology Report No. KH-R-15.

Fanning, K.A., J.A. Breland II and R.H. Byrne. 1982. Radium-226 and Radon-222 in the Coastal Waters of West Florida: High Concentrations and Atmospheric Degassing. *Science* 215:667-670.

Fishbein, L. 1984. An Overview of Environmental and Toxicological Aspects of Aromatic Hydrocarbons. I. Benzene. *Sci. Tot. Environ.* 40:189-218.

Francesconi, K.A. and R.C. Lenanton. 1992. Mercury Contamination in a Semi-Enclosed Marine Embayment: Organic and Inorganic Mercury Content of Biota and Factors Influencing Mercury Levels in Fish. *Mar. Environ. Res.* 33:189-212.

Froelich, P.M., L.W. Kaul, J.T. Byrd, M.O. Andreae and K.K. Roe. 1985. Arsenic, Barium, Germanium, Tin, Dimethylsulfide and Nutrient Biogeochemistry in Charlotte Harbor, Florida, a Phosphorus-Enriched Estuary. *Estuar. Cstl. Shelf Sci.* 20:239-264.

Fujiki, M. and S. Tajima. 1992. The Pollution of Minamata Bay by Mercury. *Wat. Sci. Technol.* 25:133-140.

Giam, C.S., H.S. Chan and G.S. Neff. 1975. Sensitive Method for Determination of Phthalate Ester Plasticizers in Open-Ocean Biota Samples. *Anal. Chem.* 47:2,225-2,229.

Giam, C.S., H.S. Chan and G.S. Neff. 1978. Phthalate Ester Plasticizers, DDT, DDE and Polychlorinated Biphenyls in Biota from the Gulf of Mexico. *Mar. Pollut. Bull.* 9:249-251.

Gooday, A.J. and J.A. Nott. 1982. Intracellular Barite Crystals in Two Xenophyophores, *Aschemonella ramuliformis* and *Galatheammina* sp. (Protozoa: Rhizopoda) with Comments on the Taxonomy of *A. ramuliformis*. *J. Mar. Biol. Ass. UK* 62:595-605.

Gossett, R.W., D.A. Brown and D.R. Young. 1983. Predicting the Bioaccumulation of Organic Compounds in Marine Organisms Using Octanol/Water Partition Coefficients. *Mar. Pollut. Bull.* 14:387-392.

Grauby, A., C. Foulquier, B. Descamps and Y. Jaulent. 1973. *Résultats Relatifs à la Toxicité d'Effluents Industriels de la Région de Fos et de l'Étang de Berre ur les Anguilles, les Daphnies, les Loups et Ales Muges.* CEA, Labo. Radio Écologie Continentale, Contract No. VEN-0368. Agence de Bassin Rhône Méditerranée-Corse. 135 pp.

Grieb, T.M., C.T. Driscoll, S.P. Gloss, C.L. Schofield, G.L. Bowie and D.B. Porcella. 1990. Factors Affecting Mercury Accumulation in Fish in the Upper Michigan Peninsula. *Environ. Toxicol. Chem.* 9:919-930.

Hansen, C.T., C.O. Nielsen, R. Dietz and M.M. Hansen. 1990. Zinc, Cadmium, Mercury and Selenium in Minke Whales, Belugas and Narwals from West Greenland. *Polar Biol.* 10:529-539.

Hart, A.D., B.D. Graham and D.A. Gettleson. 1995. *NORM Associated with Produced Water Discharges.* Society of Petroleum Engineers publication SPE 29727. Annual Meeting of the Society of Petroleum Engineers. Society of Petroleum Engineers, Richardson, TX.

Hellou, J., L.L. Fancy and J.F. Payne. 1992a. Concentrations of Twenty-Four Elements in Bluefin Tuna, *Thunnus thynnus*, from the Northwest Atlantic. *Chemosphere* 24:211-218.

Hellou, J., W.G. Warren, J.F. Payne, S. Belkhode and P. Lobel. 1992b. Heavy Metals and Other Elements in Three Tissues of Cod, *Gadus morhua*, from the Northwest Atlantic. *Mar. Pollut. Bull.* 24:452-458.

Hellou, J., C. Upshall, J.F. Payne and P.V. Hodson. 1994. Polycyclic Aromatic Compounds in Cod (*Gadus morhua*) from the Northwest Atlantic and St. Lawrence Estuary. *Sci. Tot. Environ.* 145:71-79.

Hellou, J., D. Mackay and B. Fowler. 1995. Bioconcentration of Polycyclic Aromatic Compounds from Sediments to Muscle of Finfish. *Environ. Sci. Technol.* 29:2,555-2,560.

Hiatt, M.H. 1981. Analysis of Fish and Sediment for Volatile Priority Pollutants. *Anal. Chem.* 53:1,541-1,543.

Honda, K.R., J.E. Marcovecchio, S. Kan, R. Tatsukawa and H. Ogi. 1990. Metal Concentrations in Pelagic Seabirds from the North Pacific Ocean. *Arch. Environ. Contam. Toxicol.* 19:704-711.

Howard, L.S. and B.E. Brown. 1986. Metals in Tissues and Skeleton of *Fungia fungites* from Phuket, Thailand. *Mar. Pollut. Bull.* 17:569-570.

Howard, P.H., S. Banerjee and K.H. Robillard. 1985. Measurement of Water Solubilities, Octanol/Water Partition Coefficients and Vapor Pressures of Commercial Phthalate Esters. *Environ. Toxicol. Chem.* 4:653-661.

Hudgins, C.M., Jr. 1989. *Chemical Treatments and Usage in Offshore Oil and Gas Production Systems.* Report to the American Petroleum Institute, Washington, DC. 52 pp.

Hudgins, C.M., Jr. 1991. *Chemical Usage in North Sea Oil and Gas Production and Exploration Operations.* Report to Oljeindustriens Landsforening (OLF). Petrotech Consultants, Inc., Houston, TX.

Hudgins, C.M. 1992. Chemical Treatment and Usage in Offshore Oil and Gas Production Systems. *J. Petrol. Technol.* May 1992:604-611.

Iyengar, M.A.R. 1984. Distribution in Nature. *in*: *Behavior of Radium in Waterways and Aquifers* (Final Report of Co-ordinated Research Programme). IAEA-TEC DOC-301, International Atomic Energy Administration, Vienna, Austria. pp. 58-86.

Iyengar, M.A.R. 1990. The Natural Distribution of Radium. *in*: *The Environmental Behaviour of Radium.* Vol. 1. Tech. Rept. Ser. No. 310. International Atomic Energy Agency, Vienna, Austria. pp. 59-128.

Iyengar, M.A.R. and K.N. Rao. 1990. Uptake of Radium by Marine Animals. *in*: *The Environmental Behaviour of Radium.* Vol. 1. Tech. Rept. Ser. No. 310. International Atomic Energy Acency, Vienna, Austria. pp. 467-485.

Jenkins, K.D., S. Howe, B.M. Sanders and C. Norwood. 1989. Sediment Deposition, Biological Accumulation and Subcellular Distribution of Barium Following Drilling of an Exploratory Well. *in*: F.R. Engelhardt, J.P. Ray, and A.H. Gillam, eds., *Drilling Wastes.* Elsevier Applied Sciences, London. pp. 587-608.

Jüttner, F. 1994. Emission of Aromatic Hydrocarbons and Aldehydes into the Water by a Four-Stroke Outboard Motor: Quantitative Measurements. *Chemosphere* 29:191-200.

King, T.L., J.F. Uthe and C.J. Musial. 1993. Polycyclic Aromatic Hydrocarbons in the Digestive Glands of American Lobster, *Homarus americanus*, Captured in the Proximity of a Coal-Coking Plant. *Bull. Environ. Contam. Toxicol.* 50:907-914.

Kinnetic Laboratories, Inc. 1996. *1995 Annual Monitoring Report. Prince William Sound RCAC Long-Term Environmental Monitoring Program.* Kinnetic Laboratories, Inc., Anchorage, AK. Publication No. 4022D.

Ko, F.-C. and J.E. Baker. 1994. Partitioning of Hydrophobic Organic Contaminants to Suspended Sediments and Plankton in the Mesohaline Chesapeake Bay. *Mar. Chem.* 49:171-188.

Koning, C.W. and S.E. Hrudey. 1992. Sensory and Chemical Characterization of Fish Tainted by Exposure to Oil sand Wastewaters. *Wat. Sci. Technol.* 25:27-34.

Large, R. 1990. *Characterization of Produced Water, Phase 1: Literature Survey.* Report to Conoco (UK) Ltd., Aberdeen, Scotland.

Lasorsa, B. and S. Allen-Gil. 1995. The Methylmercury to Total Mercury Ratio in Selected Marine, Freshwater, and Terrestrial organisms. *Wat. Air Soil Pollut.* 80:905-913.

Law, R.J. and J.A. Whinnett. 1994. The Determination of Polycyclic Aromatic Hydrocarbons in Seawater from the *Fluxmanche* Transect (Dover Strait). *Oceanol. Acta* 16:593-597.

Lee, R.F. 1981. Mixed Function Oxygenases (MFO) in Marine Invertebrates. *Mar. Biol. Lett.* 2:87-105.

Levitus, S. 1982. *Climatological Atlas of the World Ocean.* NOAA Professional Paper 13. U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

Lopezavila, V., J. Milanes, F. Constantine and W.F. Beckert. 1990. Typical Phthalate Ester Contamination Incurred Using EPA Method 8060. *J. Assoc. Offic. Anal. Chem.* 73:709-720.

Lytle, T.F. and J.S. Lytle. 1982. Heavy Metals in Oysters and Clams of St. Louis Bay, Mississippi. *Bull. Contam. Tox.* A14:683-694.

MacDonald, I.R., N.L. Guinasso, Jr., S.G. Ackleson, J.F. Amos, R. Duckworth, R. Sassen and J.M. Brooks. 1993. Natural Oil Slicks in the Gulf of Mexico Visible from Space. *J. Geophys. Res.* 98:351-364.

Mackay, D., H. Puig and L.S. McCarty. 1992. An Equation Describing the Time Course and Variability in Uptake and Toxicity of Narcotic Chemicals in Fish. *Environ. Toxicol. Chem.* 11:941-951.

Mastran, T.A., A. M. Dietrich, D.L. Gallagher and T.J. Grizzard. 1994. Distribution of Polyaromatic Hydrocarbons in the Water Column and Sediments of a Drinking Water Reservoir with Respect to Boating Activity. *Wat. Res.* 28:2,353-2,366.

McCarty, L.S. 1986. The Relationship Between Aquatic Toxicity QSARs and Bioconcentration for Some Organic Chemicals. *Environ. Toxicol. Chem.* 5:1,071-1,080.

McCarty, L.S., D. Mackay, A.D. Smith, G.W. Ozburn and D.G. Dixon. 1992. Residue-Based Interpretation of Toxicity and Bioconcentration QSARs from Aquatic Bioassays: Neutral Narcotic Organics. *Environ. Toxicol. Chem.* 11:917-930.

McCarty, L.S., D. Mackay, A.D. Smith, G.W. Ozburn and D.G. Dixon. 1993. Residue-Based Interpretation of Toxicity and Bioconcentration QSARs from Aquatic Bioassays: Polar Narcotic Organics. *Ecotoxicol. Environ. Saf.* 25:253-270.

McGill, A.S., P.R. Mackie, P. Howgate and J.G. McHenery. 1987. The Flavour and Chemical Assessment of Dabs (*Limanda limanda*) Caught in the Vicinity of the Beatrice Oil Platform. *Mar. Pollut. Bull.* 18:186-189.

Meador, J.P., J.E. Stein, W.L. Reichert and U. Varanasi. 1995. Bioaccumulation of Polycyclic Aromatic Hydrocarbons by Marine Organisms. *Rev. Environ. Contam. Toxicol.* 143:79-165.

Meyer, J.S. and G. Linder. 1986. Exhaustive Steam Distillation Extraction of Aromatic Organics from Rainbow Trout and Water. *Environ. Toxicol. Chem.* 5:155-159.

Miller, R.L., T.F. Kraemer, and B.F. McPherson. 1990. Radium and Radon in Charlotte Harbor Estuary, Florida. *Estuar. Cstl. Shelf Sci.* 31:439-457.

Millward, G.E., H.J. Kitts, S.D.W. Comber, L. Ebdon and A.G. Howard. 1996. Methylated Arsenic in the Southern North Sea. *Estuar. Cstl. Shelf Sci.* 43:1-18.

Monteiro, L.R. and H.D. Lopes. 1990. Mercury Content of Swordfish, *Xiphias gladius*, in Relation to Length, Weight, Age, and Sex. *Mar. Pollut. Bull.* 21:293-296.

Naes, K., J. Knutzen and L. Berglind. 1995. Occurrence of PAH in Marine Organisms and Sediments from Smelter Discharge in Norway. *Sci. Totl Environ.* 163:93-106.

Naito, K.L. 1994. *Bioaccumulation of As, Ba, Cu and Zn in Fish and Bivalves Collected Near Produced Water Outfalls in the Gulf of Mexico.* Masters Thesis. Dept. of Oceanography and Ocean Engineering, Florida Institute of Technology, Melbourne, FL. 66 pp.

Najdek, M. and J. Sapunar. 1987. Total and Methyl-Mercury Content in Bivalves, *Mytilus galloprovincialis* Lamarck and *Ostrea edulis* Linnaeus: Relationship of Biochemical Composition and Body Size. *Bull. Environ. Contam. Toxicol.* 39:56-62.

Nakashima, S., R.E. Sturgeon, S.N. Willie, and S.S. Berman. 1988. Determination of Trace Elements in Sea Water by Graphite-Furnace Atomic Absorption Spectrometry After Preconcentration by Tetrahydroborate Reductive Precipitation. *Analytica Chimica Acta* 207:291-299.

Neff, J.M. 1979. *Polycyclic Aromatic Hydrocarbons in the Aquatic Environment. Sources, Fates and Biological Effects.* Applied Science Publishers, Barking, Essex, England. 262 pp.

Neff, J.M. 1997a. *Metals and Organic Chemicals Associated with Oil and Gas Well Produced Water: Bioaccumulation, Fates, and Effects in the Marine Environment.* Report to the Offshore Operators Committee, New Orleans, LA.

Neff, J.M. 1997b. The Ecotoxicology of Arsenic in the Marine Environment: A Review. *Environ. Toxicol. Chem.* 16:(in press).

Neff, J.M. and W.A. Burns. 1996. Estimation of Polycyclic Aromatic Hydrocarbon Concentrations in the Water Column Based on Tissue Residues in Mussels and Salmon: An Equilibrium Partitioning Approach. *Environ. Toxicol. Chem.* 15(12):2,240-2,253.

Neff, J.M. and T.C. Sauer, Jr. 1995. *Barium in Produced Water: Fate and Effects in the Marine Environment.* API Publication 4633. American Petroleum Institute, Washington, DC.

Neff, J.M. and W.A. Stubblefield. 1995. Chemical and Toxicological Evaluation of Water Quality Following the *Exxon Valdez* Oil Spill. *in*: P.G. Wells, J.N. Butler and J.S. Hughes, eds., *Exxon Valdez Oil Spill: Fate and Effects in Alaskan Waters.* ASTM STP 1219. American Society for Testing and Materials, Philadelphia, PA. pp. 141-177.

Neff, J.M., T.C. Sauer and N. Maciolek. 1989. *Fate and Effects of Produced Water Discharges in Nearshore Marine Waters.* API Publication No. 4472. American Petroleum Institute, Washington, DC. 300 pp.

Neff, J.M., T.C. Sauer and N. Maciolek. 1992. Composition, Fate and Effects of Produced Water Discharges to Nearshore Marine Waters. *in*: J.P. Ray and R. Englehardt (eds.), *Produced Water: Technological/Environmental Issues and Solutions.* Plenum Press, New York, NY. pp. 371-386.

Niimi, A.J. and G.P. Kissoon. 1994. Evaluation of the Critical Body Burden Concept Based on Inorganic and Organic Mercury Toxicity to Rainbow Trout (*Oncorhynchus mykiss*). *Arch. Environ. Contam. Toxicol.* 26:169-178.

NOAA. 1991. *Our Living Oceans.* NOAA Tech. Mem. NMFS-F/SPO1, 3/92, 5M. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. 123 pp.

NOAA. 1995. *NOAA National Status & Trends Program Mollusk Chemistry Data. Tissue Chemistry Data 86-93.* ASCII text file. National Oceanic and Atmospheric Administration, Rockville, MD.

Norstrom, R.J., R.E. Schweinsberg and B.T. Collins. 1986. Heavy Metals and Essential Elements in Livers of the Polar Bear (*Ursus maritimus*) in the Canadian Arctic. *Sci. Tot. Environ.* 48:195-212.

Nott, J.A. and A. Nicolaidou. 1993. Bioreduction of Zinc and Manganese Along a Molluscan Food Chain. *Comp. Biochem. Physiol.* 104A:235-238.

Nott, J.A. and A. Nicolaidou. 1994. Variable Transfer of Detoxified Metals from Snails to Hermit Crabs in Marine Food Chains. *Mar. Biol.* 120:369-377.

Nozaki, Y. 1991. The Systematics and Kinetics of U/Th Decay Series Nuclides in Ocean Water. *Rev. Aquat. Sci.* 4:75-105.

O'Connor, T.P. and B. Beliaeff. 1995. *Recent Trends in Coastal Environmental Quality: Results from the Mussel Watch Project.* National Oceanic and Atmospheric Administration, National Ocean Service, Office of Ocean Resources, Conservation and Assessment, Coastal Monitoring and Bioeffects Assessment Division, Silver Spring, MD. 40 pp.

Palmer, S.J., B.J. Presley, R.J. Taylor and E.N. Powell. 1993. Field Studies Using the Oyster *Crassostrea virginica* to Determine Mercury Accumulation and Depuration Rates. *Bull. Environ. Contam. Toxicol.* 51:464-470.

Pastor, A., F. Hernández, M.A. Peris, J. Beltrán, J.V. Sancho and M.T. Castillo. 1994. Levels of Heavy Metals in Some Marine Organisms from the Western Mediterranean Area (Spain). *Mar. Pollut. Bull.* 28:50-53.

Patterson, C. and D. Settle. 1977. Comparative Distributions of Alkalies, Alkaline Earths and Lead Among Major Tissues of the Tuna *Thunna alalunga*. *Mar. Biol.* 39:289-295.

Pierre, M. and L. Violett. 1979. *A Study of Jets in Cross-Currents and Stratified Media.* Agronne National Laboratory Report LIB-TR-41, February 1977. Translated from French by Ralph McElroy Co.

Pittinger, C.A., A.L. Buikema, Jr., S.G. Hornor and R.W. Young. 1985. Variation in Tissue Burdens of Polycyclic Aromatic Hydrocarbons in Indigenous and Relocated Oysters. *Environ. Toxicol. Chem.* 4:379-387.

Platt, H.M. and P.R. Mackie. 1981. Sources of Antarctic Hydrocarbons. *Mar. Pollut. Bull.* 12:407-409.

Poole, A.J., D.J. Allington and D.C. Denon. 1995. Temporal and Spatial Survey of Dissolved 226Ra in Coastal Waters of the Eastern Irish Sea. *Sci. Tot. Environ.* 168:233-247.

Rabalais, N.N., B.A. McKee, D.J. Reed and J.C. Means. 1991. *Fate and Effects of Nearshore Discharges of OCS Produced Waters.* Vol. 1: Executive Summary. Vol. 2: Technical Report. Vol. 3: Appendices. OCS Studies MMS 91-004, MMS 91-005, and MMS 91-006. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Regional Office, New Orleans, LA.

Rabalais, N.N., B.A. McKee, D.J. Reed and J.C. Means. 1992. Fate and Effects of Produced Water Discharges in Coastal Louisiana, Gulf of Mexico, USA. *in*: J.P. Ray and F.R. Engelhardt, eds., *Produced Water. Technological/Environmental Issues and Solutions.* Plenum Press, New York, NY. pp. 355-369.

Rainbow, P.S. 1988. The Significance of Trace Metal Concentrations in Decapods. *Symp. Soc. Zool. Lond.* 59:291-313.

Rainbow, P.S., D.J.H. Phillips and M.H. Depledge. 1990. The Significance of Trace Metal Concentrations in Marine Invertebrates. A Need for Laboratory Investigation of Accumulation Strategies. *Mar. Pollut. Bull.* 21:321-324.

Ramelow, G.J., C.L. Webre, C.S. Mueller, J.N. Beck, J.C. Young and M.P. Langley. 1989. Variations of Heavy Metals and Arsenic in Fish and Other Organisms from the Calcasieu River and Lake, Louisiana. *Arch. Environ. Contam. Toxicol.* 18:804-818.

Ray, L.E., H.E. Murray and C.S. Giam. 1983. Organic Pollutants in Marine Samples from Portland, Maine. *Chemosphere* 12:1,031-1,038.

Riksheim, H. and S. Johnsen. 1993. *Determination of Produced Water Contaminants in the Marine Environment.* SPE 27151 presented at 2nd International Conference on Health Safety and the Environment in Oil and Gas Production, Jakarta, Indonesia, 25-27 Janaury 1994.

Roesijadi, G. 1992. Metallothioneins in Metal Regulation and Toxicity in Aquatic Animals. *Aquat. Toxicol.* 22:81-114.

Rolfhus, K.R. and W.F Fitzgerald. 1995. Linkages Between Atmospheric Mercury Deposition and the Methylmercury Content of Marine Fish. *Wat. Air Soil Pollut.* 80:291-297.

Saiki, M.K. and D.U. Palawski. 1990. Selenium and Other Elements in Juvenile Striped Bass from the San Joaquin Valley and San Francisco Estuary, California. *Arch. Environ. Contam. Toxicol.* 19:717-730.

Santschi, P.D. and B.D. Honeyman. 1989. Radionuclides in Aquatic Environments. *Radiat. Phys. Chem.* 34:213-240.

Sauer, T.C., Jr. 1980. Volatile Liquid Hydrocarbons in Waters of the Gulf of Mexico and Caribbean Sea. *Limnol. Oceanog.* 25:338-351.

Sauer, T.C. and A.D. Uhler. 1994. Pollutant Source Identification and Allocation: Advances in Hydrocarbon Fingerprinting. *Remediation* Winter 1994/1995:25-50.

Sauer, T.C., Jr., W.M. Sackett and L.M. Jeffrey. 1978. Volatile Liquid Hydrocarbons in the Surface Coastal Waters of the Gulf of Mexico. *Mar. Chem.* 7:1-16.

Science Applications International Corporation. 1989. *Gulf of Mexico Physical Oceanography Program, Final Report: Year 5. Volume II Technical Report.* OCS Report/MMS-89-0068, U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico, OCS Regional Office, New Orleans, LA. 333 pp.

Sijm, D.T.H.M., M. Schipper and A. Opperhyizen. 1993. Toxicokinetics of Halogenated Benzenes in Fish: Lethal Body Burden as a Toxicological End Point. *Environ. Toxicol. Chem.* 12:1,117-1,127.

Simkiss, K. and M.G. Taylor. 1989. Metal Fluxes Across the Membranes of Aquatic Organisms. *Rev. Aquat. Sci.* 1:173-188.

Sirota, G.R., J.F. Uthe, A. Sreedharan, R. Matheson, C.J. Musial and K. Hamilton. 1983. Polynuclear Aromatic Hydrocarbons in Lobster (*Homarus americanus*) and Sediments in the Vicinity of a Coking Facility. *in*: M. Cooke and A.J. Dennis, eds., *Polynuclear Aromatic Hydrocarbons: Formation, Metabolism and Measurement.* Seventh International Symposium. Battelle Press, Columbus, OH. pp. 1,123-1,136.

Smith, J.P. 1993. *Field Observations of Dilution of Radium-226 from Produced Water Discharges - Comparison with Dispersion Model Predictions.* Report to the Offshore Operators Committee.

Smith, J.P., H.L. Mairs, M.G. Brandsma, R.P. Meek and R.C. Ayers, Jr. 1994. *Field validation of the Offshore Operators Committee (OOC) Produced Water Discharge Model.* SPE Paper 28350. SPE 69th Annual Technical conference and Exhibit, New Orleans, LA. Society of Petroleum Engineers, Richardson, TX.

Snavely, E.S., Jr. 1989a. *Radionuclides in Produced Water. A Literature Review.* Report to the American Petroleum Institute, Washington, DC. 78 pp.

Snavely, E.S., Jr. 1989b. *Radionuclides in Produced Water. A Literature Review.* Appendix 2 - Technical assessment of selected papers. Report to the American Petroleum Institute, Washington, DC. 92 pp.

Somerville, H.J. 1987. Environmental aspects of offshore operations. *in*: *Microbiological Problems in the Offshore Oil Industry, International Conference, Aberdeen, Scotland*. John Wiley & Sons, London. pp. 105-124.

Somerville, H.J., D. Bennett, J.N. Davenport, M.S. Holt, A. Lynes, A. Mahieu, B. McCourt, J.G. Parker, R.R. Stephenson, R.J. Watkinson, T.G. Wilkinson. 1987. Effect of Produced Water from North Sea Oil Operations. *Marine Pollution Bulletin* 18:549-558.

Stegeman, J.J. 1981. Polynuclear Aromatic Hydrocarbons and Their Metabolism in the Marine Environment. in: H.V. Gelboin and P.O.P. Ts'o, eds., *Polycyclic Hydrocarbons and Cancer.* Volume 3. Academic Press, New York. pp. 1-60.

Stegeman, J.J. 1985. Benzo(a)pyrene Oxidation and Microsomal Enzyme Activity in the Mussel (*Mytilus edulis*) and Other Bivalve Mollusc Species from the Western N. Atlantic. *Mar. Biol.* 89:21-30.

Steimle, F.W., V.S. Zdanowicz and D.F. Gadbois. 1990. Metals and Organic Contaminants in Northwest Atlantic Deep-Sea Tilefish Tissues. *Mar. Pollut. Bull.* 21:530-535.

Stephenson, M.T., R.C. Ayers, L.J. Bickford, D.D. Caudle, J.T. Cline, G. Cranmer, A. Duff, E. Garland, T.A. Herenius, R.P.W.M. Jacobs, C. Inglesfield, G. Norris, J.D. Petersen and A.D. Read. 1994. *North Sea Produced Water: Fate and Effects in the Marine Environment.* Report No. 2.62/204. E&P Forum, London, England. 48 pp.

Strømgren, T., S.E. Sørstrøm, L. Schou, I. Kaarstad, T. Aunaas, O.G. Brakstad and Ø. Johansen. 1995. Acute Toxic Effects of Produced Water in Relation to Chemical Composition and Dispersion. *Mar. Environ. Res.* 40:147-169.

Struhsaker, J.W. 1977. Effects of Benzene (a Toxic Component of Petroleum) on Spawning Pacific herring, *Clupea harengus pallasi*. *Fish. Bull.* 75:43-49.

Stuermer, D.H., R.B. Spies, P.H. Davis, D.J. Ng, C.J. Morris and S. Neal. 1982. The Hydrocarbons in the Isla Vista Marine Seep Environment. *Mar. Chem.* 11:413-426.

Sullivan, B. and D. Carty. 1994. Is It Real Contamination or Is It Just Plastic? *Soils* Jan-Feb. 1994:6-8.

Suter, G.W. 1993. *Ecological Risk Assessment.* Lewis Publishers, Boca Raton, FL. 528 pp.

Swaileh, K.M. and D. Adelung. 1994. Levels of Trace Metals and Effect of Body Size on Metal Content and Concentration in *Arctica islandica* L. (Mollusca: Bivalvia) from Kiel Bay, western Baltic. *Mar. Pollut. Bull.* 28:500-505.

Terrens, G.W. and R.D. Tait. 1993. *Effects on the Marine Environment of Produced Formation Water Discharges from Esso/BHPP's Bass Strait Platforms.* Esso Australia Ltd., Melbourne, Australia. 25 pp.

Terrens, G.W. and R.D. Tait. 1996. Monitoring Ocean Concentrations of Aromatic Hydrocarbons from Produced Formation Water Discharges to Bass Strait, Australia. SPE 36033. *Proceedings of the International Conference on Health, Safety & Environment.* Society of Petroleum Engineers, Richardson, TX. pp. 739-747.

Thomson, J.D. 1985. Mercury Concentrations of the Axial Muscle Tissues of Some Marine Fishes of the Continental Shelf Adjacent to Tasmania. *Aust. J. Mar. Freshwat. Res.* 36:509-517.

Thurén, A. 1986. Determination of Phthalates in Aquatic Environments. *Bull. Environ. Contam. Toxicol.* 36:33-40.

Trefry, J.H., K.L. Naito, R.P. Trocine and S. Metz. 1995. Distribution and Bioaccumulation of Heavy Metals from Produced Water Discharges to the Gulf of Mexico. *Wat. Sci. Technol.* 32:31-36.

Trefry, J.H., R.P. Trocine, K.L. Naito and S. Metz. 1996. Assessing the Potential for Enhanced Bioaccumulation of Heavy Metals from Produced Water Discharges to the Gulf of Mexico. *in*: M. Reed and S. Johnson, eds., *Produced Water 2: Environmental Issues and Mitigation Technologies.* Plenum Press, New York. pp. 339-354.

Uthus, E.O. 1992. Evidence for Arsenic Essentiality. *Environ. Geochem. Hlth.* 14:55-58.

Van Leeuwen, C.J., P.T.J. Van Der Zandt, T. Aldenberg, H.J.M Verhaar and J.L.M. Hermens. 1992. Application of QSARs, Extrapolation and Equilibrium Partitioning in Aquatic Effects Assessment. I. Narcotic industrial pollutants. *Environ. Toxicol. Chem.* 11:267-282.

Varanasi, U. and J.E. Stein. 1991. Disposition of Xenobiotic Chemicals and Metabolites in Marine Organisms. *Environ. Hlth. Persp.* 90:93-100.

Veith, G.D. and P. Kosian. 1983. Estimating Bioconcentration Potential from Octanol/Water Partition Coefficients. *in*: D. Mackay, S. Patterson and St.J. Eisenreich, eds., *Physical Behavior of PCBs in the Great Lakes.* Ann Arbor Science Publishers, Ann Arbor, MI. pp. 269-282.

Viarengo, A., L. Canesi, A. Mazzucotelli, and E. Ponzano. 1993. Cr, Zn and Cd Content in Different Tissues of the Antarctic Scallop *Adamussium colbecki*: Role of Metallothionein in Heavy Metal Homeostasis and Detoxication. *Mar. Ecol. Prog. Ser.* 95:163-168.

Wade, T.L., M.C. Kennicutt II and J.M. Brooks. 1989. Gulf of Mexico Hydrocarbon Seep Communities: Part III. Aromatic Hydrocarbon Concentrations in Organisms, Sediments and Water. *Mar. Environ. Res.* 27:19-30.

Wakeham, S.G., J.T. Goodwin and A.C. Davis. 1982. *Volatile Organic Compounds in Narragansett Bay, Rhode Island.* Technical Report WHOI-82-36. Woods Hole Oceanographic Institution, Woods Hole, MA.

Waldock, M.J. 1983. Determination of Phthalate Esters in Samples from the Marine Environment Using Gas Chromatography Mass Spectrometry. *Chem. Ecol.* 1:261-277.

Walker, T.I. 1988. Mercury Concentrations in Edible Tissues of Elasmobranchs, Teleosts, Crustaceans and Mollusks from South-Eastern Australian Waters. *Aust. J. Mar. Freshwat. Res.* 39:39-49.

Warne, M.St.J., D.W. Connell and D.W. Hawker. 1991. Comparison of the Critical Concentration and Critical Volume Hypotheses to Model Non-Specific Toxicity of Individual Compounds. *Toxicol.* 66:187-195.

Whelan, J.K., M.E. Tarafa and J.M. Hunt. 1982. *Volatile C1-C8 Organic Compounds in Macroalgae.* Nature, Lond.

Witt, G. 1995. Polycyclic Aromatic Hydrocarbons in Water and Sediment of the Baltic Sea. *Mar. Pollut. Bull.* 31:237-248.

Wofford, H.W., C.D. Wilsey, G.S. Neff, C.S. Giam and J.M. Neff. 1981. Bioaccumulation and Metabolism of Phthalate Esters by Oysters, Brown Shrimp, and Sheepshead Minnows. *Ecotoxicol. Environ. Safe.* 5:202-210.

Youngblood, W.W. and M. Blumer. 1975. Polycyclic Aromatic Hydrocarbons in the Environment: Homologous Series in Soils and Recent Marine Sediments. *Geochim. Cosmochim.* Acta 39:1303-1314.

Section 6
LIST OF ABBREVIATIONS

ADL	Arthur D. Little
ANOVA	analysis of variance
BAP	benzo[a]pyrene
Battelle	Battelle Ocean Sciences
BCF	bioconcentration factor
BEHP	bis(2-ethylhexyl)phthalate
CBR	critical body residue
CSA	Continental Shelf Associates, Inc.
DDW	distilled deionized water
DGPS	differential global positioning system
DMR	Discharge Monitoring Report
DOE	U.S. Department of Energy
DQO	data quality objective
EFr	exposure frequency
EPA	U.S. Environmental Protection Agency
FIT	Florida Institute of Technology
GC/MS	gas chromatography/mass spectrometry
GFAAS	graphite furnace atomic absorption spectrometry
GIS	Geographical Information System
GPC	gel permeation column
HPLC	high pressure liquid chromatography
ICP-MS	inductively coupled plasma-mass spectrometry
MDL	method detection limit
ND	non-detected
NIST	U.S. National Institute of Standards and Technology
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council of Canada
OOC	Offshore Operators Committee
PAH	polycyclic aromatic hydrocarbon
PB	procedural blank
PCB	polychlorinated biphenyl
PQL	practical quantitation level
QA	quality assurance
QAPjP	Quality Assurance Project Plan
RIS	recovery internal standard
RPD	relative percent difference
RSD	relative standard deviation
SIM	selected ion monitoring
SIS	surrogate internal standard
SOP	standard operating procedure
SRM	Standard Reference Material
SVOC	semivolatile organic compound
VOA	volatile organic analysis
VOC	volatile organic compound

Gulf of Mexico Produced Water Bioaccumulation Study

Definitive Component Appendices

April 1997

(Reformatted for Microsoft Word in May 2009)

Prepared For:

Offshore Operators Committee
P.O. Box 50751
New Orleans, Louisiana 70150

Prepared By:

Continental Shelf Associates, Inc.
759 Parkway Street
Jupiter, Florida 33477

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

APPENDIX A

STATISTICAL ANALYSIS

Appendix A
STATISTICAL ANALYSIS

A.1 DESCRIPTION OF THE STATISTICAL ANALYSIS METHODOLOGY

A.1.1 Case 1 - Percentage of Non-detected Values Less Than 15%

Analysis of variance (ANOVA) with contrasts was used to compare mean chemical concentrations between paired platforms for each species-analyte combination. We modeled the mean concentration (Y) as a function of a grand mean (m) plus an effect of cruise (C) and platform (P),

$$Y = m + C + P + e \quad \text{(Equation 1)}.$$

The amount of variability not explained by either when (cruise) or where (platform) samples were taken is the error term (e). A test on the platform effect (P) tests if mean concentrations differed between members of a platform pair. The null and two-tailed alternative hypotheses were, respectively,

H_o: $P = 0$, and

H_a: $P \neq 0$.

In terms of the model (Equation 1), under the null hypothesis P = 0 and concentrations were equal for discharging and non-discharging platforms for both cruises. Composite means of two subsamples were used as replicates. There were 3 composite means per cruise-platform combination, 12 composites for each ANOVA (2 cruises $\times$ 2 platforms $\times$ 3 composite means). Subsamples were pseudoreplicates and their use as replicates would have inflated the degrees of freedom. All tests were performed at a type 1 error of $\alpha = 0.05$. (As noted in **Section 2.1.3** Statistical Analysis, there was a low rate of discharge at the High Island platform and for the western platform pair the null and alternative hypotheses compare mean concentrations at low [High Island] and high [East Breaks] discharge rates.)

We enhanced the probability of finding significant effects in two ways. First, we blocked by cruise. Blocking (Snedecor and Cochran, 1989) recognizes that concentrations may naturally differ seasonally due to changes in temperatures, currents, contaminants from other sources, and other environmental factors. Cruises were taken in different seasons and blocking by cruise reduced the amount of unexplained error. Second, we tested platform pairs for each cruise separately with contrasts (Dixon and Massey, 1969), even when results for ANOVA tests where not significant. Generally, contrasts and other post-hoc tests are performed only if the results for the ANOVA are significant. Contrasts used the error term from the ANOVA model (Equation 1) and therefore were made on 9 degrees of freedom, rather than on the 5 degrees of freedom which would have been used had individual t-tests between platforms for each cruise been made. Using the error in Equation 1 for contrasts included all 12 composite means and gave a more stable estimate of error than would have the 6 composite means for a t-test. However, in some cases, the variance for 6 composites could have been smaller, in which case the t-test could have been significant and the contrast not significant even though made on more degrees of freedom. The question of which comparison is more appropriate in this case, t-test or contrast, depends on which estimate of error for comparing the two platform means was more representative of the conditions of the study. We believe that, for most cases, the error

term based on the ANOVA model was better because it was based on more data. This argument is somewhat obviated since all mean values, regardless of whether significant platform effects were found, were compared to screening values for risk assessment.

We did not include the interaction term for a cruise-by-platform effect (C×P) in our model because this was an observational study and not an experiment. An interaction between cruise and platform implies that seasons affect discharging and non discharging platforms differently. Given the low levels of concentrations observed and environmental similarities in platforms for each pair, we think that interactions were unlikely and that any significant interactions would have been spurious. Because this was an observational study and not an experiment, excluding the interaction term from the model helped in interpreting test results. In experiments, treatments are randomized and under the null hypothesis, effect (in this case platform) means are equal. Since the treatment (i.e., produced waters) could not be randomized among platforms, we did not expect mean concentrations to be truly equal between members of a pair. In the absence of knowing all the environmental factors that affect concentrations and being unable to randomize produced waters, pairing was imperfect. Hence, for this study, the null hypothesis was never strictly true, even if produced waters had absolutely no effect on concentrations. By combining potential interaction effects with the error term, we reduced the probability of declaring significant effects of produced waters which were actually due to imperfect pairing. Combining may have slightly inflated the error term, if there actually were interactions between cruises and platforms, but this could have been offset by assigning the 1 degrees of freedom to the error term that would have gone to an interaction term, had it been included in the model.

ANOVA was performed with SAS for Windows Release 6.10. Input data consisted of designators for 1) cruise; 2) platform; 3) taxon; 4) composite sample; and 5) target chemical in addition to the concentration of the target chemical for each analysis of the composite sample (two analyses per sample as discussed in **Section 2.1**). A platform pair designator was created for each data record based on the platform designator. Concentrations reported as non-detected (ND) values in the data were replaced with ½ the method detection limit (MDL) (Gilbert, 1987; EPA, 1989).

A.1.2 Case 2- Percentage of Non-detected Values Greater Than 15% and Less Than 50%

When a moderate proportion of the data were ND values, non-parametric tests were more appropriate than ANOVA. We used the Friedman and Mann-Whitney Tests (Conover, 1980) in the same way we used ANOVA and contrasts, respectively, in the previous section: Friedman for comparing platform pairs over both cruises, where cruise was a blocking factor as with ANOVA; Mann-Whitney for comparing platform pairs within cruises. Ranked transformed composite means were used as replicates.

The null and alternative hypotheses are the same for both Friedman and Mann-Whitney Tests.

H_o: Ranks for platforms are equally likely,

H_a: Ranks for platforms are not equally likely.

Significantly higher or lower ranks at high discharging platforms were interpreted as evidence for an effect of produced waters on analyte concentration.

Because one or more of the subsamples may have been ND, the data were treated as follows prior to ranking and statistical analysis:

> if both subsamples were NDs, ND was used in the statistical analysis;
>
> if both subsamples exceeded MDL (were not NDs), their mean was used in the statistical analysis; and
>
> if one subsample was ND and the other subsample was greater than the MDL (not ND), the ND was replaced with ½MDL and the mean of two was used in statistical analysis.

After performing this procedure, a data record consisted of designators for 1) cruise; 2) platform; 3) taxon; 4) composite sample; and 5) target chemical, in addition to a single concentration or ND value for each composite sample.

Because tied ranks occurred, the methodology described by Randles (1979) was used to correct for ties for the Friedman Test. This methodology requires that, for a given number of ties, every permutation of ranks be determined (400 permutations) and the Friedman Test statistic calculated for each permutation. The test statistic was statistically significant if it was greater than 95% of test statistics calculated for each possible permutation. The Friedman Test were performed at $\alpha = 0.05$.

Data for Friedman and Mann-Whitney Tests were ranked with SAS for Windows Release 6.10 and the ranks were imported into a spreadsheet program (Quattro Pro 6.0 for Windows). The test statistics were calculated in the spreadsheet program. Computation of the Friedman Test statistic for all possible permutations to correct for ties was also performed with Quattro Pro 6.0 for Windows.

Data for taxa that were collected and analyzed for a single cruise (rockhind and sergeant major) were tested only with the Mann-Whitney Test. All Mann-Whitney Tests were made at $\alpha = 0.10$.

A.1.3 Case 3 - Percentage of Non-detected Values Greater Than 50% and Less Than 90%

When a high proportion of the data were ND values, neither ANOVA with contrasts nor Friedman and Mann-Whitney Tests were appropriate (EPA, 1989). These data were transformed to binary values, either ND or not ND, and Fishers Exact Test (Conover, 1980) of proportions was used. Cruises were tested separately. Composites were used as replicates. If both subsamples were NDs then the composite was ND, else the composite was not ND. The null and alternative hypotheses were as follows:

> H_o: The proportion of NDs is equal for members of a platform pair,
>
> H_a: The proportion of NDs is not equal for members of a platform pair.

A significantly higher or lower proportion of NDs was interpreted as evidence for an effect of produced waters on analyte concentration. All tests were performed at $\alpha = 0.05$. The analyses of the data with Fisher's Exact Test was performed with SAS for Windows Release 6.10.

A.1.4 Numbers of Specimens in Composite Samples

The appropriate number of specimens for each composite was estimated with the procedure described in Cohen (1977) for a t-test. For a particular difference between means at the discharging and reference platform and an optimal power level, e.g., 95%, the following formula was used to determine the appropriate number of specimens:

$$d = \frac{m_A - m_B}{\sigma_{Screening\ Survey}}$$

where d = the effect size;
$m_A - m_B$ = the difference between the two means that is of interest and is determined a priori; and
$\sigma_{Screening\ Survey}$ = the standard deviation, which was estimated from the variance among individual specimens collected and analyzed for the Screening Survey.

The number of specimens (n) was determined from tables in Cohen (1977) for values of d and the power level.

A.1.5 Power Analysis

The methodology described in Cohen (1977) was used to compute power to compare two means. This was applied to those cases where a variance among composite samples was calculated. For a given power level, (e.g., 95%), the formula

$$d = \frac{m_A - m_B}{\sigma_{composites}}$$

was rewritten as

$$m_A - m_B = \frac{d}{\sigma_{composites}}$$

where $m_A - m_B$ = the difference between the two means;
d = the effect size; and
$\sigma_{composites}$ = the standard deviation, which was estimated from the variance among composite samples.

For a particular power level and sample size, d was determine from Cohen (1977) and the difference between the two means was computed. The results of the power analyses are presented in **Tables A-1** to **A-3**.

A.2 EXAMPLES OF STATISTICAL ANALYSES

A.2.1 Analysis of Variance and Contrasts

An example of the analysis of variance (ANOVA) of methodology is presented for the cadmium data for the jewel box at GC19A (D) and EI361A (R) for Cruises 2 and 3. The example data are presented in **Table A-4**. These data were analyzed with the SAS program presented in **Table A-5**. The results of running this SAS program are presented in **Table A-6**. Contrasts to compare platforms for each cruise were computed. An example for this data set is presented in **Table A-7**.

A.2.2 Friedman Test and Mann-Whitney Test

Examples of the Friedman Test and Mann-Whitney Test are presented for the cadmium data for the gray triggerfish at GC19A (D) and EI361A (R) for Cruises 2 and 3 (**Table A-8**). Sums of ranks for computation of the test statistics for the Friedman Test and Mann-Whitney Test were computed with the SAS program presented in **Table A-9**. Results for the Friedman Test and Mann-Whitney Test are presented in **Tables A-10** and **A-11**, respectively.

A.2.3 Fisher's Exact Test

An example of the Fisher's Exact Test is presented for the BEHP data for jewel box at GC19A (D) and EI361A (R) for Cruise 2 (**Table A-12**). These data were analyzed with the SAS program presented in **Table A-13**, and the results of this example analysis are presented in **Table A-14**.

A.3 RESULTS OF THE STATISTICAL ANALYSIS

The results of the statistical analysis described in **Section A.1.1** to **A.1.3** are presented in **Tables A-15** to **A-22**.

Table A-1. Detectable differences (percentage of the reference mean concentration) based on the analyses of variance for metals data.

Analyte	Taxon	Platform Pair	Cruise	Power = 80%		Power = 90%		Power = 95%	
				Detectable Difference	Percent of Reference Mean	Detectable Difference	Percent of Reference Mean	Detectable Difference	Percent of Reference Mean
Arsenic (µg/g dry weight)	Jewel box	GC19A-EI361A	2	6.8	13	7.8	15	8.7	17
			3	6.8	11	7.8	13	8.7	14
		EB165A-HI356A	2	8.6	16	10	18	11	20
			3	8.6	14	10	16	11	18
	Yellow chub	GC19A-EI361A	2	0.46	14	0.53	16	0.59	18
			3	0.46	14	0.53	16	0.59	18
		EB165A-HI356A	2	0.93	19	1.1	21	1.2	24
			3	0.93	35	1.1	41	1.2	45
	Creole-fish	GC19A-EI361A	2	2.5	42	2.9	48	3.3	54
			3	2.5	53	2.9	62	3.3	69
		EB165A-HI356A	2	3.2	42	3.7	49	4.1	54
			3	3.2	35	3.7	41	4.1	45
	Rockhind	EB165A-HI356A	2	1.4	32	1.7	37	1.9	41
	Sergeant major	EB165A-HI356A	3	11	34	13	39	14	44
	Thorny oyster	GC19A-EI361A	2	32	38	37	44	41	48
			3	32	31	37	36	41	40
		EB165A-HI356A	2	24	36	28	42	31	46
			3	24	33	28	38	31	43
	Gray triggerfish	GC19A-EI361A	2	6.9	24	8.0	27	8.9	31
			3	6.9	26	8.0	31	8.9	34
Barium (µg/g dry weight)	Jewel box	GC19A-EI361A	2	80	301	93	348	103	387
			3	80	234	93	271	103	301
		EB165A-HI356A	2	13	60	15	70	16	78
			3	13	54	15	62	16	69
	Yellow chub	GC19A-EI361A	2	0.53	39	0.62	45	0.69	50
			3	0.53	725	0.62	840	0.69	934
		EB165A-HI356A	2	0.80	62	0.92	71	1.0	79
			3	0.80	1017	0.92	1177	1.0	1309

Table A-1. (Continued).

Analyte	Taxon	Platform Pair	Cruise	Power = 80%		Power = 90%		Power = 95%	
				Detectable Difference	Percent of Reference Mean	Detectable Difference	Percent of Reference Mean	Detectable Difference	Percent of Reference Mean
Barium (µg/g dry weight) (Continued)	Creole-fish	GC19A-EI361A	2	0.31	28	0.35	32	0.39	36
			3	0.31	182	0.35	210	0.39	234
		EB165A-HI356A	2	0.38	36	0.44	42	0.49	47
			3	0.38	384	0.44	444	0.49	494
	Rockhind	EB165A-HI356A	2	0.43	149	0.50	173	0.55	192
	Sergeant major	EB165A-HI356A	3	0.48	72	0.56	84	0.62	93
	Thorny oyster	GC19A-EI361A	2	12	70	14	82	16	91
			3	12	49	14	56	16	62
		EB165A-HI356A	2	3.8	19	4.4	22	4.9	25
			3	3.8	20	4.4	23	4.9	25
	Gray triggerfish	GC19A-EI361A	2	0.56	75	0.65	86	0.72	96
			3	0.56	476	0.65	551	0.72	613
Cadmium (µg/g dry weight)	Jewel box	GC19A-EI361A	2	2.7	25	3.1	29	3.4	33
			3	2.7	25	3.1	28	3.4	32
		EB165A-HI356A	2	1.5	19	1.8	22	2.0	24
			3	1.5	17	1.8	20	2.0	22
	Yellow chub	GC19A-EI361A	2	0.002	24	0.003	27	0.003	30
			3	0.002	28	0.003	33	0.003	36
		EB165A-HI356A	2	0.006	42	0.007	49	0.007	54
			3	0.006	53	0.007	62	0.007	69
	Creole-fish	GC19A-EI361A	2	0.004	45	0.004	52	0.005	58
			3	0.004	31	0.004	35	0.005	39
		EB165A-HI356A	2	0.007	81	0.008	94	0.009	104
			3	0.007	58	0.008	67	0.009	75
	Sergeant major	EB165A-HI356A	3	0.015	181	0.017	210	0.019	233
	Thorny oyster	GC19A-EI361A	2	8.6	35	10	40	11	45
			3	8.6	27	10	31	11	35
		EB165A-HI356A	2	6.8	34	7.9	39	8.8	44
			3	6.8	28	7.9	32	8.8	36

Table A-1. (Continued).

Analyte	Taxon	Platform Pair	Cruise	Power = 80%		Power = 90%		Power = 95%	
				Detectable Difference	Percent of Reference Mean	Detectable Difference	Percent of Reference Mean	Detectable Difference	Percent of Reference Mean
Mercury (µg/g dry weight)	Jewel box	GC19A-EI361A	2	0.027	37	0.031	42	0.034	47
			3	0.027	41	0.031	47	0.034	52
		EB165A-HI356A	2	0.019	26	0.022	30	0.024	33
			3	0.019	29	0.022	33	0.024	37
	Yellow chub	GC19A-EI361A	2	0.046	59	0.053	68	0.059	76
			3	0.046	68	0.053	79	0.059	88
		EB165A-HI356A	2	0.026	29	0.030	33	0.033	37
			3	0.026	36	0.030	42	0.033	47
	Creole-fish	GC19A-EI361A	2	0.030	22	0.035	26	0.039	29
			3	0.030	18	0.035	21	0.039	23
		EB165A-HI356A	2	0.042	31	0.049	36	0.055	40
			3	0.042	36	0.049	41	0.055	46
	Rockhind	EB165A-HI356A	2	0.31	58	0.36	67	0.40	75
	Sergeant major	EB165A-HI356A	3	0.048	24	0.056	27	0.062	30
	Thorny oyster	GC19A-EI361A	2	0.10	84	0.11	98	0.13	109
			3	0.10	58	0.11	67	0.13	74
		EB165A-HI356A	2	0.048	32	0.056	37	0.062	41
			3	0.048	25	0.056	29	0.062	32
	Gray triggerfish	GC19A-EI361A	2	0.30	107	0.35	124	0.39	138
			3	0.30	279	0.35	323	0.39	359

Table A-2. Detectable differences (percentage of the reference mean concentration) based on the analyses of variance for semivolatile organic compound data.

Analyte	Taxon	Platform Pair	Cruise	Power = 80%		Power = 90%		Power = 95%	
				Detectable Difference	Percent of Reference Mean	Detectable Difference	Percent of Reference Mean	Detectable Difference	Percent of Reference Mean
2-Methylnaphthalene (ng/g dry weight)	Jewel box	GC19A-EI361A	2	5.3	34	6.1	40	6.8	44
			3	5.3	63	6.1	73	6.8	81
		EB165A-HI356A	2	11	63	12	73	14	81
			3	11	135	12	156	14	174
	Yellow chub	GC19A-EI361A	2	5.3	106	6.2	123	6.9	136
			3	5.3	54	6.2	62	6.9	69
		EB165A-HI356A	2	0.74	24	0.85	28	0.95	31
			3	0.74	22	0.85	25	0.95	28
	Creole-fish	GC19A-EI361A	2	2.0	73	2.3	84	2.6	94
			3	2.0	49	2.3	57	2.6	64
	Sergeant major	EB165A-HI356A	3	2.4	64	2.7	75	3.0	83
C1-Naphthalenes (ng/g dry weight)	Jewel box	GC19A-EI361A	2	6.2	63	7.2	72	8.0	81
			3	6.2	62	7.2	71	8.0	79
		EB165A-HI356A	2	9.0	65	10	75	12	84
			3	9.0	90	10	104	12	116
	Yellow chub	GC19A-EI361A	2	5.2	98	6.0	113	6.7	126
			3	5.2	51	6.0	59	6.7	65
		EB165A-HI356A	2	1.6	54	1.8	62	2.0	69
			3	1.6	40	1.8	47	2.0	52
	Sergeant major	EB165A-HI356A	3	2.7	65	3.1	75	3.4	84
Phenol (ng/g dry weight)	Jewel box	GC19A-EI361A	2	284	124	329	143	366	159
			3	284	65	329	75	366	84
	Yellow chub	GC19A-EI361A	2	137	127	159	147	177	164
			3	137	178	159	206	177	229
		EB165A-HI356A	2	94	94	109	109	121	121
			3	94	85	109	99	121	110
	Rockhind	EB165A-HI356A	2	117	132	135	153	151	170
	Sergeant major	EB165A-HI356A	3	44	61	51	71	56	79

Table A-2. (Continued).

Analyte	Taxon	Platform Pair	Cruise	Power = 80%		Power = 90%		Power = 95%	
				Detectable Difference	Percent of Reference Mean	Detectable Difference	Percent of Reference Mean	Detectable Difference	Percent of Reference Mean
Phenol (ng/g dry weight) (Continued)	Thorny oyster	GC19A-EI361A	2	130	143	151	166	167	184
			3	130	88	151	102	167	114
		EB165A-HI356A	2	133	147	154	170	172	189
			3	133	83	154	96	172	107
	Gray triggerfish	GC19A-EI361A	2	334	241	387	279	430	311
			3	334	244	387	282	430	314

Table A-3. Detectable differences (percentage of the reference mean concentration) based on the analyses of variance for metals data.

Analyte	Taxon	Platform Pair	Cruise	Power = 80%		Power = 90%		Power = 95%	
				Detectable Difference	Percent of Reference Mean	Detectable Difference	Percent of Reference Mean	Detectable Difference	Percent of Reference Mean
^{226}Ra (pCi/g dry weight)	Jewel box	GC19A-EI361A	2	0.038	51	0.044	59	0.049	66
			3	0.038	48	0.044	55	0.049	61
		EB165A-HI356A	2	0.10	97	0.11	113	0.13	126
			3	0.10	120	0.11	139	0.13	155
	Rockhind	EB165A-HI356A	2	0.050	651	0.058	754	0.064	838
	Sergeant major	EB165A-HI356A	3	0.030	625	0.035	724	0.039	805
	Thorny oyster	GC19A-EI361A	2	0.11	52	0.13	60	0.14	67
			3	0.11	129	0.13	150	0.14	166
		EB165A-HI356A	2	0.048	210	0.055	243	0.061	270
			3	0.048	46	0.055	53	0.061	59

Table A-4. Data for example analysis of variance. Data are cadmium concentrations in jewel box collected at GC19A (D) and EI361A (R) during Cruises 2 and 3.

Cruise	Platform	Taxon	Composite	Parameter	Concentration (µg/g dry weight)
2	GC19A (D)	Jewel box	A	Cadmium	6.20
2	GC19A (D)	Jewel box	A	Cadmium	6.87
2	GC19A (D)	Jewel box	B	Cadmium	7.45
2	GC19A (D)	Jewel box	B	Cadmium	7.33
2	GC19A (D)	Jewel box	C	Cadmium	7.71
2	GC19A (D)	Jewel box	C	Cadmium	7.27
2	EI361A (R)	Jewel box	A	Cadmium	9.49
2	EI361A (R)	Jewel box	A	Cadmium	9.16
2	EI361A (R)	Jewel box	B	Cadmium	11.0
2	EI361A (R)	Jewel box	B	Cadmium	10.6
2	EI361A (R)	Jewel box	C	Cadmium	11.4
2	EI361A (R)	Jewel box	C	Cadmium	11.4
3	GC19A (D)	Jewel box	A	Cadmium	3.9
3	GC19A (D)	Jewel box	A	Cadmium	4.0
3	GC19A (D)	Jewel box	B	Cadmium	3.4
3	GC19A (D)	Jewel box	B	Cadmium	3.5
3	GC19A (D)	Jewel box	C	Cadmium	4.6
3	GC19A (D)	Jewel box	C	Cadmium	4.8
3	EI361A (R)	Jewel box	A	Cadmium	11.2
3	EI361A (R)	Jewel box	A	Cadmium	10.1
3	EI361A (R)	Jewel box	B	Cadmium	11.9
3	EI361A (R)	Jewel box	B	Cadmium	12.6
3	EI361A (R)	Jewel box	C	Cadmium	9.6
3	EI361A (R)	Jewel box	C	Cadmium	9.5

Table A-5. SAS program for example analysis of variance.

```
data metal;
     input cruise $ platform $ taxon $ compos $ parm $  conc;
     if platform = 'GC19' or platform = 'EI361' then platpair = 'E';
     else platpair =  'W';
     cards;
          2        GC19A (D)        Jewel box        A        Cadmium        6.20
          2        GC19A (D)        Jewel box        A        Cadmium        6.87
          2        GC19A (D)        Jewel box        B        Cadmium        7.45
          2        GC19A (D)        Jewel box        B        Cadmium        7.33
          2        GC19A (D)        Jewel box        C        Cadmium        7.71
          2        GC19A (D)        Jewel box        C        Cadmium        7.27
          2        EI361A (R)       Jewel box        A        Cadmium        9.49
          2        EI361A (R)       Jewel box        A        Cadmium        9.16
          2        EI361A (R)       Jewel box        B        Cadmium        11.0
          2        EI361A (R)       Jewel box        B        Cadmium        10.6
          2        EI361A (R)       Jewel box        C        Cadmium        11.4
          2        EI361A (R)       Jewel box        C        Cadmium        11.4
          3        GC19A (D)        Jewel box        A        Cadmium        3.9
          3        GC19A (D)        Jewel box        A        Cadmium        4.0
          3        GC19A (D)        Jewel box        B        Cadmium        3.4
          3        GC19A (D)        Jewel box        B        Cadmium        3.5
          3        GC19A (D)        Jewel box        C        Cadmium        4.6
          3        GC19A (D)        Jewel box        C        Cadmium        4.8
          3        EI361A (R)       Jewel box        A        Cadmium        11.2
          3        EI361A (R)       Jewel box        A        Cadmium        10.1
          3        EI361A (R)       Jewel box        B        Cadmium        11.9
          3        EI361A (R)       Jewel box        B        Cadmium        12.6
          3        EI361A (R)       Jewel box        C        Cadmium        9.6
          3        EI361A (R)       Jewel box        C        Cadmium        9.5;
proc sort data = metal;
     by parm taxon platpair cruise platform compos;
proc glm data = metal;
     by parm taxon platpair;
     class cruise platform compos;
     model conc = cruise platform compos(cruise platform);
     test h=platform e=compos(cruise platform);
run;
quit;
```

Table A-6. SAS output for example analysis of variance.

```
                          The SAS System                    13:17 Monday, April 14, 1997   4

                                                PARM=Cadmium TAXON=JEWELBOX PLATPAIR=E
                                                      General Linear Models Procedure

Dependent Variable: CONC

Source                  DF         Sum of Squares          Mean Square         F Value         Pr > F

Model                   11         198.46308333          18.04209848          160.62          0.0001

Error                   12          1.34790000           0.11232500

Corrected Total         23         199.81098333

                R-Square                C.V.             Root MSE                  CONC Mean

                0.993254             4.125337           0.33514922                 8.12416667

Source                  DF           Type I SS          Mean Square         F Value         Pr > F

CRUISE                   1          11.73201667          11.73201667          104.45          0.0001
PLATFORM                 1         154.63526667         154.63526667         1376.68          0.0001
COMPO(CRUISE*PLATFO)     9          32.09580000           3.56620000           31.75          0.0001

Source                  DF          Type III SS         Mean Square         F Value         Pr > F

CRUISE                   1          11.73201667          11.73201667          104.45          0.0001
PLATFORM                 1         154.63526667         154.63526667         1376.68          0.0001
COMPO(CRUISE*PLATFO)     9          32.09580000           3.56620000           31.75          0.0001

Tests of Hypotheses using the Type III MS for COMPO(CRUISE*PLATFO) as an error term

Source                  DF          Type III SS         Mean Square         F Value         Pr > F

PLATFORM                 1         154.63526667         154.63526667          43.36          0.0001
```

Table A-7. Example of computation of contrasts.

Parameter	Cruise	Mean Concentration		Contrast Mean Square[a]	Error Mean Square[b]	F	Probability
		GC19A	EI361A				
Cadmium	2	7.14	10.5	17.0	3.57	4.78	0.057
Cadmium	3	4.03	10.8	69.0	3.57	19.4	0.001

[a] Computed as $3 \times (\text{mean}_{GC19A} - \text{mean}_{EI361A})^2 \div 2$.
[b] From analysis of variance.

Table A-8. Data for example Friedman Test. Data are cadmium concentrations in gray triggerfish collected at GC19A (D) and EI361A (R) during Cruises 2 and 3.

Cruise	Platform	Taxon	Composite	Parameter	ND[a]	Concentration (µg/g dry weight)
2	GC19A (D)	Triggerfish	A	Cadmium	0	0.006
2	GC19A (D)	Triggerfish	A	Cadmium	0	0.005
2	GC19A (D)	Triggerfish	B	Cadmium	1	0.001
2	GC19A (D)	Triggerfish	B	Cadmium	1	0.001
2	GC19A (D)	Triggerfish	C	Cadmium	1	0.001
2	GC19A (D)	Triggerfish	C	Cadmium	1	0.001
2	EI361A (R)	Triggerfish	A	Cadmium	0	0.005
2	EI361A (R)	Triggerfish	A	Cadmium	0	0.004
2	EI361A (R)	Triggerfish	B	Cadmium	1	0.001
2	EI361A (R)	Triggerfish	B	Cadmium	0	0.003
2	EI361A (R)	Triggerfish	C	Cadmium	1	0.001
2	EI361A (R)	Triggerfish	C	Cadmium	1	0.001
3	GC19A (D)	Triggerfish	A	Cadmium	0	0.012
3	GC19A (D)	Triggerfish	A	Cadmium	0	0.010
3	GC19A (D)	Triggerfish	B	Cadmium	0	0.009
3	GC19A (D)	Triggerfish	B	Cadmium	0	0.008
3	GC19A (D)	Triggerfish	C	Cadmium	0	0.009
3	GC19A (D)	Triggerfish	C	Cadmium	0	0.008
3	EI361A (R)	Triggerfish	A	Cadmium	0	0.003
3	EI361A (R)	Triggerfish	A	Cadmium	0	0.003
3	EI361A (R)	Triggerfish	B	Cadmium	0	0.003
3	EI361A (R)	Triggerfish	B	Cadmium	0	0.003
3	EI361A (R)	Triggerfish	C	Cadmium	0	0.002
3	EI361A (R)	Triggerfish	C	Cadmium	0	0.004

[a] ND=1 if non-detected value; ND = 0 otherwise.

Table A-9. SAS program to compute sums of ranks for examples of Friedman Test and Mann-Whitney Test.

```
data metal;
   input cruise $ platform $ taxon $ compos $ parm $ nd calcconc;
   if platform = 'GC19' or platform = 'EI361' then platpair = 'E'; else platpair =  'W';
   if nd = 1 then value = -1; else value = calcconc;
   cards;
         2     GC19A       Triggerfish       A       Cadmium       0       0.006
         2     GC19A       Triggerfish       A       Cadmium       0       0.005
         2     GC19A       Triggerfish       B       Cadmium       1       0.001
         2     GC19A       Triggerfish       B       Cadmium       1       0.001
         2     GC19A       Triggerfish       C       Cadmium       1       0.001
         2     GC19A       Triggerfish       C       Cadmium       1       0.001
         2     EI361A      Triggerfish       A       Cadmium       0       0.005
         2     EI361A      Triggerfish       A       Cadmium       0       0.004
         2     EI361A      Triggerfish       B       Cadmium       1       0.001
         2     EI361A      Triggerfish       B       Cadmium       0       0.003
         2     EI361A      Triggerfish       C       Cadmium       1       0.001
         2     EI361A      Triggerfish       C       Cadmium       1       0.001
         3     GC19A       Triggerfish       A       Cadmium       0       0.012
         3     GC19A       Triggerfish       A       Cadmium       0       0.010
         3     GC19A       Triggerfish       B       Cadmium       0       0.009
         3     GC19A       Triggerfish       B       Cadmium       0       0.008
         3     GC19A       Triggerfish       C       Cadmium       0       0.009
         3     GC19A       Triggerfish       C       Cadmium       0       0.008
         3     EI361A      Triggerfish       A       Cadmium       0       0.003
         3     EI361A      Triggerfish       A       Cadmium       0       0.003
         3     EI361A      Triggerfish       B       Cadmium       0       0.003
         3     EI361A      Triggerfish       B       Cadmium       0       0.003
         3     EI361A      Triggerfish       C       Cadmium       0       0.002
         3     EI361A      Triggerfish       C       Cadmium       0       0.004;
proc sort;
   by cruise platform taxon parm compos;
proc summary data = metal nway;
   class cruise platform taxon parm compos;
   id platpair;
   var value;
   output out=metal1 max=maxvalue;
data metal2;
   set metal1;
   drop _type_ _freq_ ;
data metal3;
   merge metal metal2 (in=dummy);
   by cruise platform taxon parm compos;
data metal4;
   set metal3;
   if maxvalue < 0 then calvalue = -1;
   else calvalue = calcconc;
proc summary data = metal4 nway;
   class cruise platform taxon parm compos;
   id platpair;
   var calvalue;
   output out=metal5 mean=;
proc sort data=metal5;
   by platpair cruise taxon parm;
proc rank data = metal5 ties=mean out=metal6;
   by platpair cruise taxon parm;
   var calvalue;
   ranks rvalue;
proc summary data = metal6 nway;
   class taxon parm platform;
   var rvalue;
   output out=metal7 sum=friedman;
proc print data=metal7;
proc summary data = metal6 nway;
   class taxon parm cruise platform;
   var rvalue;
   output out=metal8 sum=mannwhit;
proc print data=metal8;
run;
quit;
```

Table A-10. Example of Friedman Test results for cadmium in gray triggerfish collected at GC19A (D) and EI361A (R) during Cruises 2 and 3.

Parameter	Taxon	Sum of Ranks		Test Statistic	Probability
		GC19A	EI361A		
Cadmium	Triggerfish	25	17	1.52	> 0.05

Table A-11. Example of Mann-Whitney Test results for cadmium in gray triggerfish collected at GC19A (D) and EI361A (R) during Cruises 2 and 3.

Cruise	Parameter	Taxon	Sum of Ranks		Test Statistic	Probability
			GC19A	EI361A		
2	Cadmium	Triggerfish	10	11	4	> 0.05
3	Cadmium	Triggerfish	15	6	9	< 0.05

Table A-12. Data for example Fisher's Exact Test. Data are BEHP concentrations in jewel box collected at GC19A (D) and EI361A (R) during Cruise 2.

Cruise	Platform	Taxon	Composite	Parameter	ND[a]	Concentration (µg/g dry weight)
2	GC19A (D)	Jewel box	A	BEHP	1	68
2	GC19A (D)	Jewel box	A	BEHP	1	68
2	GC19A (D)	Jewel box	B	BEHP	0	470
2	GC19A (D)	Jewel box	B	BEHP	1	68
2	GC19A (D)	Jewel box	C	BEHP	0	350
2	GC19A (D)	Jewel box	C	BEHP	0	900
2	EI361A (R)	Jewel box	A	BEHP	1	68
2	EI361A (R)	Jewel box	A	BEHP	1	68
2	EI361A (R)	Jewel box	B	BEHP	1	68
2	EI361A (R)	Jewel box	B	BEHP	1	68
2	EI361A (R)	Jewel box	C	BEHP	0	420
2	EI361A (R)	Jewel box	C	BEHP	0	1,900

[a] ND=1 if non-detected value; ND = 0 otherwise.

Table A-13. SAS program for Fisher's Exact Test.

```
data svoc;
  input cruise $ platform $ taxon $ compos $ parm $ nd calcconc;
  if platform = 'GC19' or platform = 'EI361' then platpair = 'E';
    else platpair =  'W';
  if nd = 1 then value = -1;
    else value = calcconc;
  cards;
          2       GC19       CHAMA      A      BEHP      1         68
          2       GC19       CHAMA      A      BEHP      1         68
          2       GC19       CHAMA      B      BEHP      0        470
          2       GC19       CHAMA      B      BEHP      1         68
          2       GC19       CHAMA      C      BEHP      0        350
          2       GC19       CHAMA      C      BEHP      0        900
          2       EI361      CHAMA      A      BEHP      1         68
          2       EI361      CHAMA      A      BEHP      1         68
          2       EI361      CHAMA      B      BEHP      1         68
          2       EI361      CHAMA      B      BEHP      1         68
          2       EI361      CHAMA      C      BEHP      0        420
          2       EI361      CHAMA      C      BEHP      0      1,900;
proc sort;
  by cruise platform taxon parm compos;
proc summary data = svoc;
  class cruise platform taxon parm compos;
  var value;
  id platpair;
  output out=svoc1 max=;
data svoc2;
  set svoc1;
  if _type_ = 31;
  drop _type_ _freq_;
  if value = -1 then fisher=1;
    else fisher = 0;
proc sort data = svoc2;
  by platpair cruise taxon parm;
proc freq data = svoc2;
  by platpair cruise taxon parm;
  tables platform*fisher / exact;
run;
quit;
```

Table A-14. SAS output for example Fisher's Exact Test.

```
                          The SAS System                 12:57 Tuesday, April 15, 1997   3

---------------------------------------- PLATPAIR=E CRUISE=2 TAXON=CHAMA PARM=BEHP ----------------------------------------

                          TABLE OF PLATFORM BY FISHER

                PLATFORM     FISHER

                Frequency|
                Percent  |
                Row Pct  |
                Col Pct  |      0|      1|  Total
                ---------+--------+--------+
                EI361    |      1 |      2 |      3
                         |  16.67 |  33.33 |  50.00
                         |  33.33 |  66.67 |
                         |  33.33 |  66.67 |
                ---------+--------+--------+
                GC19     |      2 |      1 |      3
                         |  33.33 |  16.67 |  50.00
                         |  66.67 |  33.33 |
                         |  66.67 |  33.33 |
                ---------+--------+--------+
                Total           3        3        6
                           50.00    50.00   100.00

              STATISTICS FOR TABLE OF PLATFORM BY FISHER

            Statistic                     DF     Value       Prob
            ------------------------------------------------------
            Chi-Square                     1     0.667      0.414
            Likelihood Ratio Chi-Square    1     0.680      0.410
            Continuity Adj. Chi-Square     1     0.000      1.000
            Mantel-Haenszel Chi-Square     1     0.556      0.456
            Fisher's Exact Test (Left)                      0.500
                       (Right)                              0.950
                       (2-Tail)                             1.000
            Phi Coefficient                     -0.333
            Contingency Coefficient              0.316
            Cramer's V                          -0.333

            Sample Size = 6
            WARNING: 100% of the cells have expected counts less
                     than 5. Chi-Square may not be a valid test.
```

Table A-15. Summary of the statistical results for volatile organic compound levels in tissues (dry weight).

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
Toluene	Jewel box	Friedman	No	GC19A-EI361A	2	MW	No
				GC19A-EI361A	3	MW	Yes (R>D)
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	Yes (R>D)
	Thorny oyster	Friedman	No	GC19A-EI361A	2	MW	No
				GC19A-EI361A	3	MW	No
	Thorny oyster	N/T	---	EB165A-HI356A	3	Fisher	No
	Yellow chub	N/T	---	GC19A-EI361A	3	Fisher	No
	Gray triggerfish	N/T	---	GC19A-EI361A	3	Fisher	No

D = Discharge.
Fisher = Fisher's Exact Test.
Friedman = Friedman Test.
MW = Mann-Whitney Test.
N/T = No test performed.
R = Reference.

Table A-16. Summary of the statistical results for semivolatile organic compound levels in tissues (dry weight).

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
Phenol	Jewel box	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	Yes (D>R)
2-Methylnaphthalene	Jewel box	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
1-Methylnaphthalene	Jewel box	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
2,6-Dimethylnaphthalene	Jewel box	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	No
2,3,5-Trimethylnaphthalene	Jewel box	N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
C_1-Naphthalenes	Jewel box	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
C_2-Naphthalenes	Jewel box	Friedman	No	GC19A-EI361A	2	MW	No
				GC19A-EI361A	3	MW	No
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	No
C_3-Naphthalenes	Jewel box	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	No

Table A-16. (Continued).

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
C_1-Fluorenes	Jewel box	Friedman	No	GC19A-EI361A	2	MW	No
				GC19A-EI361A	3	MW	No
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	No
1-Methylphenanthrene	Jewel box	N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
C_1-Phenanthrenes/anthracenes	Jewel box	N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
C_2-Phenanthrenes/anthracenes	Jewel box	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
C_2-Dibenzothiophenes	Jewel box	Friedman	No	GC19A-EI361A	2	MW	Yes (D>R)
				GC19A-EI361A	3	MW	No
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	No
C_3-Dibenzothiophenes	Jewel box	Friedman	Yes (D>R)	GC19A-EI361A	2	MW	Yes (D>R)
				GC19A-EI361A	3	MW	No
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	No
Bis(2-ethylhexyl)phthalate	Jewel box	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
Benzo[e]pyrene	Jewel box	Friedman	No	GC19A-EI361A	2	MW	No
				GC19A-EI361A	3	MW	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No

Table A-16. (Continued).

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
Benzo[a]pyrene	Jewel box	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
Perylene	Jewel box	Friedman	No	GC19A-EI361A	2	MW	Yes (D>R)
				GC19A-EI361A	3	MW	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
Phenol	Thorny oyster	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	Yes (D>R)	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	Yes (D>R)
2-Methylnapthalene	Thorny oyster	Friedman	No	GC19A-EI361A	2	MW	Yes (D>R)
				GC19A-EI361A	3	MW	Yes (R>D)
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	No
2,6-Dimethylnaphthalene	Thorny oyster	Friedman	No	GC19A-EI361A	2	MW	Yes (D>R)
				GC19A-EI361A	3	MW	Yes (R>D)
		Friedman	Yes (R>D)	EB165A-HI356A	2	MW	Yes (R>D)
				EB165A-HI356A	3	MW	No
2,3,5-Trimethylnaphthalene	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	Yes (D>R)
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
C_1-Naphthalenes	Thorny oyster	Friedman	No	GC19A-EI361A	2	MW	Yes (D>R)
				GC19A-EI361A	3	MW	Yes (R>D)
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No

Table A-16. (Continued).

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
C_2-Naphthalenes	Thorny oyster	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	No
C_3-Naphthalenes	Thorny oyster	Friedman	Yes (D>R)	GC19A-EI361A	2	MW	Yes (D>R)
				GC19A-EI361A	3	MW	No
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	No
C_4-Naphthalenes	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	Yes (D>R)
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	Yes (R>D)
Biphenyl	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	2	Fisher	No
C_1-Fluorenes	Thorny oyster	Friedman	No	GC19A-EI361A	2	MW	No
				GC19A-EI361A	3	MW	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
Anthracene	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		Friedman	Yes (D>R)	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	Yes (D>R)
Phenanthrene	Thorny oyster	N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
1-Methylphenanthrene	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No

Table A-16. (Continued).

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
C_1-Phenanthrenes/anthracenes	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	Yes(D>R)
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
C_2-Phenanthrenes/anthracenes	Thorny oyster	Friedman	Yes (D>R)	GC19A-EI361A	2	MW	Yes (D>R)
				GC19A-EI361A	3	MW	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
C_3-Phenanthrenes/anthracenes	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	Yes (D>R)
				GC19A-EI361A	3	Fisher	No
C_4-Phenanthrenes/anthracenes	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	Yes (D>R)
				GC19A-EI361A	3	Fisher	No
Dibenzothiophene	Thorny oyster	N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
C_1-Dibenzothiophenes	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	Yes (D>R)
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
C_2-Dibenzothiophenes	Thorny oyster	Friedman	Yes (D>R)	GC19A-EI361A	2	MW	Yes (D>R)
				GC19A-EI361A	3	MW	Yes (D>R)
		Friedman	No	EB165A-HI356A	2	MW	Yes (D>R)
				EB165A-HI356A	3	MW	No
C_3-Dibenzothiophenes	Thorny oyster	Friedman	Yes (D>R)	GC19A-EI361A	2	MW	Yes (D>R)
				GC19A-EI361A	3	MW	Yes (D>R)
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	No
C_1-Fluoranthenes/pyrenes	Thorny oyster	N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
C_2-Fluoranthenes/pyrenes	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	Yes (D>R)
				GC19A-EI361A	3	Fisher	No

Table A-16. (Continued).

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
C_1-Chrysenes	Thorny oyster	Friedman	Yes (D>R)	GC19A-EI361A	2	MW	Yes (D>R)
				GC19A-EI361A	3	MW	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
C_2-Chrysenes	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	Yes (D>R)
				GC19A-EI361A	3	Fisher	No
Bis(2-ethylhexyl)phthalate	Thorny oyster	Friedman	No	GC19A-EI361A	2	MW	No
				GC19A-EI361A	3	MW	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
Benzo[e]pyrene	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
Benzo[a]pyrene	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
Perylene	Thorny oyster	Friedman	Yes (D>R)	GC19A-EI361A	2	MW	Yes (D>R)
				GC19A-EI361A	3	MW	Yes (D>R)
Benzo[g,h,i]perylene	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	Yes (D>R)
				GC19A-EI361A	3	Fisher	No
Phenol	Yellow chub	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Bis(2-ethylhexyl)phthalate	Yellow chub	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No

Table A-16. (Continued).

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
2-Methylnaphthalene	Yellow chub	AOV	Yes (R>D)	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	Yes (D>R)	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
1-Methylnaphthalene	Yellow chub	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
C_1-Naphthalenes	Yellow chub	AOV	Yes (R>D)	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
C_2-Naphthalenes	Yellow chub	Friedman	Yes (R>D)	GC19A-EI361A	2	MW	Yes (R>D)
				GC19A-EI361A	3	MW	Yes(R>D)
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
Biphenyl	Yellow chub	N/T	---	GC19A-EI361A	2	Fisher	Yes (R>D)
				GC19A-EI361A	3	Fisher	No
C_1-Fluorenes	Yellow chub	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
Phenanthrene	Yellow chub	N/T	---	GC19A-EI361A	2	Fisher	Yes (D>R)
				GC19A-EI361A	3	Fisher	No
Phenol	Creole-fish	Friedman	No	GC19A-EI361A	2	MW	No
				GC19A-EI361A	3	MW	No
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	Yes (R>D)
Bis(2-ethylhexyl)phthalate	Creole-fish	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No

Table A-16. (Continued).

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
2-Methylnaphthalene	Creole-fish	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
C_1-Naphthalenes	Creole-fish	Friedman	No	GC19A-EI361A	2	MW	No
				GC19A-EI361A	3	MW	No
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	No
C_1-Fluorenes	Creole-fish	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
Phenol	Rockhind	N/T	---	EB165A-HI356A	2	AOV	No
Bis(2-ethylhexyl)phthalate	Rockhind	N/T	---	EB165A-HI356A	2	Fisher	No
2-Methylnaphthalene	Rockhind	N/T	---	EB165A-HI356A	2	MW	No
C_1-Naphthalenes	Rockhind	N/T	---	EB165A-HI356A	2	MW	No
Biphenyl	Rockhind	N/T	---	EB165A-HI356A	2	Fisher	No
C_1-Fluorenes	Rockhind	N/T	---	EB165A-HI356A	2	Fisher	No
Phenol	Sergeant Major	N/T	---	EB165A-HI356A	3	AOV	No
Bis(2-ethylhexyl)phthalate	Sergeant Major	N/T	---	EB165A-HI356A	3	Fisher	No
2-Methylnaphthalene	Sergeant Major	N/T	---	EB165A-HI356A	3	AOV	No
1-Methylnaphthalene	Sergeant Major	N/T	---	EB165A-HI356A	3	Fisher	No
C_1-Naphthalenes	Sergeant Major	N/T	---	EB165A-HI356A	3	AOV	No
Phenol	Gray triggerfish	AOV	Yes (D>R)	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	Yes (D>R)
Bis(2-ethylhexyl)phthalate	Gray triggerfish	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
2-Methylnaphthalene	Gray triggerfish	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
C_1-Naphthalenes	Gray triggerfish	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No

Table A-16. (Continued).

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
C_1-Fluorenes	Gray triggerfish	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No

AOV = Analysis of variance.
Contrast = Contrast comparison performed after AOV.
D = Discharge.
Fisher = Fisher's Exact Test.
Friedman = Friedman Test.
MW = Mann-Whitney Test.
N/T = No test performed.
R = Reference.

Table A-17. Summary of the statistical analysis results for trace metal levels in tissues (dry weight).

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
Arsenic	Jewel box	AOV	Yes (R>D)	GC19A-EI361A	2	Contrast	Yes (R>D)
				GC19A-EI361A	3	Contrast	Yes (R>D)
		AOV	Yes (R>D)	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Barium	Jewel box	AOV	Yes (D>R)	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	Yes (R>D)	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Cadmium	Jewel box	AOV	Yes (R>D)	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	Yes (R>D)
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Mercury	Jewel box	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Arsenic	Yellow chub	AOV	Yes (D>R)	GC19A-EI361A	2	Contrast	Yes (D>R)
				GC19A-EI361A	3	Contrast	Yes (D>R)
		AOV	Yes (D>R)	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Barium	Yellow chub	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Cadmium	Yellow chub	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No

Table A-17. (Continued)

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
Mercury	Yellow chub	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Arsenic	Creole-fish	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Barium	Creole-fish	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Cadmium	Creole-fish	AOV	Yes (D>R)	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Mercury	Creole-fish	AOV	Yes (D>R)	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Arsenic	Rockhind	N/T	---	EB165A-HI356A	2	AOV	Yes (D>R)
Barium	Rockhind	N/T	---	EB165A-HI356A	2	AOV	No
Cadmium	Rockhind	N/T	---	EB165A-HI356A	2	MW	No
Mercury	Rockhind	N/T	---	EB165A-HI356A	2	AOV	Yes (R>D)
Arsenic	Sergeant major	N/T	---	EB165A-HI356A	3	AOV	Yes (R>D)
Barium	Sergeant major	N/T	---	EB165A-HI356A	3	AOV	Yes (R>D)
Cadmium	Sergeant major	N/T	---	EB165A-HI356A	3	AOV	Yes (D>R)
Mercury	Sergeant major	N/T	---	EB165A-HI356A	3	AOV	Yes (D>R)

Table A-17. (Continued)

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
Arsenic	Thorny oyster	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	Yes (D>R)	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Barium	Thorny oyster	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	Yes (R>D)	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Cadmium	Thorny oyster	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	Yes (D>R)	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Mercury	Thorny oyster	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
Arsenic	Gray triggerfish	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
Barium	Gray triggerfish	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
Cadmium	Gray triggerfish	Friedman	No	GC19A-EI361A	2	MW	No
				GC19A-EI361A	3	MW	Yes (D>R)
Mercury	Gray triggerfish	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No

AOV = Analysis of variance.
Contrast = Contrast comparison performed after AOV.
D = Discharge.
Friedman = Friedman Test.
MW = Mann-Whitney Test.
N/T = No test performed.
R = Reference.

Table A-18. Summary of the statistical results for radionuclide levels in tissue samples (pCi/g dry weight).

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
^{226}Ra	Jewel box	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
^{228}Ra	Jewel box	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	Yes (D>R)
				EB165A-HI356A	3	Fisher	No
^{226}Ra	Yellow chub	Friedman	No	GC19A-EI361A	2	MW	No
				GC19A-EI361A	3	MW	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
^{228}Ra	Yellow chub	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
^{226}Ra	Creole-fish	Friedman	No	GC19A-EI361A	2	MW	No
				GC19A-EI361A	3	MW	No
		Friedman	No	EB165A-HI356A	2	MW	No
				EB165A-HI356A	3	MW	No
^{228}Ra	Creole-fish	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
^{226}Ra	Rockhind	N/T	---	EB165A-HI356A	2	MN	No
^{228}Ra	Rockhind	N/T	---	EB165A-HI356A	2	Fisher	No
^{226}Ra	Sergeant major	N/T	---	EB165A-HI356A	3	MN	No
^{228}Ra	Sergeant major	N/T	---	EB165A-HI356A	3	Fisher	No

Table A-18. (Continued)

Analyte	Taxon	Discharging and Reference Platforms Different Irrespective of Cruise?		Platform Pair	Cruise	Discharging and Reference Platforms Different During Individual Surveys?	
		Test	Significant?			Test	Significant?
^{226}Ra	Thorny oyster	AOV	No	GC19A-EI361A	2	Contrast	No
				GC19A-EI361A	3	Contrast	No
		AOV	No	EB165A-HI356A	2	Contrast	No
				EB165A-HI356A	3	Contrast	No
^{228}Ra	Thorny oyster	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No
		N/T	---	EB165A-HI356A	2	Fisher	No
				EB165A-HI356A	3	Fisher	No
^{226}Ra	Gray triggerfish	Friedman	No	GC19A-EI361A	2	MW	No
				GC19A-EI361A	3	MW	No
^{228}Ra	Gray triggerfish	N/T	---	GC19A-EI361A	2	Fisher	No
				GC19A-EI361A	3	Fisher	No

AOV = Analysis of variance.
Contrast = Contrast comparison performed after AOV.
D = Discharge.
Fisher = Fisher's Exact Test.
Friedman = Friedman Test.
MW = Mann-Whitney Test.
N/T = No test performed.
R = Reference.

Table A-19. Summary of analysis of variance results.

Analyte	Platform Pair	Taxon	Degrees of Freedom (Platform/Error)	F-value	Probability*	Platform Difference
2-Methylnaphthalene	GC19A-EI361A	Jewel box	1/9	1.04	0.33	
2-Methylnaphthalene	EB165A-HI356A	Jewel box	1/9	2.57	0.12	
2-Methylnaphthalene	GC19A-EI361A	Yellow chub	1/9	7.26	0.02	R>D
2-Methylnaphthalene	EB165A-HI356A	Yellow chub	1/9	7.45	0.02	D>R
2-Methylnaphthalene	GC19A-EI361A	Creole-fish	1/9	0.00	0.97	
2-Methylnaphthalene	EB165A-HI356A	Sergeant major	1/4	2.41	0.20	
C_1-Naphthalenes	GC19A-EI361A	Jewel box	1/9	6.07	0.80	
C_1-Naphthalenes	EB165A-HI356A	Jewel box	1/9	1.13	0.31	
C_1-Naphthalenes	GC19A-EI361A	Yellow chub	1/9	8.66	0.02	R>D
C_1-Naphthalenes	EB165A-HI356A	Yellow chub	1/9	1.62	0.24	
C_1-Naphthalenes	EB165A-HI356A	Sergeant major	1/4	2.69	0.18	
Phenol	GC19A-EI361A	Jewel box	1/9	1.13	0.32	
Phenol	GC19A-EI361A	Yellow chub	1/9	1.86	0.21	
Phenol	EB165A-HI356A	Yellow chub	1/9	0.03	0.86	
Phenol	EB165A-HI356A	Rockhind	1/4	0.06	0.81	
Phenol	EB165A-HI356A	Sergeant major	1/4	0.57	0.49	
Phenol	GC19A-EI361A	Thorny oyster	1/9	4.75	0.07	
Phenol	EB165A-HI356A	Thorny oyster	1/9	10.12	0.01	D>R
Phenol	GC19A-EI361A	Gray triggerfish	1/9	19.41	0.002	D>R
Arsenic	GC19A-EI361A	Jewel box	1/9	42	0.0001	R>D
Arsenic	EB165A-HI356A	Jewel box	1/9	6.85	0.028	R>D
Arsenic	GC19A-EI361A	Yellow chub	1/9	53	0.0001	D>R
Arsenic	EB165A-HI356A	Yellow chub	1/9	11.41	0.0082	D>R
Arsenic	GC19A-EI361A	Creole-fish	1/9	0.20	0.67	
Arsenic	EB165A-HI356A	Creole-fish	1/9	0.19	0.68	
Arsenic	EB165A-HI356A	Rockhind	1/4	169	0.0002	D>R
Arsenic	EB165A-HI356A	Sergeant major	1/4	16.69	0.015	R>D
Arsenic	GC19A-EI361A	Thorny oyster	1/9	0.83	0.39	
Arsenic	EB165A-HI356A	Thorny oyster	1/9	6.44	0.032	D>R
Arsenic	GC19A-EI361A	Gray triggerfish	1/9	1.27	0.29	
Barium	GC19A-EI361A	Jewel box	1/9	8.11	0.019	D>R

Table A-19. (Continued)

Analyte	Platform Pair	Taxon	Degrees of Freedom (Platform/Error)	F-value	Probability*	Platform Difference
Barium	EB165A-HI356A	Jewel box	1/9	5.74	0.040	R>D
Barium	GC19A-EI361A	Yellow chub	1/9	0.02	0.89	
Barium	EB165A-HI356A	Yellow chub	1/9	1.23	0.30	
Barium	GC19A-EI361A	Creole-fish	1/9	0.53	0.49	
Barium	EB165A-HI356A	Creole-fish	1/9	3.55	0.092	
Barium	EB165A-HI356A	Rockhind	1/4	0.22	0.66	
Barium	EB165A-HI356A	Sergeant major	1/4	8.19	0.046	R>D
Barium	GC19A-EI361A	Thorny oyster	1/9	0.06	0.81	
Barium	EB165A-HI356A	Thorny oyster	1/9	10.56	0.01	R>D
Barium	GC19A-EI361A	Gray triggerfish	1/9	1.40	0.27	
Cadmium	GC19A-EI361A	Jewel box	1/9	43.36	0.0001	R>D
Cadmium	EB165A-HI356A	Jewel box	1/9	3.91	0.079	
Cadmium	GC19A-EI361A	Yellow chub	1/9	0.25	0.63	
Cadmium	EB165A-HI356A	Yellow chub	1/9	0.74	0.41	
Cadmium	GC19A-EI361A	Creole-fish	1/9	14.03	0.0046	D>R
Cadmium	EB165A-HI356A	Creole-fish	1/9	1.02	0.34	
Cadmium	EB165A-HI356A	Sergeant major	1/4	13.56	0.021	D>R
Cadmium	GC19A-EI361A	Thorny oyster	1/9	3.17	0.11	
Cadmium	EB165A-HI356A	Thorny oyster	1/9	12.94	0.0058	D>R
Mercury	GC19A-EI361A	Jewel box	1/9	4.30	0.068	
Mercury	EB165A-HI356A	Jewel box	1/9	0.04	0.85	
Mercury	GC19A-EI361A	Yellow chub	1/9	3.73	0.086	
Mercury	EB165A-HI356A	Yellow chub	1/9	0.06	0.82	
Mercury	GC19A-EI361A	Creole-fish	1/9	11.70	0.0076	D>R
Mercury	EB165A-HI356A	Creole-fish	1/9	1.05	0.33	
Mercury	EB165A-HI356A	Rockhind	1/4	7.80	0.049	R>D
Mercury	EB165A-HI356A	Sergeant major	1/4	25.41	0.0073	D>R
Mercury	GC19A-EI361A	Thorny oyster	1/9	3.48	0.095	
Mercury	EB165A-HI356A	Thorny oyster	1/9	1.54	0.25	
Mercury	GC19A-EI361A	Gray triggerfish	1/9	1.22	0.30	
^{226}Ra	GC19A-EI361A	Jewel box	1/9	0.85	0.38	
^{226}Ra	EB165A-HI356A	Jewel box	1/9	0.08	0.78	

Table A-19. (Continued)

Analyte	Platform Pair	Taxon	Degrees of Freedom (Platform/Error)	F-value	Probability*	Platform Difference
^{226}Ra	GC19A-EI361A	Thorny oyster	1/9	0.00	0.95	
^{226}Ra	EB165A-HI356A	Thorny oyster	1/9	1.12	0.32	

* Probability of an F-value greater than the F-value tabulated. Probability <0.05 indicated that there was a statistically significantly difference between the two platforms.
D = Discharge.
R = Reference.

Table A-20. Summary of the results for testing contrasts between platforms within the individual definitive cruises.

Analyte	Cruise	Platform Pair	Taxon	F-value	Probability	Platform Difference
2-Methylnaphthalene	2	GC19A - EI361A	Jewel box	0.07	0.80	
2-Methylnaphthalene	3	GC19A - EI361A	Jewel box	0.56	0.47	
2-Methylnaphthalene	2	EB165A - HI356A	Jewel box	3.12	0.11	
2-Methylnaphthalene	3	EB165A - HI356A	Jewel box	0.002	0.96	
2-Methylnaphthalene	2	GC19A - EI361A	Yellow chub	0.53	0.48	
2-Methylnaphthalene	3	GC19A - EI361A	Yellow chub	3.85	0.08	
2-Methylnaphthalene	2	EB165A - HI356A	Yellow chub	1.46	0.26	
2-Methylnaphthalene	3	EB165A - HI356A	Yellow chub	2.31	0.16	
2-Methylnaphthalene	2	GC19A - EI361A	Creole-fish	0.58	0.47	
2-Methylnaphthalene	3	GC19A - EI361A	Creole-fish	0.53	0.49	
C_1-Naphthalenes	2	GC19A - EI361A	Jewel box	0.24	0.64	
C_1-Naphthalenes	3	GC19A - EI361A	Jewel box	0.57	0.47	
C_1-Naphthalenes	2	EB165A - HI356A	Jewel box	1.74	0.22	
C_1-Naphthalenes	3	EB165A - HI356A	Jewel box	0.06	0.81	
C_1-Naphthalenes	2	GC19A - EI361A	Yellow chub	0.95	0.36	
C_1-Naphthalenes	3	GC19A - EI361A	Yellow chub	3.87	0.08	
C_1-Naphthalenes	2	EB165A - HI356A	Yellow chub	0.50	0.50	
C_1-Naphthalenes	3	EB165A - HI356A	Yellow chub	0.32	0.59	
Phenol	2	GC19A - EI361A	Jewel box	0.13	0.73	
Phenol	3	GC19A - EI361A	Jewel box	2.01	0.19	
Phenol	2	GC19A - EI361A	Yellow chub	1.15	0.31	
Phenol	3	GC19A - EI361A	Yellow chub	0.09	0.77	
Phenol	2	EB165A - HI356A	Yellow chub	0.63	0.45	
Phenol	3	EB165A - HI356A	Yellow chub	0.95	0.36	
Phenol	2	GC19A - EI361A	Thorny oyster	0.76	0.41	
Phenol	3	GC19A - EI361A	Thorny oyster	1.71	0.22	
Phenol	2	EB165A - HI356A	Thorny oyster	0.13	0.73	
Phenol	3	EB165A - HI356A	Thorny oyster	7.99	0.02	D>R
Phenol	2	GC19A - EI361A	Gray triggerfish	2.90	0.12	
Phenol	3	GC19A - EI361A	Gray triggerfish	7.30	0.02	D>R
Arsenic	2	GC19A - EI361A	Jewel box	5.26	0.05	R>D
Arsenic	3	GC19A - EI361A	Jewel box	17.66	0.002	R>D

Table A-20. (Continued)

Analyte	Cruise	Platform Pair	Taxon	F-value	Probability	Platform Difference
Arsenic	2	EB165A - HI356A	Jewel box	4.67	0.06	
Arsenic	3	EB165A - HI356A	Jewel box	0.21	0.66	
Arsenic	2	GC19A - EI361A	Yellow chub	14.87	0.004	D>R
Arsenic	3	GC19A - EI361A	Yellow chub	11.90	0.007	D>R
Arsenic	2	EB165A - HI356A	Yellow chub	4.45	0.06	
Arsenic	3	EB165A - HI356A	Yellow chub	1.62	0.23	
Arsenic	2	GC19A - EI361A	Creole-fish	0.30	0.59	
Arsenic	3	GC19A - EI361A	Creole-fish	0.98	0.35	
Arsenic	2	EB165A - HI356A	Creole-fish	1.87	0.20	
Arsenic	3	EB165A - HI356A	Creole-fish	0.88	0.37	
Arsenic	2	GC19A - EI361A	Thorny oyster	1.17	0.31	
Arsenic	3	GC19A - EI361A	Thorny oyster	0.03	0.87	
Arsenic	2	EB165A - HI356A	Thorny oyster	0.27	0.62	
Arsenic	3	EB165A - HI356A	Thorny oyster	4.06	0.07	
Arsenic	2	GC19A - EI361A	Gray triggerfish	1.04	0.33	
Arsenic	3	GC19A - EI361A	Gray triggerfish	0.01	0.92	
Barium	2	GC19A - EI361A	Jewel box	0.35	0.57	
Barium	3	GC19A - EI361A	Jewel box	5.10	0.05	
Barium	2	EB165A - HI356A	Jewel box	1.14	0.31	
Barium	3	EB165A - HI356A	Jewel box	1.76	0.22	
Barium	2	GC19A - EI361A	Yellow chub	0.00	0.97	
Barium	3	GC19A - EI361A	Yellow chub	0.03	0.96	
Barium	2	EB165A - HI356A	Yellow chub	1.02	0.34	
Barium	3	EB165A - HI356A	Yellow chub	0.01	0.92	
Barium	2	GC19A - EI361A	Creole-fish	1.18	0.31	
Barium	3	GC19A - EI361A	Creole-fish	0.13	0.73	
Barium	2	EB165A - HI356A	Creole-fish	3.29	0.10	
Barium	3	EB165A - HI356A	Creole-fish	0.00	0.95	
Barium	2	GC19A - EI361A	Thorny oyster	0.13	0.73	
Barium	3	GC19A - EI361A	Thorny oyster	0.01	0.92	
Barium	2	EB165A - HI356A	Thorny oyster	3.99	0.08	
Barium	3	EB165A - HI356A	Thorny oyster	1.57	0.24	
Barium	2	GC19A - EI361A	Gray triggerfish	2.04	0.19	

Table A-20. (Continued)

Analyte	Cruise	Platform Pair	Taxon	F-value	Probability	Platform Difference
Barium	3	GC19A - EI361A	Gray triggerfish	0.06	0.81	
Cadmium	2	GC19A - EI361A	Jewel box	4.78	0.06	
Cadmium	3	GC19A - EI361A	Jewel box	19.35	0.002	R>D
Cadmium	2	EB165A - HI356A	Jewel box	1.93	0.20	
Cadmium	3	EB165A - HI356A	Jewel box	0.34	0.57	
Cadmium	2	GC19A - EI361A	Yellow chub	2.25	0.17	
Cadmium	3	GC19A - EI361A	Yellow chub	1.10	0.31	
Cadmium	2	EB165A - HI356A	Yellow chub	1.70	0.22	
Cadmium	3	EB165A - HI356A	Yellow chub	0.21	0.66	
Cadmium	2	GC19A - EI361A	Creole-fish	3.13	0.11	
Cadmium	3	GC19A - EI361A	Creole-fish	4.03	0.08	
Cadmium	2	EB165A - HI356A	Creole-fish	1.04	0.33	
Cadmium	3	EB165A - HI356A	Creole-fish	0.00	0.99	
Cadmium	2	GC19A - EI361A	Thorny oyster	0.00	0.97	
Cadmium	3	GC19A - EI361A	Thorny oyster	3.04	0.12	
Cadmium	2	EB165A - HI356A	Thorny oyster	2.25	0.17	
Cadmium	3	EB165A - HI356A	Thorny oyster	4.39	0.07	
Mercury	2	GC19A - EI361A	Jewel box	0.70	0.42	
Mercury	3	GC19A - EI361A	Jewel box	1.53	0.25	
Mercury	2	EB165A - HI356A	Jewel box	0.59	0.46	
Mercury	3	EB165A - HI356A	Jewel box	0.32	0.59	
Mercury	2	GC19A - EI361A	Yellow chub	0.00	0.99	
Mercury	3	GC19A - EI361A	Yellow chub	3.75	0.08	
Mercury	2	EB165A - HI356A	Yellow chub	0.34	0.57	
Mercury	3	EB165A - HI356A	Yellow chub	0.68	0.43	
Mercury	2	GC19A - EI361A	Creole-fish	4.73	0.06	
Mercury	3	GC19A - EI361A	Creole-fish	1.55	0.24	
Mercury	2	EB165A - HI356A	Creole-fish	0.12	0.74	
Mercury	3	EB165A - HI356A	Creole-fish	0.47	0.51	
Mercury	2	GC19A - EI361A	Thorny oyster	2.46	0.15	
Mercury	3	GC19A - EI361A	Thorny oyster	0.09	0.77	
Mercury	2	EB165A - HI356A	Thorny oyster	0.78	0.40	
Mercury	3	EB165A - HI356A	Thorny oyster	0.13	0.73	

Table A-20. (Continued)

Analyte	Cruise	Platform Pair	Taxon	F-value	Probability	Platform Difference
Mercury	2	GC19A - EI361A	Gray triggerfish	0.75	0.41	
Mercury	3	GC19A - EI361A	Gray triggerfish	3.88	0.08	
^{226}Ra	2	GC19A - EI361A	Jewel box	0.76	0.41	
^{226}Ra	3	GC19A - EI361A	Jewel box	0.003	0.96	
^{226}Ra	2	EB165A - HI356A	Jewel box	0.21	0.66	
^{226}Ra	3	EB165A - HI356A	Jewel box	0.03	0.86	
^{226}Ra	2	GC19A - EI361A	Thorny oyster	0.01	0.91	
^{226}Ra	3	GC19A - EI361A	Thorny oyster	0.000	0.98	
^{226}Ra	2	EB165A - HI356A	Thorny oyster	2.36	0.16	
^{226}Ra	3	EB165A - HI356A	Thorny oyster	0.23	0.64	

D = Discharge.
R = Reference.

Table A-21. Summary of the results for Friedman Tests between platforms.

Parameter	Platform Pair	Taxon	Test Statistic	Platform Difference
Toluene	GC19A - EI361A	Jewel box	1.9	
Toluene	EB165A - HI356A	Jewel box	1.9	
Toluene	GC19A - EI361A	Thorny oyster	0.02	
2,6-Dimethylnaphthalene	EB165A - HI356A	Jewel box	0.10	
Benzo[e]pyrene	GC19A - EI361A	Jewel box	0.86	
C_1-Fluorenes	GC19A - EI361A	Jewel box	0.60	
C_1-Fluorenes	EB165A - HI356A	Jewel box	1.5	
C_2-Dibenzothiophenes	GC19A - EI361A	Jewel box	2.9	
C_2-Dibenzothiophenes	EB165A - HI356A	Jewel box	0.21	
C_2-Naphthalenes	GC19A - EI361A	Jewel box	1.5	
C_2-Naphthalenes	EB165A - HI356A	Jewel box	0.21	
C_3-Dibenzothiophenes	GC19A - EI361A	Jewel box	4.0	D>R
C_3-Dibenzothiophenes	EB165A - HI356A	Jewel box	0.10	
C_3-Naphthalenes	EB165A - HI356A	Jewel box	0.10	
Perylene	GC19A - EI361A	Jewel box	1.5	
Phenol	EB165A - HI356A	Jewel box	0.38	
C_2-Naphthalenes	GC19A - EI361A	Yellow chub	7.7	R>D
C_1-Naphthalenes	GC19A - EI361A	Creole-fish	0.02	
C_1-Naphthalenes	EB165A - HI356A	Creole-fish	1.5	
Phenol	GC19A - EI361A	Creole-fish	0.10	
Phenol	EB165A - HI356A	Creole-fish	2.9	
2,6-Dimethylnaphthalene	GC19A - EI361A	Thorny oyster	0.00	
2,6-Dimethylnaphthalene	EB165A - HI356A	Thorny oyster	4.7	R>D
2-Methylnaphthalene	GC19A - EI361A	Thorny oyster	0.86	
2-Methylnaphthalene	EB165A - HI356A	Thorny oyster	0.00	
Bis(2ethylhexyl)phthalate	GC19A - EI361A	Thorny oyster	0.86	
Anthracene	EB165A - HI356A	Thorny oyster	5.4	D>R
C_1-Chrysenes	GC19A - EI361A	Thorny oyster	4.7	D>R
C_1-Fluorenes	GC19A - EI361A	Thorny oyster	0.21	
C_1-Naphthalenes	GC19A - EI361A	Thorny oyster	0.00	
C_2-Dibenzothiophenes	GC19A - EI361A	Thorny oyster	7.7	D>R
C_2-Dibenzothiophenes	EB165A - HI356A	Thorny oyster	0.38	
C_2-Naphthalenes	GC19A - EI361A	Thorny oyster	0.10	
C_2-Naphthalenes	EB165A - HI356A	Thorny oyster	0.21	
C_2-Phenanthrenes/anthracenes	GC19A - EI361A	Thorny oyster	4.7	D>R
C_3-Dibenzothiophenes	GC19A - EI361A	Thorny oyster	7.7	D>R
C_3-Dibenzothiophenes	EB165A - HI356A	Thorny oyster	0.38	
C_3-Naphthalenes	GC19A - EI361A	Thorny oyster	4.7	D>R
C_3-Naphthalenes	EB165A - HI356A	Thorny oyster	0.60	
Perylene	GC19A - EI361A	Thorny oyster	7.7	D>R
Cadmium	GC19A - EI361A	Gray triggerfish	1.5	
^{226}Ra	GC19A - EI361A	Yellow chub	0.02	
^{226}Ra	GC19A - EI361A	Creole-fish	0.60	
^{226}Ra	EB165A - HI356A	Creole-fish	0.10	
^{226}Ra	GC19A - EI361A	Gray triggerfish	0.38	

Table A-22. Summary of the results for Mann-Whitney tests between platforms within the individual definitive cruises.

Analyte	Cruise	Platform	Taxon	Test Statistic	Platform Difference
Toluene	2	GC19A - EI361A	Jewel box	4.5	
Toluene	3	GC19A - EI361A	Jewel box	0	R>D
Toluene	2	EB165A - HI356A	Jewel box	4.5	
Toluene	3	EB165A - HI356A	Jewel box	0	R>D
Toluene	2	GC19A - EI361A	Thorny oyster	4.5	
Toluene	3	GC19A - EI361A	Thorny oyster	4	
2-Methylnaphthalene	2	EB165A - HI356A	Rockhind	2.5	
C_1-Naphthalenes	2	EB165A - HI356A	Rockhind	2.5	
2,6-Dimethylnaphthalene	2	EB165A - HI356A	Jewel box	6	
2,6-Dimethylnaphthalene	3	EB165A - HI356A	Jewel box	4	
Benzo[e]pyrene	2	GC19A - EI361A	Jewel box	6	
Benzo[e]pyrene	3	GC19A - EI361A	Jewel box	6	
C_1-Fluorenes	2	GC19A - EI361A	Jewel box	3.5	
C_1-Fluorenes	3	GC19A - EI361A	Jewel box	3	
C_1-Fluorenes	2	EB165A - HI356A	Jewel box	2	
C_1-Fluorenes	3	EB165A - HI356A	Jewel box	3	
C_2-Dibenzothiophenes	2	GC19A - EI361A	Jewel box	9	D>R
C_2-Dibenzothiophenes	3	GC19A - EI361A	Jewel box	5.5	
C_2-Dibenzothiophenes	2	EB165A - HI356A	Jewel box	6	
C_2-Dibenzothiophenes	3	EB165A - HI356A	Jewel box	4.5	
C_2-Naphthalenes	2	GC19A - EI361A	Jewel box	5	
C_2-Naphthalenes	3	GC19A - EI361A	Jewel box	8	
C_2-Naphthalenes	2	EB165A - HI356A	Jewel box	5.5	
C_2-Naphthalenes	3	EB165A - HI356A	Jewel box	2	
C_3-Dibenzothiophenes	2	GC19A - EI361A	Jewel box	9	D>R
C_3-Dibenzothiophenes	3	GC19A - EI361A	Jewel box	6.5	
C_3-Dibenzothiophenes	2	EB165A - HI356A	Jewel box	7	
C_3-Dibenzothiophenes	3	EB165A - HI356A	Jewel box	3	
C_3-Naphthalenes	2	EB165A - HI356A	Jewel box	4	
C_3-Naphthalenes	3	EB165A - HI356A	Jewel box	4	
Perylene	2	GC19A - EI361A	Jewel box	8.5	D>R
Perylene	3	GC19A - EI361A	Jewel box	4.5	
Phenol	2	EB165A - HI356A	Jewel box	2	
Phenol	3	EB165A - HI356A	Jewel box	9	D>R
C_2-Naphthalenes	2	GC19A - EI361A	Yellow chub	0	R>D
C_2-Naphthalenes	3	GC19A - EI361A	Yellow chub	0	R>D
C_1-Naphthalenes	2	GC19A - EI361A	Creole-fish	7.5	
C_1-Naphthalenes	3	GC19A - EI361A	Creole-fish	2	
C_1-Naphthalenes	2	EB165A - HI356A	Creole-fish	6	
C_1-Naphthalenes	3	EB165A - HI356A	Creole-fish	7	
Phenol	2	GC19A - EI361A	Creole-fish	7	
Phenol	3	GC19A - EI361A	Creole-fish	1	
Phenol	2	EB165A - HI356A	Creole-fish	3.5	
Phenol	3	EB165A - HI356A	Creole-fish	0	R>D

Table A-22. (Continued)

Analyte	Cruise	Platform	Taxon	Test Statistic	Platform Difference
2,6-Dimethylnaphthalene	2	GC19A - EI361A	Thorny oyster	9	D>R
2,6-Dimethylnaphthalene	3	GC19A - EI361A	Thorny oyster	0	R>D
2,6-Dimethylnaphthalene	2	EB165A - HI356A	Thorny oyster	0	R>D
2,6-Dimethylnaphthalene	3	EB165A - HI356A	Thorny oyster	2	
2-Methylnaphthalene	2	GC19A - EI361A	Thorny oyster	6	
2-Methylnaphthalene	3	GC19A - EI361A	Thorny oyster	0	R>D
2-Methylnaphthalene	2	EB165A - HI356A	Thorny oyster	5	
2-Methylnaphthalene	3	EB165A - HI356A	Thorny oyster	4	
Bis(ethylhexyl)phthalate	2	GC19A - EI361A	Thorny oyster	3	
Bis(ethylhexyl)phthalate	3	GC19A - EI361A	Thorny oyster	3	
Anthracene	2	EB165A - HI356A	Thorny oyster	7.5	
Anthracene	3	EB165A - HI356A	Thorny oyster	9	D>R
C_1-Chrysenes	2	GC19A - EI361A	Thorny oyster	9	D>R
C_1-Chrysenes	3	GC19A - EI361A	Thorny oyster	7	
C_1-Fluorenes	2	GC19A - EI361A	Thorny oyster	6	
C_1-Fluorenes	3	GC19A - EI361A	Thorny oyster	4.5	
C_1-Naphthalenes	2	GC19A - EI361A	Thorny oyster	9	D>R
C_1-Naphthalenes	3	GC19A - EI361A	Thorny oyster	0	R>D
C_2-Dibenzothiophenes	2	GC19A - EI361A	Thorny oyster	9	D>R
C_2-Dibenzothiophenes	3	GC19A - EI361A	Thorny oyster	9	D>R
C_2-Dibenzothiophenes	2	EB165A - HI356A	Thorny oyster	9	D>R
C_2-Dibenzothiophenes	3	EB165A - HI356A	Thorny oyster	2	
C_2-Naphthalenes	2	GC19A - EI361A	Thorny oyster	9	D>R
C_2-Naphthalenes	3	GC19A - EI361A	Thorny oyster	1	
C_2-Naphthalenes	2	EB165A - HI356A	Thorny oyster	4.5	
C_2-Naphthalenes	3	EB165A - HI356A	Thorny oyster	3	
C_2-Phenanthrenes/anthracenes	2	GC19A - EI361A	Thorny oyster	9	D>R
C_2-Phenanthrenes/anthracenes	3	GC19A - EI361A	Thorny oyster	7	
C_3-Dibenzothiophenes	2	GC19A - EI361A	Thorny oyster	9	D>R
C_3-Dibenzothiophenes	3	GC19A - EI361A	Thorny oyster	9	D>R
C_3-Dibenzothiophenes	2	EB165A - HI356A	Thorny oyster	8	
C_3-Dibenzothiophenes	3	EB165A - HI356A	Thorny oyster	3	
C_3-Naphthalenes	2	GC19A - EI361A	Thorny oyster	9	D>R
C_3-Naphthalenes	3	GC19A - EI361A	Thorny oyster	7	
C_3-Naphthalenes	2	EB165A - HI356A	Thorny oyster	4.5	
C_3-Naphthalenes	3	EB165A - HI356A	Thorny oyster	2	
Perylene	2	GC19A - EI361A	Thorny oyster	9	D>R
Perylene	3	GC19A - EI361A	Thorny oyster	9	D>R
Cadmium	2	EB165A - HI356A	Rockhind	5	
Cadmium	2	GC19A - EI361A	Gray triggerfish	4	
Cadmium	3	GC19A - EI361A	Gray triggerfish	9	D>R
^{226}Ra	2	EB165A - HI356A	Rockhind	9	
^{228}Ra	2	EB165A - HI356A	Rockhind	5	
^{226}Ra	3	EB165A - HI356A	Sergeant major	7	
^{228}Ra	3	EB165A - HI356A	Sergeant major	5	
^{226}Ra	2	GC19A - EI361A	Yellow chub	5.5	

Table A-22. (Continued)

Analyte	Cruise	Platform	Taxon	Test Statistic	Platform Difference
^{226}Ra	3	GC19A - EI361A	Yellow chub	4	
^{226}Ra	2	GC19A - EI361A	Creole-fish	5	
^{226}Ra	3	GC19A - EI361A	Creole-fish	6.5	
^{226}Ra	2	EB165A - HI356A	Creole-fish	2	
^{226}Ra	3	EB165A - HI356A	Creole-fish	8	
^{226}Ra	2	GC19A - EI361A	Gray triggerfish	6	
^{226}Ra	3	GC19A - EI361A	Gray triggerfish	1	

D = Discharge.
R = Reference.

A.4 REFERENCES

Cohen, J. 1977. *Statistical Power Analysis for the Behavioral Sciences, Revised Edition*. Academic Press, New York, NY.

Conover, W.J. 1980. *Practical Nonparametric Statistics*, 2nd ed. John Wiley & Sons Inc., New York, NY. 493 pp.

Dixon and Massey. 1969. *Introduction to Statistical Analysis.* McGraw-Hill Book Company, New York, NY. 638 pp.

EPA. 1989. *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance.* EPA/530/SW-89/026. Office of Solid Waste, Washington, DC. 148 pp.

Gilbert, R.O. 1987. *Statistical Methods for Environmental Pollution Monitoring.* Van Nostrand Reinhold, New York. 320 pp.

Randles, R.H. 1979. *Introduction to the Theory of Nonparametric Statistics.* Wiley, New York, NY. 450 pp.

Snedecor, G.W., and W. G. Cochran, 1989. *Statistical Methods*, 8th ed. Iowa State University Press, Ames, IA. 503 pp.

APPENDIX B

REPRESENTATIVE PHOTOGRAPHS

PHOTOGRAPH 1 – Upper Left

East Breaks 165A discharging platform.

PHOTOGRAPH 2 – Upper Right

High Island A 356A reference platform.

PHOTOGRAPH 3 – Lower Left

Green Canyon 19A discharging platform.

PHOTOGRAPH 4 – Lower Right

Eugene Island 361A reference platform.

PHOTOGRAPH 5 – Upper Left

Storage containers for jewel boxes. Sample label and barcode designation for sample tracking are visible on the glass jars.

PHOTOGRAPH 6 – Upper Right

Target species of fish are placed in the dykor-coated fish box prior to processing.

PHOTOGRAPH 7 – Lower Left

Above surface produced water discharge at East Breaks 165A.

PHOTOGRAPH 8 – Lower Right

Tissue samples are weighed and measured prior to being stored frozen in on-board freezer.

PHOTOGRAPH 9 – Upper Right

Diver collecting bivalve target species by removing the bivalve from the platform using a metal pry bar. Samples are placed in a dive bag for transport back the survey vessel.

PHOTOGRAPH 10 – Upper Left

The efficiency of low-profile traps was tested during the Screening Survey. The baited traps attracted but failed to capture many fish. Other methods such as spearing and hook-and-line were found to be more efficient.

PHOTOGRAPH 11 – Lower Left

Diver collecting target fish species by spearing.

PHOTOGRAPH 12 – Lower Right

Fish often congregated at the junctions of the platform crossmembers and support pilings.

APPENDIX C

ANALYTICAL RESULTS FOR CRUISE 1

Table C-1. Summary of volatile organic compound concentrations (µg/L) measured in produced water samples collected during Cruise 1 at four discharging platforms.

Analyte	EB165A	GC19A	SS277A	VR214A
Benzene	810 - 1000	500 - 590	12 - 120	3600 - 4300
Toluene	450 - 480	360 - 480	28 - 55	1400 - 1800
Ethylbenzene	50 - 57	61 - 64	51 - 68	140 - 150
m/p-Xylene	220 - 230	180 - 200	15 - 20	600 - 620
o-Xylene	100	110 - 130	23 - 27	320 - 330
C_3-Benzenes	44 - 60	13 - 62	ND - 27	150 - 170
C_4-Benzenes	7.7 - 8.9	8.0 - 9.8	ND - 10	14 - 17

ND = Concentration below the method detection limit.

Table C-2. Summary of semivolatile organic compound concentrations (ng/L) measured in produced water samples collected during Cruise 1 at four discharging platforms.

Analyte	EB165A	GC19A	SS277A	VR214A
Phenol	260000 - 290000	84000 - 670000	28000 - 30000	690000 - 940000
Naphthalene	15000 - 18000	19000 - 28000	38000 - 48000	28000 - 46000
2-Methylnaphthalene	7600 - 8500	14000 - 22000	40000 - 49000	11000 - 19000
1-Methylnaphthalene	5900 - 6400	15000 - 24000	28000 - 36000	10000 - 21000
2,6-Dimethylnaphthalene	1000 - 1300	3400 - 14000	12000 - 17000	1700 - 6700
2,3,5-Trimethylnaphthalene	340 - 360	2200 - 5200	5500 - 6400	840 - 1800
C_1-Naphthalenes	8500 - 9500	19000 - 30000	43000 - 54000	14000 - 28000
C_2-Naphthalenes	4800 - 5300	18000 - 39000	45000 - 59000	7800 - 16000
C_3-Naphthalenes	2200 - 2400	13000 - 34000	32000 - 39000	3400 - 7800
C_4-Naphthalenes	890 - 1500	8100 - 19000	18000 - 21000	2100 - 4400
Acenaphthylene	550 - 580	ND	ND	ND
Acenaphthene	140 - 160	ND	ND	ND
Biphenyl	650 - 840	910 - 3400	3400 - 4300	2200 - 4200
Fluorene	110 - 130	440 - 1100	1200 - 1500	190 - 440
C_1-Fluorenes	82 - 220	1400 - 2800	3800 - 4200	330 - 740
C_2-Fluorenes	550 - 870	3100 - 6400	6500 - 7700	520 - 1600
C_3-Fluorenes	420 - 550	4100 - 7300	6500 - 8200	500 - 1800
Anthracene	ND	150 - 540	ND	45 - 60
Phenanthrene	160 - 180	960 - 3000	2900 - 3200	410 - 590
1-Methylphenanthrene	68 - 89	710 - 1700	2400 - 2700	150 -230
C_1-Phenanthrenes/Anthracenes	36 - 390	2300 -5400	9000 - 9800	660 - 1000
C_2-Phenanthrenes/Anthracenes	380 - 420	3300 - 7500	12000 - 13000	690 - 1000
C_3-Phenanthrenes/Anthracenes	240 - 270	2800 - 7000	9000 - 12000	690 - 1000
C_4-Phenanthrenes/Anthracenes	ND	1300 - 4600	5500 - 8300	450 - 800
Dibenzothiophene	110 - 130	910 - 1700	1900 - 2200	110 - 170
C_1-Dibenzothiophenes	250 - 290	2600 - 5900	7500 - 8800	590 - 890
C_2-Dibenzothiophenes	370 - 530	5600 - 13000	15000 - 17000	550 -900
C_3-Dibenzothiophenes	410 -570	7100 - 15000	14000 - 19000	510 - 820
Fluoranthene	20 -30	ND - 1200	ND	34 - 48
Pyrene	24 - 26	180 - 1000	270 - 290	30 - 43
C_1-Fluoranthenes/Pyrenes	ND	350 - 920	1300 - 1500	210 - 260

Table C-2. (Continued).

Analyte	EB165A	GC19A	SS277A	VR214A
C_2-Fluoranthenes/Pyrenes	ND	580 - 1300	1600 - 2000	200 - 330
Benzo[a]anthracene	ND	ND - 380	ND	ND
Chrysene	ND	96 - 380	170 - 200	ND
C_1-Chrysenes	ND	220 - 550	750 - 930	ND
C_2-Chrysenes	ND	400 - 1000	1400 - 1600	ND
C_3-Chrysenes	ND	480 - 1000	1400 - 1500	ND
C_4-Chrysenes	ND	480 - 1100	1200 - 1500	ND
Benzo[b]fluoranthene	ND - 15	45 - 290	57 - 65	8.8 - 18
Benzo[k]fluoranthene	ND - 4.9J	8.6J - 85	ND	ND
Bis(2-ethylhexyl)phthalate	ND - 160J	91J - 230J	150J - 240J	120J - 1600J
Benzo[e]pyrene	ND	18 - 110	ND - 43	ND
Benzo[a]pyrene	ND	13 - 140	ND	ND
Perylene	73 - 93	710 - 1800	2200 - 2400	93 - 200
Indeno[1,2,3-c,d]pyrene	ND	10J - 130	ND - 14J	ND
Dibenzo[a,h]anthracene	ND	ND - 36	ND	ND
Benzo[g,h,i]perylene	ND - 9.5J	15J - 110	21 - 23	4.9J - 7.2J

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-3. Summary of metal concentrations (µg/L) and radionuclide activities (pCi/L) measured in produced water samples collected during Cruise 1 at four discharging platforms.

Analyte	EB165A	GC19A	SS277A	VR214A
Arsenic	5.3 - 6.4	22	ND	8.3 - 9.0
Barium	230000	150000 - 160000	100000 - 110000	120000 - 130000
Cadmium	0.55J - 0.66J	ND	ND	ND
Mercury	0.021J - 0.022J	0.016J - 0.020J	ND	0.082 - 0.087
^{226}Ra	95 - 140	210 - 250	160 - 200	130 - 140
^{228}Ra	620 - 730	710 - 790	370 - 510	480 - 490

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-4. Summary of volatile organic compound concentrations (µg/L) measured in ambient seawater samples collected during Cruise 1 at eight platforms.

Analyte	EB165A	HI356A	GC19A	EI361A	SS277A	IE360C	VR214A	EC229A
Benzene	ND	ND	ND - 0.28J	ND	ND	ND	ND - 0.65	ND
Toluene	ND	ND - 0.50	ND - 0.53	ND	ND	ND	0.42J - 0.80	0.31J - 0.46
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
m/p-Xylene	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	ND	ND	ND	ND	ND	ND	ND	ND
C_3-Benzenes	ND	ND	ND - 0.44J	ND	ND	ND	ND - 0.49J	ND
C_4-Benzenes	ND	ND	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-5. Summary of semivolatile organic compound concentrations (ng/L) measured in ambient seawater samples collected during Cruise 1 at eight platforms.

Analyte	EB165A	HI356A	GC19A	EI361A	SS277A	EI360C	VR214A	EC229A
Phenol	ND	ND - 52	43 - 96	95 - 130	120 - 230	110 - 140	110 - 230	74 - 120
Naphthalene	4.9J - 6.8J	ND - 5.5J	4.8J - 5.3J	ND - 10J	6.2J - 9.1J	7J - 9.9J	4.3J - 9.7J	ND - 4.5J
2-Methylnaphthalene	ND	ND	ND - 6J	ND	ND - 4.3J	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes	ND	ND	ND	ND	ND	ND	ND	ND
C_2-Naphthalenes	ND	ND	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes	ND	ND	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND
Biphenyl	ND	ND	ND	ND	ND - 3.8J	ND - 12	ND	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND
C_1-Fluorenes	ND	ND	ND	ND	ND	ND	ND	ND
C_2-Fluorenes	ND	ND	ND	ND	ND - 52	ND	ND - 37	ND
C_3-Fluorenes	ND	ND	ND	ND	ND - 78	ND	ND - 110	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene	ND	ND	ND	ND	ND - 8.2J	ND	ND - 9.6J	ND
C_1-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND - 54	ND	ND - 16	ND
C_2-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND - 120	ND	ND - 100	ND
C_3-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND - 230	ND	ND - 180	ND
C_4-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND - 190	ND	ND - 230	ND
Dibenzothiophene	ND	ND	ND	ND	ND - 4.2J	ND	ND - 2.1J	ND
C_1-Dibenzothiophenes	ND	ND	ND	ND	ND - 34	ND	ND - 28	ND
C_2-Dibenzothiophenes	ND	ND	ND	ND	ND - 94	ND	ND - 93	ND
C_3-Dibenzothiophenes	ND	ND	ND	ND	ND - 170	ND	ND - 140	ND
Fluoranthene	ND	ND - 4.1J	ND	ND	ND - 5.6J	ND	ND - 5.9J	ND
Pyrene	ND	ND	ND	ND	ND - 22	ND	ND - 25	ND
C_1-Fluoranthenes/Pyrenes	ND	ND	ND	ND	ND - 65	ND	ND - 73	ND

Table C-5. (Continued).

Analyte	EB165A	HI356A	GC19A	EI361A	SS277A	EI360C	VR214A	EC229A
C_2-Fluoranthenes/Pyrenes	ND	ND	ND	ND	ND - 110	ND	ND - 130	ND
Benzo[a]anthracene	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND - 14	ND	ND - 18	ND
C_1-Chrysenes	ND	ND	ND	ND	ND - 28	ND	ND - 34	ND
C_2-Chrysenes	ND	ND	ND	ND	ND - 49	ND	ND - 57	ND
C_3-Chrysenes	ND	ND	ND	ND	ND - 48	ND	ND - 46	ND
C_4-Chrysenes	ND	ND	ND	ND	ND - 46	ND	ND - 33	ND
Benzo[b]fluoranthene	ND	ND	ND	ND	ND - 4.2J	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	ND - 160J	ND - 110J	ND - 200J	94J - 200J	140J - 300J	230J - 300J	120J - 240J	100J -110J
Benzo[e]pyrene	ND	ND	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND	ND	ND	ND	ND	ND
Perylene	ND	ND	ND	ND	ND	ND	ND	ND
Indeno[1,2,3-c,d]pyrene	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-6. Summary of metal concentrations (µg/L) and radionuclide activities (pCi/L) measured in ambient seawater samples collected during Cruise 1 at eight platforms.

Analyte	EB165A	HI356A	GC19A	EI361A	SS277A	EI360C	VR214A	EC229A
Arsenic	1.2	1.2	1.2	1.1 - 1.2	1.2	1.2	1.2	1.3
Barium	9.6 - 36	10 - 14	8.7 - 9.1	9.0 - 9.4	9.5 - 11	8.6 - 9.2	11 - 12	10 - 12
Cadmium	0.007J - 0.016	0.011J - 0.030	0.005J - 0.006J	ND - 0.008J	0.007J - 0.009J	0.006J - 0.007J	ND - 0.005J	ND
Mercury	ND	ND	ND	ND	ND	ND	ND	ND
^{226}Ra	0.020 - 0.050	ND - 0.070	ND	ND - 0.040	0.010 - 0.06	ND - 0.090	0.010	ND - 0.050
^{228}Ra	ND - 0.08	ND - 0.58	ND	ND - 0.36	ND - 1.4	ND - 0.58	ND	ND - 0.85

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-7 Summary of volatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at East Breaks 165A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
Benzene	ND	ND	ND	ND	ND
Toluene	ND - 6.6J	ND - 3.9J	ND	ND - 8.4J	ND
Ethylbenzene	ND - 3.2J	ND	ND	ND - 5.8J	ND
m/p-Xylene	ND - 11J	ND	ND	ND - 21	ND
o-Xylene	ND - 4.4J	ND	ND	ND - 12	ND
C_3-Benzenes	ND - 1.6J	ND	ND	ND - 14	ND
C_4-Benzenes	ND	ND	ND	ND - 37	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-8. Summary of semivolatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at East Breaks 165A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
Phenol	ND - 38J	ND - 63J	ND - 41J	ND	ND
Naphthalene	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND - 2.3J	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND - 5.3J	ND	ND	ND
C_1-Naphthalenes	ND	ND	ND	ND	ND
C_2-Naphthalenes	ND	ND	ND	ND	ND
C_3-Naphthalenes	ND	ND	ND	ND	ND
C_4-Naphthalenes	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND
Biphenyl	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND
C_1-Fluorenes	ND	ND	ND	ND	ND
C_2-Fluorenes	ND	ND	ND	ND	ND
C_3-Fluorenes	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND - 3.5J	ND	ND
1-Methylphenanthrene	ND	ND	ND	ND	ND
C_1-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND
C_2-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND
C_3-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND
C_4-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND
Dibenzothiophene	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes	ND	ND - 2.9J	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND
C_1-Fluoranthenes/Pyrenes	ND	ND	ND	ND	ND

Table C-8. (Continued).

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
C_2-Fluoranthenes/Pyrenes	ND	ND	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND
C_1-Chrysenes	ND	ND	ND	ND	ND
C_2-Chrysenes	ND	ND	ND	ND	ND
C_3-Chrysenes	ND	ND	ND	ND	ND
C_4-Chrysenes	ND	ND	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	ND	ND	ND	ND	ND - 150J
Benzo[e]pyrene	ND	ND	ND	ND	ND
Benzo[a]pyrene	ND - 2.8J	ND	ND	ND	ND
Perylene	ND - 4.0J	ND	ND	ND	ND
Indeno[1,2,3-c,d]pyrene	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-9. Summary of metal concentrations (µg/g dry weight) in the edible tissues of five species collected at East Breaks 165A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
Arsenic	32 - 39	76 - 120	1.3 - 2.2	2.6 - 3.4	0.80 - 2.3
Barium	14 - 30	15 - 18	0.024 - 0.16	0.16 - 0.30	ND - 0.065J
Cadmium	6.2 - 7.9	24 - 32	0.010 - 0.013	0.010 - 0.035	0.003J - 0.010
Mercury	0.061 - 0.070	0.13 - 0.14	0.049 - 0.054	0.10 - 0.26	0.11 - 0.56

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-10. Summary of radionuclide activities (pCi/g wet weight) in the edible tissues of five species collected at East Breaks 165A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
^{226}Ra	0.010 - 0.014	0.018 - 0.019	ND - 0.001	ND - 0.002	ND
^{228}Ra	0.003 - 0.009	ND - 0.012	ND - 0.009	ND - 0.011	ND - 0.006

ND = Concentration below the method detection limit.

Table C-11. Summary of volatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at High Island A 356A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
Benzene	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND
m/p-Xylene	ND	ND	ND - 4.4J	ND	ND
o-Xylene	ND	ND	ND	ND	ND
C_3-Benzenes	ND	ND	ND - 5.0J	ND	ND
C_4-Benzenes	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-12. Summary of semivolatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at High Island A 356A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
Phenol	ND - 61J	58J	ND	ND - 55J	ND - 110J
Naphthalene	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND	ND	ND
C_1-Naphthalenes	ND	ND	ND	ND	ND
C_2-Naphthalenes	ND	ND	ND	ND	ND
C_3-Naphthalenes	ND	ND - 5.4J	ND	ND	ND
C_4-Naphthalenes	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND
Biphenyl	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND
C_1-Fluorenes	ND	ND	ND	ND	ND
C_2-Fluorenes	ND	ND	ND	ND	ND
C_3-Fluorenes	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND
1-Methylphenanthrene	ND	ND	ND	ND	ND
C_1-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND
C_2-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND
C_3-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND
C_4-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND
Dibenzothiophene	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes	ND	ND - 2.2J	ND	ND	ND
C_2-Dibenzothiophenes	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND
C_1-Fluoranthenes/Pyrenes	ND	ND	ND	ND	ND

Table C-12. (Continued).

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
C_2-Fluoranthenes/Pyrenes	ND	ND	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND
C_1-Chrysenes	ND	ND	ND	ND	ND
C_2-Chrysenes	ND	ND	ND	ND	ND
C_3-Chrysenes	ND	ND	ND	ND	ND
C_4-Chrysenes	ND	ND	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	ND	ND	ND	ND	ND
Benzo[e]pyrene	ND	ND	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND	ND	ND
Perylene	ND - 3.5J	ND	ND	ND	ND
Indeno[1,2,3-c,d]pyrene	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-13. Summary of metal concentrations (µg/g dry weight) in the edible tissues of five species collected at High Island A 356A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
Arsenic	42 - 62	69 - 82	1.5 - 1.8	3.1 - 6.3	0.88 - 2.4
Barium	15 - 23	28 - 33	0.020J - 0.11	0.042J - 0.051J	ND - 0.053J
Cadmium	8.8 - 12	24 - 35	0.007J - 0.024	0.005J - 0.036	0.002J
Mercury	0.067 - 0.10	0.16 - 0.50	0.057 - 0.19	0.080 - 0.16	0.64 - 1.4

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table C-14. Summary of radionuclide activities (pCi/g wet weight) in the edible tissues of five species collected at High Island A 356A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
^{226}Ra	0.009 - 0.010	0.016 - 0.021	ND	ND - 0.001	ND
^{228}Ra	0.001 - 0.006	ND - 0.011	ND - 0.024	ND - 0.008	ND - 0.006

ND = Concentration below the method detection limit.

Table C-15. Summary of volatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at Green Canyon 19A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
Benzene	ND	ND	ND	ND	ND
Toluene	ND	ND - 6.8J	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND
m/p-Xylene	ND	ND	ND	ND	ND
o-Xylene	ND	ND	ND	ND	ND
C_3-Benzenes	ND	ND	ND	ND	ND
C_4-Benzenes	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-16. Summary of semivolatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at Green Canyon 19A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
Phenol	39J - 59J	ND - 70J	ND - 40J	48J - 150J	ND - 57J
Naphthalene	ND	ND	ND	ND	ND - 8.6J
2-Methylnaphthalene	ND	ND	ND	ND	ND - 2.4J
1-Methylnaphthalene	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND	ND	ND
C_1-Naphthalenes	ND	ND	ND	ND	ND - 2.7J
C_2-Naphthalenes	ND	ND	ND	ND	ND
C_3-Naphthalenes	ND	6.9J - 11J	ND	ND	ND
C_4-Naphthalenes	ND	17J - 21J	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND
Biphenyl	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND
C_1-Fluorenes	ND	ND - 10J	ND	ND	ND
C_2-Fluorenes	ND	ND	ND	ND	ND
C_3-Fluorenes	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND
Phenanthrene	ND	3.5J - 5.0J	ND	ND	ND - 13J
1-Methylphenanthrene	ND	ND	ND	ND	ND
C_1-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND
C_2-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND
C_3-Phenanthrenes/Anthracenes	ND	ND - 21J	ND	ND	ND
C_4-Phenanthrenes/Anthracenes	ND	ND - 18J	ND	ND	ND
Dibenzothiophene	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes	ND	ND - 5.7J	ND	ND	ND
C_2-Dibenzothiophenes	ND	ND - 17	ND	ND	ND
C_3-Dibenzothiophenes	ND	ND - 22	ND	ND	ND
Fluoranthene	ND	ND - 3.3J	ND	ND	ND - 7.3J
Pyrene	ND	ND - 4.1J	ND	ND	ND - 5.2J
C_1-Fluoranthenes/Pyrenes	ND	3.3J - 3.5J	ND	ND	ND

Table C-16. (Continued).

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
C_2-Fluoranthenes/Pyrenes	ND	ND - 3.7J	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND
C_1-Chrysenes	ND	ND - 2.7J	ND	ND	ND
C_2-Chrysenes	ND	ND	ND	ND	ND
C_3-Chrysenes	ND	ND	ND	ND	ND
C_4-Chrysenes	ND	ND	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	ND	ND	ND - 180J	ND	ND
Benzo[e]pyrene	ND	ND	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND	ND	ND
Perylene	ND	ND	ND	ND	ND
Indeno[1,2,3-c,d]pyrene	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-17. Summary of metal concentrations (µg/g dry weight) in the edible tissues of five species collected at Green Canyon 19A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
Arsenic	34 - 39	100 - 130	0.60 - 1.2	3.1 - 3.3	0.85 - 1.1
Barium	42 - 49	37 - 55	0.022J - 0.089J	0.16 - 0.37	0.021J - 0.34
Cadmium	7.8 - 8.6	22 - 27	0.005J - 0.009J	0.005J - 0.018	ND - 0.004J
Mercury	0.064 - 0.15	0.13 - 0.17	0.033 - 0.10	0.11 - 0.16	0.093 - 0.36

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-18. Summary of radionuclide activities (pCi/g wet weight) in the edible tissues of five species collected at Green Canyon 19A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
^{226}Ra	ND - 0.011	0.015 - 0.019	ND - 0.002	ND - 0.003	ND
^{228}Ra	ND - 0.005	ND - 0.010	ND - 0.008	ND	ND - 0.003

ND = Concentration below the method detection limit.

Table C-19. Summary of volatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at Eugene Island 361A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
Benzene	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND
m/p-Xylene	ND	ND	ND	ND	ND
o-Xylene	ND	ND	ND	ND	ND
C_3-Benzenes	ND	ND	ND	ND	ND
C_4-Benzenes	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table C-20. Summary of semivolatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at Eugene Island 361A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
Phenol	ND - 51J	ND	ND - 47J	ND - 38J	ND - 53J
Naphthalene	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND - 3.9J	ND	ND
1-Methylnaphthalene	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND	ND	ND
C_1-Naphthalenes	ND	ND	ND - 3.8J	ND	ND
C_2-Naphthalenes	ND	ND	ND	ND	ND
C_3-Naphthalenes	ND	ND	ND	ND	ND
C_4-Naphthalenes	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND
Biphenyl	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND
C_1-Fluorenes	ND	ND	ND	ND	ND
C_2-Fluorenes	ND	ND	ND	ND	ND
C_3-Fluorenes	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND
1-Methylphenanthrene	ND	ND	ND	ND	ND
C_1-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND
C_2-Phenanthrenes/Anthracenes	ND	ND	ND - 18J	ND	ND
C_3-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND
C_4-Phenanthrenes/Anthracenes	ND	ND	ND	ND	ND
Dibenzothiophene	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes	ND - 1.7J	ND	ND	ND	ND
C_2-Dibenzothiophenes	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes	ND - 4.8J	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND
C_1-Fluoranthenes/Pyrenes	ND	ND	ND	ND	ND

Table C-20. (Continued).

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
C_2-Fluoranthenes/Pyrenes	ND	ND	ND	ND	ND
Benzo[a]anthracene	ND	ND - 3.8J	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND
C_1-Chrysenes	ND	ND	ND	ND	ND
C_2-Chrysenes	ND	ND	ND	ND	ND
C_3-Chrysenes	ND	ND	ND	ND	ND
C_4-Chrysenes	ND	ND	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	ND	ND	ND - 390J	ND - 320J	ND
Benzo[e]pyrene	ND	ND	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND	ND	ND
Perylene	ND	ND	ND	ND	ND
Indeno[1,2,3-c,d]pyrene	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND - 26	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-21. Summary of metal concentrations (µg/g dry weight) in the edible tissues of five species collected at Eugene Island 361A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
Arsenic	36 - 49	92 - 130	0.75 - 1.5	1.4 - 3.9	0.62 - 1.6
Barium	12 - 18	13 - 15	0.27 - 0.67	0.11 - 0.39	0.030J - 0.21
Cadmium	9.4 - 12	11 - 26	0.006J - 0.011	0.003J - 0.021	ND - 0.008J
Mercury	0.051 - 0.080	0.12 - 0.19	0.030 - 0.036	0.12 - 0.20	0.26 - 0.45

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-22. Summary of radionuclide activities (pCi/g wet weight) in the edible tissues of five species collected at Eugene Island 361A during Cruise 1.

Analyte	Jewel box	Thorny oyster	Yellow chub	Creole-fish	Rockhind
^{226}Ra	0.005 - 0.007	0.014 - 0.016	ND - 0.001	ND - 0.001	ND
^{228}Ra	0.003 - 0.042	ND - 0.007	ND - 0.024	ND - 0.002	ND

ND = Concentration below the method detection limit.

Table C-23. Summary of volatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at Ship Shoal 277A during Cruise 1.

Analyte	Jewel box	Yellow chub	Creole-fish	Red snapper
Benzene	ND	ND	ND	ND
Toluene	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND
m/p-Xylene	ND	ND	ND	ND
o-Xylene	ND	ND	ND	ND
C_3-Benzenes	ND	ND	ND	ND
C_4-Benzenes	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table C-24. Summary of semivolatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at Ship Shoal 277A during Cruise 1.

Analyte	Jewel box	Yellow chub	Creole-fish	Red snapper
Phenol	ND	ND - 125J	ND	ND - 67J
Naphthalene	ND	ND	ND	ND
2-Methylnaphthalene	ND - 2.5	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND	ND
2,6-Dimethylnaphthalene	ND - 3.5J	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND - 2.4J	ND	ND	ND - 4.7J
C_1-Naphthalenes	ND	ND	ND	ND
C_2-Naphthalenes	ND - 13J	ND	ND	ND
C_3-Naphthalenes	ND - 24J	ND	ND	ND
C_4-Naphthalenes	6.2J - 26	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND
Biphenyl	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND
C_1-Fluorenes	ND	ND	ND	ND
C_2-Fluorenes	ND	ND	ND	ND
C_3-Fluorenes	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND
1-Methylphenanthrene	ND	ND	ND	ND
C_1-Phenanthrenes/Anthracenes	ND	ND	ND	ND
C_2-Phenanthrenes/Anthracenes	ND	ND	ND	ND
C_3-Phenanthrenes/Anthracenes	ND	ND	ND	ND
C_4-Phenanthrenes/Anthracenes	ND	ND	ND	ND
Dibenzothiophene	ND	ND	ND	ND
C_1-Dibenzothiophenes	ND - 5.7J	ND	ND	ND
C_2-Dibenzothiophenes	ND - 12	ND	ND	ND
C_3-Dibenzothiophenes	8.6 - 20	ND	ND	ND
Fluoranthene	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND
C_1-Fluoranthenes/Pyrenes	ND	ND	ND	ND

Table C-24. (Continued).

Analyte	Jewel box	Yellow chub	Creole-fish	Red snapper
C_2-Fluoranthenes/Pyrenes	ND	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND
C_1-Chrysenes	ND	ND	ND	ND
C_2-Chrysenes	ND - 4.2J	ND	ND	ND
C_3-Chrysenes	ND	ND	ND	ND
C_4-Chrysenes	ND	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	ND - 140J	ND	ND	ND
Benzo[e]pyrene	ND	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND	ND
Perylene	ND - 5.3J	ND	ND	ND
Indeno[1,2,3-c,d]pyrene	ND	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-25 .Summary of metal concentrations (µg/g dry weight) in the edible tissues of five species collected at Ship Shoal 277A during Cruise 1.

Analyte	Jewel box	Yellow chub	Creole-fish	Red snapper
Arsenic	37 - 39	1.0 - 1.5	2.2 - 17	0.37 - 0.88
Barium	14 - 18	0.029J - 0.070J	0.072J - 0.30J	ND - 0.027J
Cadmium	7.5 - 7.8	0.006J - 0.018	0.006J - 0.019	0.005J - 0.016
Mercury	0.066 - 0.087	0.023 - 0.035	0.11 - 0.15	0.19 - 0.21

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-26. Summary of radionuclide activities (pCi/g wet weight) in the edible tissues of five species collected at Ship Shoal 277A during Cruise 1.

Analyte	Jewel box	Yellow chub	Creole-fish	Red snapper
^{226}Ra	0.007 - 0.010	ND	ND	ND
^{228}Ra	ND	ND - 0.009	ND	ND

ND = Concentration below the method detection limit.

Table C-27 Summary of volatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at Eugene Island 360C during Cruise 1.

Analyte	Jewel box	Yellow chub	Creole-fish	Red snapper
Benzene	ND	ND	ND	ND
Toluene	ND - 4.0J	ND	ND - 6.5J	ND
Ethylbenzene	ND	ND	ND - 2.7J	ND
m/p-Xylene	ND	ND	ND - 10J	ND
o-Xylene	ND	ND	ND - 4.0	ND
C_3-Benzenes	ND	ND	ND - 8.2	ND
C_4-Benzenes	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-28. Summary of semivolatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at Eugene Island 360C during Cruise 1.

Analyte	Jewel box	Yellow chub	Creole-fish	Red snapper
Phenol	ND - 38J	ND - 51J	ND	ND
Naphthalene	ND	ND	ND	ND - 34J
2-Methylnaphthalene	ND	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND	ND
C_1-Naphthalenes	ND	ND	ND	ND
C_2-Naphthalenes	ND	ND	ND	ND
C_3-Naphthalenes	ND	ND	ND	ND
C_4-Naphthalenes	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND
Biphenyl	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND
C_1-Fluorenes	ND	ND	ND	ND
C_2-Fluorenes	ND	ND	ND	ND
C_3-Fluorenes	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND
1-Methylphenanthrene	ND	ND	ND	ND
C_1-Phenanthrenes/Anthracenes	ND	ND	ND	ND
C_2-Phenanthrenes/Anthracenes	ND	ND	ND	ND
C_3-Phenanthrenes/Anthracenes	ND	ND	ND	ND
C_4-Phenanthrenes/Anthracenes	ND	ND	ND	ND
Dibenzothiophene	ND	ND	ND	ND
C_1-Dibenzothiophenes	ND	ND	ND	ND
C_2-Dibenzothiophenes	ND	ND	ND	ND
C_3-Dibenzothiophenes	ND - 6.1J	ND	ND	ND
Fluoranthene	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND
C_1-Fluoranthenes/Pyrenes	ND	ND	ND	ND

Table C-28. (Continued).

Analyte	Jewel box	Yellow chub	Creole-fish	Red snapper
C_2-Fluoranthenes/Pyrenes	ND	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND
C_1-Chrysenes	ND	ND	ND	ND
C_2-Chrysenes	ND	ND	ND	ND
C_3-Chrysenes	ND	ND	ND	ND
C_4-Chrysenes	ND	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	ND	ND - 140J	ND - 210J	ND
Benzo[e]pyrene	ND	ND	ND	ND
Benzo[a]pyrene	ND - 2.9J	ND	ND	ND
Perylene	ND - 4.5J	ND	ND	ND
Indeno[1,2,3-c,d]pyrene	ND	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-29. Summary of metal concentrations (µg/g dry weight) in the edible tissues of five species collected at Eugene Island 360C during Cruise 1.

Analyte	Jewel box	Yellow chub	Creole-fish	Red snapper
Arsenic	42 - 47	1.4 - 1.6	2.6 - 4.6	0.27 - 0.43
Barium	17 - 22	0.053J - 0.11	0.090J - 0.16	ND - 0.15
Cadmium	11 - 13	0.009J - 0.014	0.012 - 0.020	0.002J
Mercury	0.048 - 0.061	0.039 - 0.060	0.091 - 0.12	0.23 - 0.36

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-30. Summary of radionuclide activities (pCi/g wet weight) in the edible tissues of five species collected at Eugene Island 360C during Cruise 1.

Analyte	Jewel box	Yellow chub	Creole-fish	Red snapper
^{226}Ra	0.009 - 0.015	ND - 0.002	ND - 0.003	ND
^{228}Ra	ND - 0.009	ND - 0.003	ND - 0.012	ND - 0.001

ND = Concentration below the method detection limit.

Table C-31. Summary of volatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at Vermilion 214A during Cruise 1.

Analyte	Jewel box	Red snapper	Spadefish	Gray triggerfish
Benzene	ND	ND	ND	ND
Toluene	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND
m/p-Xylene	ND	ND	ND	ND
o-Xylene	ND	ND	ND	ND
C_3-Benzenes	ND	ND	ND	ND
C_4-Benzenes	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table C-32. Summary of semivolatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at Vermilion 214A during Cruise 1.

Analyte	Jewel box	Red snapper	Spadefish	Gray triggerfish
Phenol	ND - 210	ND - 50J	ND - 55J	ND
Naphthalene	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND	ND
C_1-Naphthalenes	ND	ND	ND	ND
C_2-Naphthalenes	ND	ND	ND	ND
C_3-Naphthalenes	ND	ND	ND	ND
C_4-Naphthalenes	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND
Biphenyl	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND
C_1-Fluorenes	ND	ND	ND	ND
C_2-Fluorenes	ND	ND	ND	ND
C_3-Fluorenes	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND
1-Methylphenanthrene	ND	ND	ND	ND
C_1-Phenanthrenes/Anthracenes	ND	ND	ND	ND
C_2-Phenanthrenes/Anthracenes	ND	ND	ND	ND
C_3-Phenanthrenes/Anthracenes	ND	ND	ND	ND
C_4-Phenanthrenes/Anthracenes	ND	ND	ND	ND
Dibenzothiophene	ND	ND	ND	ND
C_1-Dibenzothiophenes	ND	ND	ND	ND
C_2-Dibenzothiophenes	ND	ND	ND	ND
C_3-Dibenzothiophenes	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND
C_1-Fluoranthenes/Pyrenes	ND	ND	ND	ND

Table C-32. (Continued).

Analyte	Jewel box	Red snapper	Spadefish	Gray triggerfish
C_2-Fluoranthenes/Pyrenes	ND	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND
C_1-Chrysenes	ND	ND	ND	ND
C_2-Chrysenes	ND	ND	ND	ND
C_3-Chrysenes	ND	ND	ND	ND
C_4-Chrysenes	ND	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	ND	ND	ND - 160J	ND
Benzo[e]pyrene	ND	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND	ND
Perylene	ND - 3.3J	ND	ND	ND
Indeno[1,2,3-c,d]pyrene	ND	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-33. Summary of metal concentrations (µg/g dry weight) in the edible tissues of five species collected at Vermilion 214A during Cruise 1.

Analyte	Jewel box	Red snapper	Spadefish	Gray triggerfish
Arsenic	37 - 42	0.48 - 0.74	2.0 - 3.4	5.7 - 24
Barium	9.1 - 17	ND - 0.092J	ND - 0.054J	0.12 - 0.22
Cadmium	7.4 - 8.1	ND - 0.003J	0.002J - 0.006J	0.003J - 0.027J
Mercury	0.042 - 0.052	0.40 - 0.44	0.12 - 0.20	0.076 - 0.28

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-34. Summary of radionuclide activities (pCi/g wet weight) in the edible tissues of five species collected at Vermilion 214A during Cruise 1.

Analyte	Jewel box	Red snapper	Spadefish	Gray triggerfish
^{226}Ra	0.007 - 0.009	ND	ND - 0.001	ND
^{228}Ra	ND - 0.033	ND	ND - 0.016	ND

ND = Concentration below the method detection limit.

Table C-35. Summary of volatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at East Cameron 229A during Cruise 1.

Analyte	Jewel box	Red snapper	Spadefish	Gray triggerfish
Benzene	ND	ND	ND	ND
Toluene	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND
m/p-Xylene	ND	ND	ND	ND
o-Xylene	ND	ND	ND	ND
C_3-Benzenes	ND - 3.0J	ND - 5.0J	ND	ND
C_4-Benzenes	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-36. Summary of semivolatile organic compound concentrations (ng/g wet weight) in the edible tissues of five species collected at East Cameron 229A during Cruise 1.

Analyte	Jewel box	Red snapper	Spadefish	Gray triggerfish
Phenol	ND - 64J	ND - 44J	ND - 43J	ND
Naphthalene	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND - 6.5J
1-Methylnaphthalene	ND	ND	ND	ND - 3.0J
2,6-Dimethylnaphthalene	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND	ND
C_1-Naphthalenes	ND	ND	ND	ND - 6.4J
C_2-Naphthalenes	ND	ND	ND	ND - 14J
C_3-Naphthalenes	ND	ND	ND	ND - 12J
C_4-Naphthalenes	ND	ND	ND	ND - 6.3J
Acenaphthylene	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND - 6.6J
Biphenyl	ND	ND	ND	ND - 2.4J
Fluorene	ND	ND	ND	ND - 11J
C_1-Fluorenes	ND	ND	ND	ND - 11J
C_2-Fluorenes	ND	ND	ND	ND
C_3-Fluorenes	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND - 6.9J
Phenanthrene	ND	ND	ND	ND - 46
1-Methylphenanthrene	ND	ND	ND	ND - 2.4J
C_1-Phenanthrenes/Anthracenes	ND	ND	ND	ND - 11J
C_2-Phenanthrenes/Anthracenes	ND	ND	ND	ND
C_3-Phenanthrenes/Anthracenes	ND	ND	ND	ND
C_4-Phenanthrenes/Anthracenes	ND	ND	ND	ND
Dibenzothiophene	ND	ND	ND	ND - 4.0J
C_1-Dibenzothiophenes	ND	ND	ND	ND - 2.8J
C_2-Dibenzothiophenes	ND	ND	ND	ND - 2.3J
C_3-Dibenzothiophenes	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND - 23
Pyrene	ND	ND	ND	ND - 17
C_1-Fluoranthenes/Pyrenes	ND	ND	ND	ND - 8J

Table C-36. (Continued).

Analyte	Jewel box	Red snapper	Spadefish	Gray triggerfish
C_2-Fluoranthenes/Pyrenes	ND	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND	ND - 4.4J
Chrysene	ND	ND	ND	ND - 4.6J
C_1-Chrysenes	ND	ND	ND	ND
C_2-Chrysenes	ND	ND	ND	ND
C_3-Chrysenes	ND	ND	ND	ND
C_4-Chrysenes	ND	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND	ND - 3.4J
Benzo[k]fluoranthene	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	ND	ND	ND	ND - 250J
Benzo[e]pyrene	ND	ND	ND	ND - 3.3J
Benzo[a]pyrene	ND	ND	ND	ND
Perylene	ND	ND	ND	ND
Indeno[1,2,3-c,d]pyrene	ND	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table C-37. Summary of metal concentrations (µg/g dry weight) in the edible tissues of five species collected at East Cameron 229A during Cruise 1.

Analyte	Jewel box	Red snapper	Spadefish	Gray triggerfish
Arsenic	35 - 39	0.32 - 0.46	1.5 - 3.4	20 - 24
Barium	11 - 13	0.013 - 0.12	0.008 - 0.12	0.090 - 0.31
Cadmium	5.6 - 7.0	0.001 - 0.004	0.006 - 0.010	0.003 - 0.011
Mercury	0.024 - 0.030	0.28 - 0.33	0.22 - 0.38	0.11 - 0.43

Table C-38. Summary of radionuclide activities (pCi/g wet weight) in the edible tissues of five species collected at East Cameron 229A during Cruise 1.

Analyte	Jewel box	Red snapper	Spadefish	Gray triggerfish
^{226}Ra	0.005 - 0.008	ND	ND	ND
^{228}Ra	0.004 - 0.030	ND - 0.031	ND - 0.022	ND

ND = Concentration below the method detection limit.

APPENDIX D

ANALYTICAL RESULTS FOR CRUISES 2 AND 3

Table D-1. Concentrations of volatile organic compounds (µg/L) in produced water samples collected at East Breaks 165A during Cruise 2.

Analyte	Sample 1 (VOW-01)	Sample 2 (VOW-02)	Sample 3 (VOW-03)
Benzene	910	890	890
Toluene	450	440	450
Ethylbenzene	66	67	67
m/p-Xylene	260	260	260
o-Xylene	130	130	130
C_3-Benzenes	49	49	49
C_4-Benzenes	9.4	8.6	8.8

Table D-2. Concentrations of volatile organic compounds (µg/L) in produced water samples collected at Green Canyon 19A during Cruise 2.

Analyte	Sample 1 (VOW-04)	Sample 2 (VOW-05)	Sample 3 (VOW-06)
Benzene	440	440	440
Toluene	360	350	370
Ethylbenzene	70	69	70
m/p-Xylene	230	220	230
o-Xylene	140	130	140
C_3-Benzenes	53	48	54
C_4-Benzenes	11	11	18

Table D-3. Concentrations of volatile organic compounds (µg/L) in ambient seawater samples collected at East Breaks 165A during Cruise 2.

Analyte	Sample 1 (VOW-07)	Sample 2 (VOW-08)	Sample 3 (VOW-09)
Benzene	ND	ND	ND
Toluene	ND	ND	ND
Ethylbenzene	ND	ND	ND
m/p-Xylene	ND	ND	ND
o-Xylene	ND	ND	ND
C_3-Benzenes	ND	ND	ND
C_4-Benzenes	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-4. Concentrations of volatile organic compounds (µg/L) in ambient seawater samples collected at High Island A 356A during Cruise 2.

Analyte	Sample 1 (VOW-10)	Sample 2 (VOW-11)	Sample 3 (VOW-12)
Benzene	ND	ND	ND
Toluene	ND	0.15 J	ND
Ethylbenzene	ND	ND	ND
m/p-Xylene	ND	ND	ND
o-Xylene	ND	ND	ND
C_3-Benzenes	ND	ND	ND
C_4-Benzenes	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-5. Concentrations of volatile organic compounds (µg/L) in ambient seawater samples collected at Green Canyon 19A during Cruise 2.

Analyte	Sample 1 (VOW-13)	Sample 2 (VOW-14)	Sample 3 (VOW-15)
Benzene	ND	ND	ND
Toluene	ND	ND	ND
Ethylbenzene	ND	ND	ND
m/p-Xylene	ND	ND	ND
o-Xylene	ND	ND	ND
C_3-Benzenes	ND	ND	ND
C_4-Benzenes	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-6. Concentrations of volatile organic compounds (µg/L) in ambient seawater samples collected at Eugene Island 361A during Cruise 2.

Analyte	Sample 1 (VOW-16)	Sample 2 (VOW-17)	Sample 3 (VOW-18)
Benzene	ND	ND	ND
Toluene	ND	0.16 J	ND
Ethylbenzene	ND	ND	ND
m/p-Xylene	ND	ND	ND
o-Xylene	ND	ND	ND
C_3-Benzenes	ND	ND	ND
C_4-Benzenes	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-7. Concentrations of volatile organic compounds (µg/L) in produced water samples collected at East Breaks 165A during Cruise 3.

Analyte	Sample 1 (VOW-19)	Sample 2 (VOW-20)	Sample 3 (VOW-21)
Benzene	970	1000	1100
Toluene	660	540	570
Ethylbenzene	63	63	66
m/p-Xylene	260	260	270
o-Xylene	120	120	120
C_3-Benzenes	25	26	24
C_4-Benzenes	5.4	4.2	4.4

Table D-8. Concentrations of volatile organic compounds (µg/L) in produced water samples collected from the primary high-volume discharge at Green Canyon 19A during Cruise 3.

Analyte	Sample 1 (VOW-22)	Sample 2 (VOW-23)	Sample 3 (VOW-24)
Benzene	1000	1000	1000
Toluene	950	980	1000
Ethylbenzene	110	110	110
m/p-Xylene	340	340	340
o-Xylene	190	190	190
C_3-Benzenes	29	27	31
C_4-Benzenes	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-9. Concentrations of volatile organic compounds (µg/L) in produced water samples collected from the secondary low-volume discharge at Green Canyon 19A during Cruise 3.

Analyte	Sample 1 (VOW-25)	Sample 2 (VOW-26)	Sample 3 (VOW-27)
Benzene	460	490	470
Toluene	340	340	350
Ethylbenzene	26	28	29
m/p-Xylene	96	100	110
o-Xylene	60	64	67
C_3-Benzenes	12	16	18
C_4-Benzenes	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-10. Concentrations of volatile organic compounds (µg/L) in ambient seawater samples collected at East Breaks 165A during Cruise 3.

Analyte	Sample 1 (VOW-28)	Sample 2 (VOW-29)	Sample 3 (VOW-30)
Benzene	ND	0.62 J	ND
Toluene	ND	0.13 J	ND
Ethylbenzene	ND	ND	ND
m/p-Xylene	ND	ND	ND
o-Xylene	ND	ND	ND
C_3-Benzenes	ND	ND	ND
C_4-Benzenes	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-11. Concentrations of volatile organic compounds (µg/L) in ambient seawater samples collected at High Island A 356A during Cruise 3.

Analyte	Sample 1 (VOW-31)	Sample 2 (VOW-32)	Sample 3 (VOW-33)
Benzene	ND	ND	ND
Toluene	ND	ND	ND
Ethylbenzene	ND	ND	ND
m/p-Xylene	ND	ND	ND
o-Xylene	ND	ND	ND
C_3-Benzenes	ND	ND	ND
C_4-Benzenes	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-12. Concentrations of volatile organic compounds (µg/L) in ambient seawater samples collected at Green Canyon 19A during Cruise 3.

Analyte	Sample 1 (VOW-34)	Sample 2 (VOW-35)	Sample 3 (VOW-36)
Benzene	ND	ND	ND
Toluene	ND	ND	ND
Ethylbenzene	ND	ND	ND
m/p-Xylene	ND	ND	ND
o-Xylene	ND	ND	ND
C_3-Benzenes	ND	ND	ND
C_4-Benzenes	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-13. Concentrations of volatile organic compounds (µg/L) in ambient seawater samples collected at Eugene Island 361A during Cruise 3.

Analyte	Sample 1 (VOW-37)	Sample 2 (VOW-38)	Sample 3 (VOW-39)
Benzene	ND	ND	ND
Toluene	ND	ND	ND
Ethylbenzene	ND	ND	ND
m/p-Xylene	ND	ND	ND
o-Xylene	ND	ND	ND
C_3-Benzenes	ND	ND	ND
C_4-Benzenes	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-14. Results of the volatile organic compound analysis of composite jewel box tissue samples at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-001)	Analysis 2 (VOT-002)	Analysis 1 (VOT-003)	Analysis 2 (VOT-004)	Analysis 1 (VOT-005)	Analysis 2 (VOT-006)
Benzene (ng/g wet weight)	ND	ND	ND	ND	1.1 J	0.9 J
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	7.3 J	5.9 J
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-15. Results of the volatile organic compound analysis of composite thorny oyster tissue samples at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-007)	Analysis 2 (VOT-008)	Analysis 1 (VOT-009)	Analysis 2 (VOT-010)	Analysis 1 (VOT-011)	Analysis 2 (VOT-012)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-16. Results of the volatile organic compound analysis of composite yellow chub tissue samples at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-013)	Analysis 2 (VOT-014)	Analysis 1 (VOT-015)	Analysis 2 (VOT-016)	Analysis 1 (VOT-017)	Analysis 2 (VOT-018)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-17. Results of the volatile organic compound analysis of composite creole-fish tissue samples at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-019)	Analysis 2 (VOT-020)	Analysis 1 (VOT-021)	Analysis 2 (VOT-022)	Analysis 1 (VOT-023)	Analysis 2 (VOT-024)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-18. Results of the volatile organic compound analysis of composite rockhind tissue samples at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-025)	Analysis 2 (VOT-026)	Analysis 1 (VOT-027)	Analysis 2 (VOT-028)	Analysis 1 (VOT-029)	Analysis 2 (VOT-030)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-19. Results of the volatile organic compound analysis of composite jewel box tissue samples at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-031)	Analysis 2 (VOT-032)	Analysis 1 (VOT-033)	Analysis 2 (VOT-034)	Analysis 1 (VOT-035)	Analysis 2 (VOT-036)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-20. Results of the volatile organic compound analysis of composite thorny oyster tissue samples at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-037)	Analysis 2 (VOT-038)	Analysis 1 (VOT-039)	Analysis 2 (VOT-040)	Analysis 1 (VOT-041)	Analysis 2 (VOT-042)
Benzene (ng/g wet weight)	1.1 J	1.5 J	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	6.6 J	9.3 J	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-21. Results of the volatile organic compound analysis of composite yellow chub tissue samples at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-043)	Analysis 2 (VOT-044)	Analysis 1 (VOT-045)	Analysis 2 (VOT-046)	Analysis 1 (VOT-047)	Analysis 2 (VOT-048)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-22. Results of the volatile organic compound analysis of composite creole-fish tissue samples at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-049)	Analysis 2 (VOT-050)	Analysis 1 (VOT-051)	Analysis 2 (VOT-052)	Analysis 1 (VOT-053)	Analysis 2 (VOT-054)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-23. Results of the volatile organic compound analysis of composite rockhind tissue samples at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-055)	Analysis 2 (VOT-056)	Analysis 1 (VOT-057)	Analysis 2 (VOT-058)	Analysis 1 (VOT-059)	Analysis 2 (VOT-060)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-24. Results of the volatile organic compound analysis of composite jewel box tissue samples at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-061)	Analysis 2 (VOT-062)	Analysis 1 (VOT-063)	Analysis 2 (VOT-064)	Analysis 1 (VOT-065)	Analysis 2 (VOT-066)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-25. Results of the volatile organic compound analysis of composite thorny oyster tissue samples at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-067)	Analysis 2 (VOT-068)	Analysis 1 (VOT-069)	Analysis 2 (VOT-070)	Analysis 1 (VOT-071)	Analysis 2 (VOT-072)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-26. Results of the volatile organic compound analysis of composite yellow chub tissue samples at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-073)	Analysis 2 (VOT-074)	Analysis 1 (VOT-075)	Analysis 2 (VOT-076)	Analysis 1 (VOT-077)	Analysis 2 (VOT-078)
Benzene (ng/g wet weight)	1.1 J	1.7 J	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	5.2 J	7.7 J	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-27. Results of the volatile organic compound analysis of composite creole-fish tissue samples at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-079)	Analysis 2 (VOT-080)	Analysis 1 (VOT-081)	Analysis 2 (VOT-082)	Analysis 1 (VOT-083)	Analysis 2 (VOT-084)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-28. Results of the volatile organic compound analysis of composite gray triggerfish tissue samples at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-085)	Analysis 2 (VOT-086)	Analysis 1 (VOT-087)	Analysis 2 (VOT-088)	Analysis 1 (VOT-089)	Analysis 2 (VOT-090)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-29. Results of the volatile organic compound analysis of composite jewel box tissue samples at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-091)	Analysis 2 (VOT-092)	Analysis 1 (VOT-093)	Analysis 2 (VOT-094)	Analysis 1 (VOT-095)	Analysis 2 (VOT-096)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-30. Results of the volatile organic compound analysis of composite thorny oyster tissue samples at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-097)	Analysis 2 (VOT-098)	Analysis 1 (VOT-099)	Analysis 2 (VOT-100)	Analysis 1 (VOT-101)	Analysis 2 (VOT-102)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-31. Results of the volatile organic compound analysis of composite yellow chub tissue samples at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-103)	Analysis 2 (VOT-104)	Analysis 1 (VOT-105)	Analysis 2 (VOT-106)	Analysis 1 (VOT-107)	Analysis 2 (VOT-108)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-32. Results of the volatile organic compound analysis of composite creole-fish tissue samples at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-109)	Analysis 2 (VOT-110)	Analysis 1 (VOT-111)	Analysis 2 (VOT-112)	Analysis 1 (VOT-113)	Analysis 2 (VOT-114)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-33. Results of the volatile organic compound analysis of composite gray triggerfish tissue samples at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-115)	Analysis 2 (VOT-116)	Analysis 1 (VOT-117)	Analysis 2 (VOT-118)	Analysis 1 (VOT-119)	Analysis 2 (VOT-120)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-34. Results of the volatile organic compound analysis of composite jewel box tissue samples at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-121)	Analysis 2 (VOT-122)	Analysis 1 (VOT-123)	Analysis 2 (VOT-124)	Analysis 1 (VOT-125)	Analysis 2 (VOT-126)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	1.8 J	1.8 J	1.8 J	1.2 J	1.3 J	1.2 J
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	15 J	15 J	16 J	11 J	11 J	10 J
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-35. Results of the volatile organic compound analysis of composite thorny oyster tissue samples at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-127)	Analysis 2 (VOT-128)	Analysis 1 (VOT-129)	Analysis 2 (VOT-130)	Analysis 1 (VOT-131)	Analysis 2 (VOT-132)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	2.7 J	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	22 J	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-36. Results of the volatile organic compound analysis of composite yellow chub tissue samples at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-133)	Analysis 2 (VOT-134)	Analysis 1 (VOT-135)	Analysis 2 (VOT-136)	Analysis 1 (VOT-137)	Analysis 2 (VOT-138)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-37. Results of the volatile organic compound analysis of composite creole-fish tissue samples at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-139)	Analysis 2 (VOT-140)	Analysis 1 (VOT-141)	Analysis 2 (VOT-142)	Analysis 1 (VOT-143)	Analysis 2 (VOT-144)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-38. Results of the volatile organic compound analysis of composite sergeant major tissue samples at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-145)	Analysis 2 (VOT-146)	Analysis 1 (VOT-147)	Analysis 2 (VOT-148)	Analysis 1 (VOT-149)	Analysis 2 (VOT-150)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-39. Results of the volatile organic compound analysis of composite jewel box tissue samples at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-151)	Analysis 2 (VOT-152)	Analysis 1 (VOT-153)	Analysis 2 (VOT-154)	Analysis 1 (VOT-155)	Analysis 2 (VOT-156)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	1.7 J	2 J	3.5 J	3.4 J	5.4	7.1
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	18 J	21 J	29 J	29 J	33	43
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-40. Results of the volatile organic compound analysis of composite thorny oyster tissue samples at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-157)	Analysis 2 (VOT-158)	Analysis 1 (VOT-159)	Analysis 2 (VOT-160)	Analysis 1 (VOT-161)	Analysis 2 (VOT-162)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	4.3 J	4.8	1.8 J	1.8 J	1.8 J	1.3 J
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	37 J	41	13 J	12 J	11 J	8.3 J
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-41. Results of the volatile organic compound analysis of composite yellow chub tissue samples at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-163)	Analysis 2 (VOT-164)	Analysis 1 (VOT-165)	Analysis 2 (VOT-166)	Analysis 1 (VOT-167)	Analysis 2 (VOT-168)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-42. Results of the volatile organic compound analysis of composite creole-fish tissue samples at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-169)	Analysis 2 (VOT-170)	Analysis 1 (VOT-171)	Analysis 2 (VOT-172)	Analysis 1 (VOT-173)	Analysis 2 (VOT-174)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-43. Results of the volatile organic compound analysis of composite sergeant major tissue samples at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-175)	Analysis 2 (VOT-176)	Analysis 1 (VOT-177)	Analysis 2 (VOT-178)	Analysis 1 (VOT-179)	Analysis 2 (VOT-180)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-44. Results of the volatile organic compound analysis of composite jewel box tissue samples at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-181)	Analysis 2 (VOT-182)	Analysis 1 (VOT-183)	Analysis 2 (VOT-184)	Analysis 1 (VOT-185)	Analysis 2 (VOT-186)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	2.8 J	0.93 J	2.8 J	2.2 J	1.3 J	2.8 J
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	17 J	5.8 J	20 J	16 J	8.4 J	18 J
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-45. Results of the volatile organic compound analysis of composite thorny oyster tissue samples at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-187)	Analysis 2 (VOT-188)	Analysis 1 (VOT-189)	Analysis 2 (VOT-190)	Analysis 1 (VOT-191)	Analysis 2 (VOT-192)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	2.8 J	5.5	7.8	4.7	3.1 J	5
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	18 J	35	46.1	28	19 J	30
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-46. Results of the volatile organic compound analysis of composite yellow chub tissue samples at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-193)	Analysis 2 (VOT-194)	Analysis 1 (VOT-195)	Analysis 2 (VOT-196)	Analysis 1 (VOT-197)	Analysis 2 (VOT-198)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-47. Results of the volatile organic compound analysis of composite creole-fish tissue samples at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-199)	Analysis 2 (VOT-200)	Analysis 1 (VOT-201)	Analysis 2 (VOT-202)	Analysis 1 (VOT-203)	Analysis 2 (VOT-204)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-48. Results of the volatile organic compound analysis of composite gray triggerfish tissue samples at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-205)	Analysis 2 (VOT-206)	Analysis 1 (VOT-207)	Analysis 2 (VOT-208)	Analysis 1 (VOT-209)	Analysis 2 (VOT-210)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	2 J	2.2 J	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	9.9 J	11 J	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-49. Results of the volatile organic compound analysis of composite jewel box tissue samples at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-211)	Analysis 2 (VOT-212)	Analysis 1 (VOT-213)	Analysis 2 (VOT-214)	Analysis 1 (VOT-215)	Analysis 2 (VOT-216)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	8.1	5	5.9	5.1	6.3	5.2
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	64	40	51	44	64	53
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-50. Results of the volatile organic compound analysis of composite thorny oyster tissue samples at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-217)	Analysis 2 (VOT-218)	Analysis 1 (VOT-219)	Analysis 2 (VOT-220)	Analysis 1 (VOT-221)	Analysis 2 (VOT-222)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	3.8 J	3 J	4.4	7.3	9.1	10.7
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	25 J	20 J	28	46	58	68
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-51. Results of the volatile organic compound analysis of composite yellow chub tissue samples at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-223)	Analysis 2 (VOT-224)	Analysis 1 (VOT-225)	Analysis 2 (VOT-226)	Analysis 1 (VOT-227)	Analysis 2 (VOT-228)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	2.7 J	ND	1.9 J	ND	ND	2.7 J
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	11 J	ND	7.5 J	ND	ND	11.0 J
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-52. Results of the volatile organic compound analysis of composite creole-fish tissue samples at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-229)	Analysis 2 (VOT-230)	Analysis 1 (VOT-231)	Analysis 2 (VOT-232)	Analysis 1 (VOT-233)	Analysis 2 (VOT-234)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	3 J	3.1 J	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	14.0 J	15.0 J	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-53. Results of the volatile organic compound analysis of composite gray triggerfish tissue samples at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (VOT-235)	Analysis 2 (VOT-236)	Analysis 1 (VOT-237)	Analysis 2 (VOT-238)	Analysis 1 (VOT-239)	Analysis 2 (VOT-240)
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	1.7 J	1.4 J	1.2 J	1.3 J	2 J	2.2 J
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	8.4 J	6.8 J	5.8 J	6.1 J	9.3 J	10 J
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-54. Concentrations of semivolatile organic compounds (ng/L) in produced water samples collected at East Breaks 165A during Cruise 2.

Analyte	Sample 1 (SVW-01)	Sample 2 (SVW-02)	Sample 3 (SVW-03)
Phenol	430000 L	430000 L	370000 L
Naphthalene	14000 L	14000 L	16000 L
2-Methylnaphthalene	8100 L	8700 L	9700 L
1-Methylnaphthalene	5900 L	6200 L	7000 L
2,6-Dimethylnaphthalene	1200	1100	1200
2,3,5-Trimethylnaphthalene	500	630	420
C_1-Naphthalenes	11000	12000	12000
C_2-Naphthalenes	6200	6700	6200
C_3-Naphthalenes	2900	3300	2800
C_4-Naphthalenes	1600	2200	1800
Acenaphthylene	ND	500	ND
Acenaphthene	50	ND	ND
Biphenyl	1100	990	1000
Fluorene	180	130	160
C_1-Fluorenes	210	250	210
C_2-Fluorenes	410	390	380
C_3-Fluorenes	500	560	470
Anthracene	18	24	19
Phenanthrene	130	170	140
1-Methylphenanthrene	90	84	54
C_1-Phenanthrenes/anthracenes	240	260	260
C_2-Phenanthrenes/anthracenes	250	270	280
C_3-Phenanthrenes/anthracenes	350	420	ND
C_4-Phenanthrenes/anthracenes	400	440	ND
Dibenzothiophene	89	90	81
C_1-Dibenzothiophenes	190	210	200
C_2-Dibenzothiophenes	280	280	270
C_3-Dibenzothiophenes	350	370	340
Flouranthene	ND	4.8 J	ND
Pyrene	10 J	10 J	11
C_1-Flouranthenes/pyrenes	ND	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND
Chrysene	ND	ND	ND
C_1-Chrysenes	ND	ND	ND
C_2-Chrysenes	ND	ND	ND
C_3-Chrysenes	ND	ND	ND
C_4-Chrysenes	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Bis(2-ethylhexyl)phthalate	110 J	170 J	330 J
Benzo[e]pyrene	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND
Perylene	45	49	47
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
L = Analyte concentration is reported from a dilution.
ND = Concentration below the MDL.

Table D-55. Concentrations of semivolatile organic compounds (ng/L) in produced water samples collected at Green Canyon 19A during Cruise 2.

Analyte	Sample 1 (SVW-04)	Sample 2 (SVW-05)	Sample 3 (SVW-06)
Phenol	320000 L	360000 L	410000 L
Naphthalene	12000 L	11000 L	18000
2-Methylnaphthalene	8700 L	8500 L	9300
1-Methylnaphthalene	8300 L	8400 L	8800
2,6-Dimethylnaphthalene	1300	1400	880
2,3,5-Trimethylnaphthalene	490	720	660
C_1-Naphthalenes	9300	12000	11000
C_2-Naphthalenes	7200	8800	8400
C_3-Naphthalenes	4500	4700	4900
C_4-Naphthalenes	2900	2900	2700
Acenaphthylene	ND	ND	ND
Acenaphthene	ND	ND	ND
Biphenyl	660	780	910
Fluorene	230	280	270
C_1-Fluorenes	360	450	400
C_2-Fluorenes	750	810	720
C_3-Fluorenes	940	950	970
Anthracene	ND	30	32
Phenanthrene	330	340	360
1-Methylphenanthrene	200	180	180
C_1-Phenanthrenes/anthracenes	710	620	630
C_2-Phenanthrenes/anthracenes	980	740	730
C_3-Phenanthrenes/anthracenes	870	610	560
C_4-Phenanthrenes/anthracenes	620	570	540
Dibenzothiophene	350	340	350
C_1-Dibenzothiophenes	740	730	710
C_2-Dibenzothiophenes	1300	1100	1100
C_3-Dibenzothiophenes	1500	1300	1200
Flouranthene	ND	10 J	20
Pyrene	30	22	19
C_1-Flouranthenes/pyrenes	88	80	76
C_2-Flouranthenes/pyrenes	120	99	100
Benzo[a]anthracene	ND	ND	ND
Chrysene	18	12 J	ND
C_1-Chrysenes	41	34	26
C_2-Chrysenes	67	60	55
C_3-Chrysenes	88	73	71
C_4-Chrysenes	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Bis(2-ethylhexyl)phthalate	110 J	110 J	97 J
Benzo[e]pyrene	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND
Perylene	210	170	160
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
L = Analyte concentration is reported from a dilution.
ND = Concentration below the MDL.

Table D-56. Concentrations of semivolatile organic compounds (ng/L) in ambient seawater samples collected at East Breaks 165A during Cruise 2.

Analyte	Sample 1 (SVW-07)	Sample 2 (SVW-08)	Sample 3 (SVW-09)
Phenol	62 J	250 B	57 J
Naphthalene	4.3 J	6.4 J	7 J
2-Methylnaphthalene	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND
C_1-Naphthalenes	ND	ND	ND
C_2-Naphthalenes	ND	ND	ND
C_3-Naphthalenes	ND	ND	ND
C_4-Naphthalenes	ND	ND	ND
Acenaphthylene	ND	ND	ND
Acenaphthene	ND	ND	ND
Biphenyl	ND	ND	ND
Fluorene	ND	ND	ND
C_1-Fluorenes	ND	ND	ND
C_2-Fluorenes	ND	ND	ND
C_3-Fluorenes	ND	ND	ND
Anthracene	ND	ND	ND
Phenanthrene	ND	ND	ND
1-Methylphenanthrene	ND	ND	ND
C_1-Phenanthrenes/anthracenes	ND	ND	ND
C_2-Phenanthrenes/anthracenes	ND	ND	ND
C_3-Phenanthrenes/anthracenes	ND	ND	ND
C_4-Phenanthrenes/anthracenes	ND	ND	ND
Dibenzothiophene	ND	ND	ND
C_1-Dibenzothiophenes	ND	ND	ND
C_2-Dibenzothiophenes	ND	ND	ND
C_3-Dibenzothiophenes	ND	ND	ND
Flouranthene	ND	ND	ND
Pyrene	ND	ND	ND
C_1-Flouranthenes/pyrenes	ND	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND
Chrysene	ND	ND	ND
C_1-Chrysenes	ND	ND	ND
C_2-Chrysenes	ND	ND	ND
C_3-Chrysenes	ND	ND	ND
C_4-Chrysenes	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Bis(2-ethylhexyl)phthalate	160 J	ND	ND
Benzo[e]pyrene	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND
Perylene	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-57. Concentrations of semivolatile organic compounds (ng/L) in ambient seawater samples collected at High Island A 356A during Cruise 2.

Analyte	Sample 1 (SVW-10)	Sample 2 (SVW-11)	Sample 3 (SVW-12)
Phenol	59 J	46 J	66 J
Naphthalene	ND	ND	5.2 J
2-Methylnaphthalene	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND
C_1-Naphthalenes	ND	ND	ND
C_2-Naphthalenes	ND	ND	ND
C_3-Naphthalenes	ND	ND	ND
C_4-Naphthalenes	ND	ND	ND
Acenaphthylene	ND	ND	3.1 J
Acenaphthene	ND	ND	ND
Biphenyl	ND	ND	ND
Fluorene	ND	ND	ND
C_1-Fluorenes	ND	ND	2.8 J
C_2-Fluorenes	ND	ND	27
C_3-Fluorenes	ND	ND	52
Anthracene	ND	ND	ND
Phenanthrene	ND	ND	ND
1-Methylphenanthrene	ND	ND	4.6 J
C_1-Phenanthrenes/anthracenes	ND	ND	25
C_2-Phenanthrenes/anthracenes	ND	ND	64
C_3-Phenanthrenes/anthracenes	ND	ND	87
C_4-Phenanthrenes/anthracenes	ND	ND	130
Dibenzothiophene	ND	ND	ND
C_1-Dibenzothiophenes	ND	ND	12
C_2-Dibenzothiophenes	ND	ND	43
C_3-Dibenzothiophenes	ND	ND	78
Flouranthene	ND	ND	3 J
Pyrene	ND	ND	10 J
C_1-Flouranthenes/pyrenes	ND	ND	37
C_2-Flouranthenes/pyrenes	ND	ND	61
Benzo[a]anthracene	ND	ND	ND
Chrysene	ND	ND	8.6 J
C_1-Chrysenes	ND	ND	11 J
C_2-Chrysenes	ND	ND	16 J
C_3-Chrysenes	ND	ND	19
C_4-Chrysenes	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Bis(2-ethylhexyl)phthalate	100 J	130 J	290 J
Benzo[e]pyrene	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND
Perylene	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-58. Concentrations of semivolatile organic compounds (ng/L) in ambient seawater samples collected at Green Canyon 19A during Cruise 2.

Analyte	Sample 1 (SVW-13)	Sample 2 (SVW-14)	Sample 3 (SVW-15)
Phenol	95 B	58 J	110 B
Naphthalene	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND
C_1-Naphthalenes	ND	ND	ND
C_2-Naphthalenes	ND	ND	ND
C_3-Naphthalenes	ND	ND	ND
C_4-Naphthalenes	ND	ND	ND
Acenaphthylene	ND	ND	ND
Acenaphthene	ND	ND	ND
Biphenyl	ND	ND	ND
Fluorene	ND	ND	ND
C_1-Fluorenes	ND	ND	ND
C_2-Fluorenes	ND	ND	ND
C_3-Fluorenes	ND	ND	ND
Anthracene	ND	ND	ND
Phenanthrene	ND	ND	ND
1-Methylphenanthrene	ND	ND	ND
C_1-Phenanthrenes/anthracenes	ND	ND	ND
C_2-Phenanthrenes/anthracenes	ND	ND	ND
C_3-Phenanthrenes/anthracenes	ND	ND	ND
C_4-Phenanthrenes/anthracenes	ND	ND	ND
Dibenzothiophene	ND	ND	ND
C_1-Dibenzothiophenes	ND	ND	ND
C_2-Dibenzothiophenes	ND	ND	ND
C_3-Dibenzothiophenes	ND	ND	ND
Flouranthene	ND	ND	ND
Pyrene	ND	ND	ND
C_1-Flouranthenes/pyrenes	ND	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND
Chrysene	ND	ND	ND
C_1-Chrysenes	ND	ND	ND
C_2-Chrysenes	ND	ND	ND
C_3-Chrysenes	ND	ND	ND
C_4-Chrysenes	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Bis(2-ethylhexyl)phthalate	160 J	110 J	160 J
Benzo[e]pyrene	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND
Perylene	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-59. Concentrations of semivolatile organic compounds (ng/L) in ambient seawater samples collected at Eugene Island 361A during Cruise 2.

Analyte	Sample 1 (SVW-16)	Sample 2 (SVW-17)	Sample 3 (SVW-18)
Phenol	240 B	53 J	89 J
Naphthalene	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND
C_1-Naphthalenes	ND	ND	ND
C_2-Naphthalenes	ND	ND	ND
C_3-Naphthalenes	ND	ND	ND
C_4-Naphthalenes	ND	ND	ND
Acenaphthylene	ND	ND	ND
Acenaphthene	ND	ND	ND
Biphenyl	ND	ND	ND
Fluorene	ND	ND	ND
C_1-Fluorenes	ND	ND	ND
C_2-Fluorenes	ND	ND	ND
C_3-Fluorenes	ND	ND	ND
Anthracene	ND	ND	ND
Phenanthrene	ND	ND	ND
1-Methylphenanthrene	ND	ND	ND
C_1-Phenanthrenes/anthracenes	ND	ND	ND
C_2-Phenanthrenes/anthracenes	ND	ND	ND
C_3-Phenanthrenes/anthracenes	ND	ND	ND
C_4-Phenanthrenes/anthracenes	ND	ND	ND
Dibenzothiophene	ND	ND	ND
C_1-Dibenzothiophenes	ND	ND	ND
C_2-Dibenzothiophenes	ND	ND	ND
C_3-Dibenzothiophenes	ND	ND	ND
Flouranthene	ND	ND	ND
Pyrene	ND	ND	ND
C_1-Flouranthenes/pyrenes	ND	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND
Chrysene	ND	ND	ND
C_1-Chrysenes	ND	ND	ND
C_2-Chrysenes	ND	ND	ND
C_3-Chrysenes	ND	ND	ND
C_4-Chrysenes	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Bis(2-ethylhexyl)phthalate	140 J	220 J	150 J
Benzo[e]pyrene	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND
Perylene	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-60. Concentrations of semivolatile organic compounds (ng/L) in produced water samples collected at East Breaks 165A during Cruise 3.

Analyte	Sample 1 (SVW-19)	Sample 2 (SVW-20)	Sample 3 (SVW-21)
Phenol	560000 L	610000 L	560000 L
Naphthalene	12000 L	10000 L	8900 L
2-Methylnaphthalene	7600 L	7100 L	6100 L
1-Methylnaphthalene	5400 L	5000 L	4200 L
2,6-Dimethylnaphthalene	810	490	560
2,3,5-Trimethylnaphthalene	430	390	310
C_1-Naphthalenes	7800 L	7300 L	6300 L
C_2-Naphthalenes	5300	5200	4400
C_3-Naphthalenes	3000	2700	2500
C_4-Naphthalenes	1200	1000	1100
Acenaphthylene	ND	ND	ND
Acenaphthene	ND	ND	ND
Biphenyl	590	560	490
Fluorene	190	77	59
C_1-Fluorenes	170 L	160 L	170 L
C_2-Fluorenes	200 L	230 L	240 L
C_3-Fluorenes	390 L	270 L	340 L
Anthracene	38 L	24 L	29 L
Phenanthrene	130	110	120
1-Methylphenanthrene	93	58	68
C_1-Phenanthrenes/anthracenes	290	220	300
C_2-Phenanthrenes/anthracenes	290	250	360
C_3-Phenanthrenes/anthracenes	170 L	580	850
C_4-Phenanthrenes/anthracenes	280 L	430	900
Dibenzothiophene	79	72	65
C_1-Dibenzothiophenes	180	160	190
C_2-Dibenzothiophenes	410	400	490
C_3-Dibenzothiophenes	380	300	470
Flouranthene	ND	ND	ND
Pyrene	9.5 J	11	32
C_1-Flouranthenes/pyrenes	ND	ND	170
C_2-Flouranthenes/pyrenes	ND	ND	190
Benzo[a]anthracene	ND	ND	ND
Chrysene	ND	ND	ND
C_1-Chrysenes	ND	ND	ND
C_2-Chrysenes	ND	ND	ND
C_3-Chrysenes	ND	ND	ND
C_4-Chrysenes	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Bis(2-ethylhexyl)phthalate	150 J	250 J	570
Benzo[e]pyrene	ND	ND	3.2 J
Benzo[a]pyrene	ND	ND	ND
Perylene	39	35	34
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
L = Analyte concentration is reported from a dilution.
ND = Concentration below the MDL.

Table D-61. Concentrations of semivolatile organic compounds (ng/L) in produced water samples collected from the primary high-volume discharge at Green Canyon 19A during Cruise 3.

Analyte	Sample 1 (SVW-22)	Sample 2 (SVW-23)	Sample 3 (SVW-24)
Phenol	550000 L	580000 L	500000 L
Naphthalene	5300 L	5300 L	6000 L
2-Methylnaphthalene	3600 L	3600 L	4200 L
1-Methylnaphthalene	3400 L	3300 L	3900 L
2,6-Dimethylnaphthalene	640	660	500
2,3,5-Trimethylnaphthalene	300	260	260
C_1-Naphthalenes	4300 L	4200 L	4700 L
C_2-Naphthalenes	5200	5500	5300
C_3-Naphthalenes	3100	2900	3000
C_4-Naphthalenes	1500	1700	1900
Acenaphthylene	1100	ND	ND
Acenaphthene	69	81	77
Biphenyl	360	370	370
Fluorene	210	190	200
C_1-Fluorenes	94 L	100 L	120 L
C_2-Fluorenes	260 L	250 L	250 L
C_3-Fluorenes	320 L	350 L	370 L
Anthracene	49 L	52 L	44 L
Phenanthrene	160	160	150
1-Methylphenanthrene	120	120	130
C_1-Phenanthrenes/anthracenes	290	300	270
C_2-Phenanthrenes/anthracenes	300	260	310
C_3-Phenanthrenes/anthracenes	100 L	140 L	140 L
C_4-Phenanthrenes/anthracenes	260 L	180 L	190 L
Dibenzothiophene	180	180	170
C_1-Dibenzothiophenes	250	270	280
C_2-Dibenzothiophenes	470	510	480
C_3-Dibenzothiophenes	400	510	440
Flouranthene	6.4 J	14	4.6 J
Pyrene	8.4 J	16	5.5 J
C_1-Flouranthenes/pyrenes	ND	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND
Chrysene	ND	ND	ND
C_1-Chrysenes	ND	ND	ND
C_2-Chrysenes	ND	ND	ND
C_3-Chrysenes	ND	ND	ND
C_4-Chrysenes	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Bis(2-ethylhexyl)phthalate	ND	150 J	ND
Benzo[e]pyrene	ND	3.2 J	ND
Benzo[a]pyrene	ND	3.2 J	ND
Perylene	29 J	42	37
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	4.7 J

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
L = Analyte concentration is reported from a dilution.
ND = Concentration below the MDL.

Table D-62. Concentrations of semivolatile organic compounds (ng/L) in produced water samples collected from the secondary low-volume discharge at Green Canyon 19A during Cruise 3.

Analyte	Sample 1 (SVW-25)	Sample 2 (SVW-26)	Sample 3 (SVW-27)
Phenol	400000 L	350000 L	350000 L
Naphthalene	12000 L	10000 L	11000 L
2-Methylnaphthalene	12000 L	11000 L	11000 L
1-Methylnaphthalene	10000 L	9400 L	8900 L
2,6-Dimethylnaphthalene	1800	1600	1700
2,3,5-Trimethylnaphthalene	2200	1700	2000
C_1-Naphthalenes	13000 L	12000 L	12000 L
C_2-Naphthalenes	13000	12000	13000
C_3-Naphthalenes	14000	14000	16000
C_4-Naphthalenes	7600	6800	8200
Acenaphthylene	ND	ND	ND
Acenaphthene	80	81	100
Biphenyl	540	530	360
Fluorene	180	180	94
C_1-Fluorenes	890	810	1000
C_2-Fluorenes	1700	1800	2000
C_3-Fluorenes	3000	2700	2900
Anthracene	ND	ND	ND
Phenanthrene	1200	1100	1100
1-Methylphenanthrene	1400	1300	1800
C_1-Phenanthrenes/anthracenes	5300	4500	6400
C_2-Phenanthrenes/anthracenes	9400	7800	9900
C_3-Phenanthrenes/anthracenes	7700	7300	9100
C_4-Phenanthrenes/anthracenes	6400	5700	7700
Dibenzothiophene	1300	1000	1500
C_1-Dibenzothiophenes	5100	4300	5300
C_2-Dibenzothiophenes	14000	11000	15000
C_3-Dibenzothiophenes	15000	12000	18000
Flouranthene	ND	ND	ND
Pyrene	250	190	230
C_1-Flouranthenes/pyrenes	740	600	910
C_2-Flouranthenes/pyrenes	1200	1200	1800
Benzo[a]anthracene	ND	ND	ND
Chrysene	170	150	200
C_1-Chrysenes	680	520	730
C_2-Chrysenes	1200	1100	1600
C_3-Chrysenes	930	840	1200
C_4-Chrysenes	990	820	1300
Benzo[b]fluoranthene	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Bis(2-ethylhexyl)phthalate	160 J	1000	110 J
Benzo[e]pyrene	34	25	32
Benzo[a]pyrene	14	32	36
Perylene	330	300	310
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND
Benzo[g,h,i]perylene	9.2 J	6.8 J	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
L = Analyte concentration is reported from a dilution.
ND = Concentration below the MDL.

Table D-63. Concentrations of semivolatile organic compounds (ng/L) in ambient seawater samples collected at East Breaks 165A during Cruise 3.

Analyte	Sample 1 (SVW-28)	Sample 2 (SVW-29)	Sample 3 (SVW-30)
Phenol	130 B	24 J	30 J
Naphthalene	4.8 J	ND	4.3 J
2-Methylnaphthalene	4.3 J	3.4 J	4.4 J
1-Methylnaphthalene	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND
C_1-Naphthalenes	ND	ND	4.8 J
C_2-Naphthalenes	ND	ND	ND
C_3-Naphthalenes	ND	ND	ND
C_4-Naphthalenes	ND	ND	ND
Acenaphthylene	ND	ND	ND
Acenaphthene	ND	ND	ND
Biphenyl	ND	ND	ND
Fluorene	ND	ND	ND
C_1-Fluorenes	ND	ND	ND
C_2-Fluorenes	ND	ND	ND
C_3-Fluorenes	ND	ND	ND
Anthracene	ND	ND	ND
Phenanthrene	ND	ND	ND
1-Methylphenanthrene	ND	ND	ND
C_1-Phenanthrenes/anthracenes	ND	ND	ND
C_2-Phenanthrenes/anthracenes	ND	ND	ND
C_3-Phenanthrenes/anthracenes	ND	ND	ND
C_4-Phenanthrenes/anthracenes	ND	ND	ND
Dibenzothiophene	ND	ND	ND
C_1-Dibenzothiophenes	ND	ND	ND
C_2-Dibenzothiophenes	ND	ND	ND
C_3-Dibenzothiophenes	ND	ND	ND
Flouranthene	ND	ND	ND
Pyrene	ND	ND	ND
C_1-Flouranthenes/pyrenes	ND	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND
Chrysene	ND	ND	ND
C_1-Chrysenes	ND	ND	ND
C_2-Chrysenes	ND	ND	ND
C_3-Chrysenes	ND	ND	ND
C_4-Chrysenes	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Bis(2-ethylhexyl)phthalate	140 J	180 J	110 J
Benzo[e]pyrene	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND
Perylene	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-64. Concentrations of semivolatile organic compounds (ng/L) in ambient seawater samples collected at High Island A 356A during Cruise 3.

Analyte	Sample 1 (SVW-31)	Sample 2 (SVW-32)	Sample 3 (SVW-33)
Phenol	45 J	24 J	76 J
Naphthalene	5.3 J	4.2 J	3.9 J
2-Methylnaphthalene	5.8 J	4.2 J	4.9 J
1-Methylnaphthalene	3.1 J	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND
C_1-Naphthalenes	6.6 J	4.8 J	4.9 J
C_2-Naphthalenes	5.8 J	ND	7 J
C_3-Naphthalenes	ND	ND	6.4 J
C_4-Naphthalenes	ND	ND	20
Acenaphthylene	ND	ND	ND
Acenaphthene	ND	ND	ND
Biphenyl	ND	ND	ND
Fluorene	ND	ND	ND
C_1-Fluorenes	ND	ND	7.9 J
C_2-Fluorenes	ND	ND	48
C_3-Fluorenes	ND	ND	200
Anthracene	ND	ND	3.2 J
Phenanthrene	ND	ND	12 J
1-Methylphenanthrene	ND	ND	14
C_1-Phenanthrenes/anthracenes	ND	ND	82
C_2-Phenanthrenes/anthracenes	ND	ND	170
C_3-Phenanthrenes/anthracenes	ND	ND	280
C_4-Phenanthrenes/anthracenes	ND	ND	450
Dibenzothiophene	ND	ND	4.3 J
C_1-Dibenzothiophenes	ND	ND	41
C_2-Dibenzothiophenes	ND	ND	160
C_3-Dibenzothiophenes	ND	ND	230
Flouranthene	ND	ND	9.2 J
Pyrene	ND	ND	32
C_1-Flouranthenes/pyrenes	ND	ND	79
C_2-Flouranthenes/pyrenes	ND	ND	180
Benzo[a]anthracene	ND	ND	ND
Chrysene	ND	ND	16 J
C_1-Chrysenes	ND	ND	33
C_2-Chrysenes	ND	ND	50
C_3-Chrysenes	ND	ND	62
C_4-Chrysenes	ND	ND	47
Benzo[b]fluoranthene	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Bis(2-ethylhexyl)phthalate	220 J	490 B	1800 B,E
Benzo[e]pyrene	ND	ND	2.8 J
Benzo[a]pyrene	ND	ND	ND
Perylene	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND

B = Analyte contained in procedural blank.
E = Analyte concentration exceeds calibration range of instrument.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-65. Concentrations of semivolatile organic compounds (ng/L) in ambient seawater samples collected at Green Canyon 19A during Cruise 3.

Analyte	Sample 1 (SVW-34)	Sample 2 (SVW-35)	Sample 3 (SVW-36)
Phenol	29 J	54 J	32 J
Naphthalene	4.8 J	4.7 J	9.3 J
2-Methylnaphthalene	6.9 J	4.7 J	9.5 J
1-Methylnaphthalene	2.5 J	2.3 J	5.3 J
2,6-Dimethylnaphthalene	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND
C_1-Naphthalenes	6.1 J	5.1 J	11 J
C_2-Naphthalenes	7.8 J	8.3 J	12 J
C_3-Naphthalenes	7.9 J	6.4 J	9.3 J
C_4-Naphthalenes	ND	ND	ND
Acenaphthylene	ND	ND	ND
Acenaphthene	4 J	4.2 J	4.6 J
Biphenyl	ND	ND	ND
Fluorene	ND	ND	ND
C_1-Fluorenes	ND	ND	ND
C_2-Fluorenes	ND	ND	ND
C_3-Fluorenes	ND	ND	ND
Anthracene	ND	ND	ND
Phenanthrene	15 J	18 J	18 J
1-Methylphenanthrene	ND	ND	ND
C_1-Phenanthrenes/anthracenes	3.6 J	3.9 J	4.2 J
C_2-Phenanthrenes/anthracenes	ND	ND	3.3 J
C_3-Phenanthrenes/anthracenes	ND	ND	ND
C_4-Phenanthrenes/anthracenes	ND	ND	ND
Dibenzothiophene	ND	ND	ND
C_1-Dibenzothiophenes	ND	ND	ND
C_2-Dibenzothiophenes	ND	ND	ND
C_3-Dibenzothiophenes	ND	ND	ND
Flouranthene	ND	ND	ND
Pyrene	ND	ND	ND
C_1-Flouranthenes/pyrenes	ND	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND
Chrysene	ND	ND	ND
C_1-Chrysenes	ND	ND	ND
C_2-Chrysenes	ND	ND	ND
C_3-Chrysenes	ND	ND	ND
C_4-Chrysenes	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Bis(2-ethylhexyl)phthalate	ND	190 J	ND
Benzo[e]pyrene	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND
Perylene	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-66. Concentrations of semivolatile organic compounds (ng/L) in ambient seawater samples collected at Eugene Island 361A during Cruise 3.

Analyte	Sample 1 (SVW-37)	Sample 2 (SVW-38)	Sample 3 (SVW-39)
Phenol	28 J	26 J	35 J
Naphthalene	ND	ND	ND
2-Methylnaphthalene	3.9 J	3.7 J	3.4 J
1-Methylnaphthalene	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND
2,3,5-Trimethylnaphthalene	ND	ND	ND
C_1-Naphthalenes	ND	ND	ND
C_2-Naphthalenes	4.6 J	3.7 J	ND
C_3-Naphthalenes	4.7 J	3.7 J	ND
C_4-Naphthalenes	ND	ND	ND
Acenaphthylene	ND	ND	ND
Acenaphthene	ND	ND	ND
Biphenyl	ND	ND	ND
Fluorene	ND	ND	ND
C_1-Fluorenes	ND	ND	ND
C_2-Fluorenes	ND	ND	ND
C_3-Fluorenes	ND	ND	ND
Anthracene	ND	ND	ND
Phenanthrene	ND	ND	ND
1-Methylphenanthrene	ND	ND	ND
C_1-Phenanthrenes/anthracenes	ND	ND	ND
C_2-Phenanthrenes/anthracenes	ND	ND	ND
C_3-Phenanthrenes/anthracenes	ND	ND	ND
C_4-Phenanthrenes/anthracenes	ND	ND	ND
Dibenzothiophene	ND	ND	ND
C_1-Dibenzothiophenes	ND	ND	ND
C_2-Dibenzothiophenes	ND	ND	ND
C_3-Dibenzothiophenes	ND	ND	ND
Flouranthene	ND	ND	ND
Pyrene	ND	ND	ND
C_1-Flouranthenes/pyrenes	ND	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND	ND
Benzo[a]anthracene	ND	ND	ND
Chrysene	ND	ND	ND
C_1-Chrysenes	ND	ND	ND
C_2-Chrysenes	ND	ND	ND
C_3-Chrysenes	ND	ND	ND
C_4-Chrysenes	ND	ND	ND
Benzo[b]fluoranthene	ND	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Bis(2-ethylhexyl)phthalate	680 B	130 J	210 J
Benzo[e]pyrene	ND	ND	ND
Benzo[a]pyrene	ND	ND	ND
Perylene	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND	ND
Dibenzo[a,h]anthracene	ND	ND	ND
Benzo[g,h,i]perylene	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-67. Results of the semivolatile organic compound analysis of composite jewel box tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-001)	Analysis 2 (SVT-002)	Analysis 1 (SVT-003)	Analysis 2 (SVT-004)	Analysis 1 (SVT-005)	Analysis 2 (SVT-006)
Phenol (ng/g wet weight)	20 JB	23 JB	ND	ND	ND	ND
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	1.5 J	1.4 J	ND	0.57 J	0.59 J	0.6 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	1 J	0.9 J	1 J	1 J	1.4 J	1.3 J
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	1.2 J	1 J	0.76 J	0.85 J	0.79 J	0.93 J
C_2-Naphthalenes (ng/g wet weight)	1.4 J	ND	1.5 J	1.8 J	1.8 J	2.1 J
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	1.8 J	1.9 J
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	0.92 JB	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	1.1 J	1.1 J	1.4 J	1.5
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	1.4 J	1.4 J	1.5	2.1
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-67. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-001)	Analysis 2 (SVT-002)	Analysis 1 (SVT-003)	Analysis 2 (SVT-004)	Analysis 1 (SVT-005)	Analysis 2 (SVT-006)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	110 J	100 J	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	3	3.2	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	5.4	6.3	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	160 JB	180 JB	ND	ND	ND	ND
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	12 J	11 J	ND	4.7 J	3.9 J	4 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	7.8 J	7 J	8.3 J	8.3 J	9.3 J	8.6 J
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	9.4 J	7.8 J	6.3 J	7 J	5.2 J	6.2 J
C_2-Naphthalenes (ng/g dry weight)	11 J	ND	12 J	15 J	12 J	14 J
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	12 J	12 J
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	7.2 JB	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-67. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-001)	Analysis 2 (SVT-002)	Analysis 1 (SVT-003)	Analysis 2 (SVT-004)	Analysis 1 (SVT-005)	Analysis 2 (SVT-006)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	9.1 J	9.1 J	9.3 J	9.9
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	12 J	12 J	9.9	14
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	860 J	780 J	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	23	25	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	42	49	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-68. Results of the semivolatile organic compound analysis of composite thorny oyster tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A				Composite Sample B				Composite Sample C			
	Analysis 1 (SVT-007)		Analysis 2 (SVT-008)		Analysis 1 (SVT-009)		Analysis 2 (SVT-010)		Analysis 1 (SVT-011)		Analysis 2 (SVT-012)	
Phenol (ng/g wet weight)	22	J	21	J	17	J	19	J	21	J	22	J
Naphthalene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
2-Methylnaphthalene (ng/g wet weight)	0.64	J		ND		ND		ND	0.56	J		ND
1-Methylnaphthalene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
2,6-Dimethylnaphthalene (ng/g wet weight)		ND		ND	0.65	J	0.74	J		ND		ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_1-Naphthalenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_2-Naphthalenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_3-Naphthalenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_4-Naphthalenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Acenaphthylene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Acenaphthene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Biphenyl (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Fluorene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_1-Fluorenes (ng/g wet weight)	0.97	J		ND		ND		ND		ND		ND
C_2-Fluorenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_3-Fluorenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Anthracene (ng/g wet weight)	0.64	J		ND		ND		ND	0.82	J	0.65	J
Phenanthrene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
1-Methylphenanthrene (ng/g wet weight)		ND		ND	0.57	J	0.59	J		ND		ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Dibenzothiophene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_1-Dibenzothiophenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_2-Dibenzothiophenes (ng/g wet weight)	1	J	1.2	J	1.9		1.6		1	J	0.96	J
C_3-Dibenzothiophenes (ng/g wet weight)	1.5		1.4	J	2.1		2.2		0.96	J	0.95	J
Fluoranthene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Pyrene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Benzo[a]anthracene (ng/g wet weight)		ND		ND		ND		ND		ND		ND

Table D-68. (Continued).

Analyte	Composite Sample A				Composite Sample B				Composite Sample C			
	Analysis 1 (SVT-007)		Analysis 2 (SVT-008)		Analysis 1 (SVT-009)		Analysis 2 (SVT-010)		Analysis 1 (SVT-011)		Analysis 2 (SVT-012)	
Chrysene (ng/g wet weight)		ND		ND	0.53	J	0.65	J		ND		ND
C_1-Chrysenes (ng/g wet weight)		ND		ND	1.5	J	1.4	J	0.87	J	0.85	J
C_2-Chrysenes (ng/g wet weight)		ND		ND	1.8	J	1.9	J		ND		ND
C_3-Chrysenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
C_4-Chrysenes (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Benzo[b]fluoranthene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Benzo[k]fluoranthene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Benzo[e]pyrene (ng/g wet weight)	0.74	J	0.7	J	0.97	J	0.82	J	0.76	J	0.7	J
Benzo[a]pyrene (ng/g wet weight)	1.1	J	1.1	J	1.5	J	1.2	J	1.1	J	0.95	J
Perylene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Dibenzo[a,h]anthracene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Benzo[g,h,i]perylene (ng/g wet weight)		ND		ND		ND		ND		ND		ND
Phenol (ng/g dry weight)	130	J	120	J	100	J	110	J	120	J	130	J
Naphthalene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
2-Methylnaphthalene (ng/g dry weight)	3.7	J		ND		ND		ND	3.3	J		ND
1-Methylnaphthalene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
2,6-Dimethylnaphthalene (ng/g dry weight)		ND		ND	3.9	J	4.4	J		ND		ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
C_1-Naphthalenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
C_2-Naphthalenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
C_3-Naphthalenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
C_4-Naphthalenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Acenaphthylene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Acenaphthene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Biphenyl (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Fluorene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
C_1-Fluorenes (ng/g dry weight)	5.6	J		ND		ND		ND		ND		ND
C_2-Fluorenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
C_3-Fluorenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Anthracene (ng/g dry weight)	3.7	J		ND		ND		ND	4.8	J	3.8	J
Phenanthrene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
1-Methylphenanthrene (ng/g dry weight)		ND		ND	3.4	J	3.5	J		ND		ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND

Table D-68. (Continued).

Analyte	Composite Sample A				Composite Sample B				Composite Sample C			
	Analysis 1 (SVT-007)		Analysis 2 (SVT-008)		Analysis 1 (SVT-009)		Analysis 2 (SVT-010)		Analysis 1 (SVT-011)		Analysis 2 (SVT-012)	
C_2-Phenanthrenes/anthracenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Dibenzothiophene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
C_1-Dibenzothiophenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
C_2-Dibenzothiophenes (ng/g dry weight)	5.8	J	7	J	11		9.5		5.8	J	5.6	J
C_3-Dibenzothiophenes (ng/g dry weight)	8.7		8.1	J	12		13		5.6	J	5.6	J
Fluoranthene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Pyrene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Benzo[a]anthracene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Chrysene (ng/g dry weight)		ND		ND	3.2	J	3.9	J		ND		ND
C_1-Chrysenes (ng/g dry weight)		ND		ND	8.9	J	8.3	J	5.1	J	5	J
C_2-Chrysenes (ng/g dry weight)		ND		ND	11	J	11	J		ND		ND
C_3-Chrysenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
C_4-Chrysenes (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Benzo[b]fluoranthene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Benzo[k]fluoranthene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Benzo[e]pyrene (ng/g dry weight)	4.3	J	4.1	J	5.8	J	4.9	J	4.4	J	4.1	J
Benzo[a]pyrene (ng/g dry weight)	6.4	J	6.4	J	8.9	J	7.1	J	6.4	J	5.6	J
Perylene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Dibenzo[a,h]anthracene (ng/g dry weight)		ND		ND		ND		ND		ND		ND
Benzo[g,h,i]perylene (ng/g dry weight)		ND		ND		ND		ND		ND		ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-69. Results of the semivolatile organic compound analysis of composite yellow chub tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-013)	Analysis 2 (SVT-014)	Analysis 1 (SVT-015)	Analysis 2 (SVT-016)	Analysis 1 (SVT-017)	Analysis 2 (SVT-018)
Phenol (ng/g wet weight)	17 J	16 J	19 J	18 J	ND	ND
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	0.65 J	0.84 J	1 J	0.87 J	0.7 J	0.81 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	0.71 J	0.7 J	0.97 J	0.95 J	0.73 J	0.74 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	1.4 J	2 J	1.6 J	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-69. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-013)	Analysis 2 (SVT-014)	Analysis 1 (SVT-015)	Analysis 2 (SVT-016)	Analysis 1 (SVT-017)	Analysis 2 (SVT-018)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	100 JB	37 JB	65 JB	370	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	74 J	70 J	86 J	81 J	ND	ND
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	2.8 J	3.6 J	4.5 J	3.9 J	3.2 J	3.7 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	3.1 J	3 J	4.4 J	4.3 J	3.3 J	3.4 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	6.1 J	9 J	7.2 J	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-69. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-013)	Analysis 2 (SVT-014)	Analysis 1 (SVT-015)	Analysis 2 (SVT-016)	Analysis 1 (SVT-017)	Analysis 2 (SVT-018)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	430 JB	160 JB	290 JB	1700	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-70. Results of the semivolatile organic compound analysis of composite creole-fish tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-019)	Analysis 2 (SVT-020)	Analysis 1 (SVT-021)	Analysis 2 (SVT-022)	Analysis 1 (SVT-023)	Analysis 2 (SVT-024)
Phenol (ng/g wet weight)	ND	ND	ND	11 J	19 J	ND
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	ND	0.58 J	ND	ND	ND	ND
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	0.7 J	ND
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	0.33 J	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-70. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-019)	Analysis 2 (SVT-020)	Analysis 1 (SVT-021)	Analysis 2 (SVT-022)	Analysis 1 (SVT-023)	Analysis 2 (SVT-024)
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	ND	ND	ND	57 J	94 J	ND
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	ND	3 J	ND	ND	ND	ND
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	3.4 J	ND
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	1.6 J	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-70. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-019)	Analysis 2 (SVT-020)	Analysis 1 (SVT-021)	Analysis 2 (SVT-022)	Analysis 1 (SVT-023)	Analysis 2 (SVT-024)
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-71. Results of the semivolatile organic compound analysis of composite rockhind tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-025)	Analysis 2 (SVT-026)	Analysis 1 (SVT-027)	Analysis 2 (SVT-028)	Analysis 1 (SVT-029)	Analysis 2 (SVT-030)
Phenol (ng/g wet weight)	18 J	17 J	19 J	16 J	18 J	34 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	3.1 J
2-Methylnaphthalene (ng/g wet weight)	0.87 J	0.78 J	ND	ND	1.1 J	0.7 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	0.92 J	0.75 J	ND	ND	1 J	0.66 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	0.65 J	0.61 J
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	1.1 J	ND	ND	ND	2 J	1.1 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-71. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-025)	Analysis 2 (SVT-026)	Analysis 1 (SVT-027)	Analysis 2 (SVT-028)	Analysis 1 (SVT-029)	Analysis 2 (SVT-030)
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	ND	ND	61 J
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	1.1 J
Phenol (ng/g dry weight)	87 J	82 J	96 J	81 J	81 J	150 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	14 J
2-Methylnaphthalene (ng/g dry weight)	4.2 J	3.8 J	ND	ND	5 J	3.2 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	4.4 J	3.6 J	ND	ND	4.5 J	3 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	2.9 J	2.7 J
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	5.3 J	ND	ND	ND	9 J	5 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-71. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-025)	Analysis 2 (SVT-026)	Analysis 1 (SVT-027)	Analysis 2 (SVT-028)	Analysis 1 (SVT-029)	Analysis 2 (SVT-030)
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	ND	ND	270 J
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	5 J

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-72. Results of the semivolatile organic compound analysis of composite jewel box tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-031)	Analysis 2 (SVT-032)	Analysis 1 (SVT-033)	Analysis 2 (SVT-034)	Analysis 1 (SVT-035)	Analysis 2 (SVT-036)
Phenol (ng/g wet weight)	18 JB	16 JB	11 JB	17 JB	37 JB	11 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	2.1 J
2-Methylnaphthalene (ng/g wet weight)	1.3 J	1.1 J	1.9 J	2 J	2.1 J	4.2
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	2.2 J
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	0.5 J	0.6 J	ND	2.2 J
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	0.5 J
C_1-Naphthalenes (ng/g wet weight)	1 J	1 J	1.4 J	1.4 J	1.5 J	3.9
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	1.3 J	ND	4.7 J
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	2.9 J
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	1.1 JB	1 JB	ND	1.1 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	1.1 J	1.1 J	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	0.9 J	1.2 J	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-72. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-031)	Analysis 2 (SVT-032)	Analysis 1 (SVT-033)	Analysis 2 (SVT-034)	Analysis 1 (SVT-035)	Analysis 2 (SVT-036)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	ND	44 J	ND
Benzo[e]pyrene (ng/g wet weight)	2.2 J	1.1 J	2.1 J	2.2 J	2.5 J	0.8 J
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	3.8 J	1.7 J	3.3 J	3.7 J	4	1.4 J
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	160 JB	140 JB	93 JB	140 JB	280 JB	83 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	16 J
2-Methylnaphthalene (ng/g dry weight)	12 J	10 J	16 J	17 J	16 J	32
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	17 J
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	4.6 J	4.9 J	ND	17 J
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	3.7 J
C_1-Naphthalenes (ng/g dry weight)	9.1 J	9 J	12 J	12 J	11 J	30
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	11 J	ND	36 J
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	22 J
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	9.3 JB	8.3 JB	ND	8.3 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-72. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-031)	Analysis 2 (SVT-032)	Analysis 1 (SVT-033)	Analysis 2 (SVT-034)	Analysis 1 (SVT-035)	Analysis 2 (SVT-036)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	9.3 J	9.3 J	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	7.7 J	10 J	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	ND	330 J	ND
Benzo[e]pyrene (ng/g dry weight)	20 J	10 J	18 J	19 J	19 J	6.1 J
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	34 J	15 J	28 J	31 J	30	11 J
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-73. Results of the semivolatile organic compound analysis of composite thorny oyster tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-037)	Analysis 2 (SVT-038)	Analysis 1 (SVT-039)	Analysis 2 (SVT-040)	Analysis 1 (SVT-041)	Analysis 2 (SVT-042)
Phenol (ng/g wet weight)	19 J	20 J	12 J	12 J	13 J	17 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	0.64 J	ND	ND
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	1 J	0.74 J	0.93 J	0.94 J	0.78 J	0.88 J
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	2 J	ND	ND	ND	1.6 J	1.6 J
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	0.84 J	1 J	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-73. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-037)	Analysis 2 (SVT-038)	Analysis 1 (SVT-039)	Analysis 2 (SVT-040)	Analysis 1 (SVT-041)	Analysis 2 (SVT-042)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	89 J	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	0.6 J	ND	ND	ND	ND	0.79 J
Benzo[a]pyrene (ng/g wet weight)	0.69 J	ND	ND	ND	ND	1.1 J
Perylene (ng/g wet weight)	ND	ND	ND	ND	0.92 J	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	110 J	120 J	80 J	80 J	68 J	88 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	4.3 J	ND	ND
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	6 J	4.4 J	6.2 J	6.3 J	4.1 J	4.6 J
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	12 J	ND	ND	ND	8.3 J	8.3 J

Table D-73. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-037)	Analysis 2 (SVT-038)	Analysis 1 (SVT-039)	Analysis 2 (SVT-040)	Analysis 1 (SVT-041)	Analysis 2 (SVT-042)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	5.6 J	6.7 J	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	540 J	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	3.6 J	ND	ND	ND	ND	4.1 J
Benzo[a]pyrene (ng/g dry weight)	4.2 J	ND	ND	ND	ND	5.7 J
Perylene (ng/g dry weight)	ND	ND	ND	ND	4.8 J	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-74. Results of the semivolatile organic compound analysis of composite yellow chub tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-043)	Analysis 2 (SVT-044)	Analysis 1 (SVT-045)	Analysis 2 (SVT-046)	Analysis 1 (SVT-047)	Analysis 2 (SVT-048)
Phenol (ng/g wet weight)	24 J	30 J	32 J	41 J	ND	11 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	0.69 J	0.61 J	0.85 J	0.71 J	0.77 J	0.66 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	1 J	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	0.66 J	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	0.68 J	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	ND	ND	1.3 J	0.7 J	0.74 J	0.68 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	4.2 J	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	7.8	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	7.4	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	4.7	3.9 J	5.2	3.6 J	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	0.99 J	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	0.96 J	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	1.9 J	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-74. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-043)	Analysis 2 (SVT-044)	Analysis 1 (SVT-045)	Analysis 2 (SVT-046)	Analysis 1 (SVT-047)	Analysis 2 (SVT-048)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	47 J	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	100 J	130 J	130 J	170 J	ND	52 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	2.9 J	2.6 J	3.5 J	2.9 J	3.6 J	3.1 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	4.1 J	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	2.7 J	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	2.8 J	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	ND	ND	5.3 J	2.9 J	3.5 J	3.2 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	17 J	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	32	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	30	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	20	17 J	21	15 J	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	4 J	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	3.9 J	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	7.8 J	ND	ND	ND

Table D-74. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-043)	Analysis 2 (SVT-044)	Analysis 1 (SVT-045)	Analysis 2 (SVT-046)	Analysis 1 (SVT-047)	Analysis 2 (SVT-048)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	200 J	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-75. Results of the semivolatile organic compound analysis of composite creole-fish tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-049)	Analysis 2 (SVT-050)	Analysis 1 (SVT-051)	Analysis 2 (SVT-052)	Analysis 1 (SVT-053)	Analysis 2 (SVT-054)
Phenol (ng/g wet weight)	11 J	12 J	26 J	17 J	ND	ND
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	0.58 J	ND	ND
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	2 J	1.4 J	1.1 J	1.3 J	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-75. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-049)	Analysis 2 (SVT-050)	Analysis 1 (SVT-051)	Analysis 2 (SVT-052)	Analysis 1 (SVT-053)	Analysis 2 (SVT-054)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	54 J	58 J	130 J	82 J	ND	ND
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	2.8 J	ND	ND
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	9.8 J	6.8 J	5.3 J	6.3 J	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-75. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-049)	Analysis 2 (SVT-050)	Analysis 1 (SVT-051)	Analysis 2 (SVT-052)	Analysis 1 (SVT-053)	Analysis 2 (SVT-054)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-76. Results of the semivolatile organic compound analysis of composite rockhind tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-055)	Analysis 2 (SVT-056)	Analysis 1 (SVT-057)	Analysis 2 (SVT-058)	Analysis 1 (SVT-059)	Analysis 2 (SVT-060)
Phenol (ng/g wet weight)	15 J	15 J	20 J	39 J	10 J	13 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	1.2 J	ND	ND	1 J	ND	ND
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	1.4 J	ND	ND	0.84 J	ND	ND
C_2-Naphthalenes (ng/g wet weight)	1.6 J	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	0.56 J	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	1 J	2.3 J	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-76. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-055)	Analysis 2 (SVT-056)	Analysis 1 (SVT-057)	Analysis 2 (SVT-058)	Analysis 1 (SVT-059)	Analysis 2 (SVT-060)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	33 J	43 J	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	66 J	66 J	96 J	190 J	50 J	65 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	5.3 J	ND	ND	4.8 J	ND	ND
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	6.1 J	ND	ND	4 J	ND	ND
C_2-Naphthalenes (ng/g dry weight)	7 J	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	2.7 J	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	4.8 J	11 J	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-76. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-055)	Analysis 2 (SVT-056)	Analysis 1 (SVT-057)	Analysis 2 (SVT-058)	Analysis 1 (SVT-059)	Analysis 2 (SVT-060)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	160 J	200 J	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-77. Results of the semivolatile organic compound analysis of composite jewel box tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-061)	Analysis 2 (SVT-062)	Analysis 1 (SVT-063)	Analysis 2 (SVT-064)	Analysis 1 (SVT-065)	Analysis 2 (SVT-066)
Phenol (ng/g wet weight)	26 JB	27 JB	22 JB	22 JB	37 JB	49
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	1.1 J	1.3 J	2 J	1.4 J	1.5 J	2.1 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	0.77 J
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	0.54 J
C_1-Naphthalenes (ng/g wet weight)	0.83 J	0.91 J	1.5 J	1 J	1.3 J	1.9 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	2.4 J	2.9 J
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	3.1 J	3.9 J
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	5 J	5.7 J
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	0.62 J	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	1.3 JB	ND	ND	1.6 JB
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	0.97 J
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	3.9 J
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	1 J	0.78 J	1.2 J	1.6
C_2-Dibenzothiophenes (ng/g wet weight)	1.4 J	1.4 J	4.4	2.7	3.8	3.6
C_3-Dibenzothiophenes (ng/g wet weight)	2.1	2.3	7	3.9	5.8	6
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-77. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-061)	Analysis 2 (SVT-062)	Analysis 1 (SVT-063)	Analysis 2 (SVT-064)	Analysis 1 (SVT-065)	Analysis 2 (SVT-066)
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	51 J	ND	37 J	94 J
Benzo[e]pyrene (ng/g wet weight)	2.2 J	2.5 J	4.5	2.2 J	2 J	1.9 J
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	3.6 J	4.5	8.2	4.1	4.5	4
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	250 JB	260 JB	200 JB	200 JB	350 JB	470
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	10 J	12 J	18 J	13 J	14 J	20 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	7.3 J
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	5.1 J
C_1-Naphthalenes (ng/g dry weight)	8 J	8.8 J	14 J	9.2 J	12 J	18 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	23 J	28 J
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	30 J	37 J
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	48 J	54 J
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	5.7 J	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	12 JB	ND	ND	15 JB
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	9.2 J
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	37 J
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	9.2 J	7.2 J	11 J	15
C_2-Dibenzothiophenes (ng/g dry weight)	13 J	13 J	40	25	36	34

Table D-77. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-061)	Analysis 2 (SVT-062)	Analysis 1 (SVT-063)	Analysis 2 (SVT-064)	Analysis 1 (SVT-065)	Analysis 2 (SVT-066)
C_3-Dibenzothiophenes (ng/g dry weight)	20	22	64	36	55	57
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	470 J	ND	350 J	900 J
Benzo[e]pyrene (ng/g dry weight)	21 J	24 J	41	20 J	19 J	18 J
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	35 J	43	75	38	43	38
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-78. Results of the semivolatile organic compound analysis of composite thorny oyster tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-067)	Analysis 2 (SVT-068)	Analysis 1 (SVT-069)	Analysis 2 (SVT-070)	Analysis 1 (SVT-071)	Analysis 2 (SVT-072)
Phenol (ng/g wet weight)	21 J	26 J	26 J	35 J	39 J	23 J
Naphthalene (ng/g wet weight)	ND	ND	ND	2.2 J	3 J	ND
2-Methylnaphthalene (ng/g wet weight)	0.85 J	1.1 J	1.1 J	1.8 J	2 J	1 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	1 J	1.1 J	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	1.2 J	1.1 J	1.6 J	2 J	1.2 J	1.2 J
2,3,5-Trimethylnaphthalene (ng/g wet weight)	0.58 J	0.46 J	0.66 J	0.7 J	0.53 J	0.52 J
C_1-Naphthalenes (ng/g wet weight)	0.89 J	1.1 J	1.1 J	1.9 J	2 J	0.92 J
C_2-Naphthalenes (ng/g wet weight)	2.7 J	2.5 J	3.2 J	4.5 J	3.6 J	2.5 J
C_3-Naphthalenes (ng/g wet weight)	5 J	4.1 J	5.8 J	7.4	4.5 J	4.2 J
C_4-Naphthalenes (ng/g wet weight)	7.5	7.6	9.4	9.9	7.9	7.8
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	0.56 J	ND	1.1 J	1.2 J	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	4.1 J	2 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	0.66 J	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	0.73 J	0.66 J	0.81 J	0.66 J	0.78 J	0.64 J
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	1.8 J	ND	2.2 J	2.2 J	2.8 J	2 J
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	9.1 J	8.7 J	9 J	8.6 J	7.9 J	6.9 J
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	11 J	11 J	10 J	11 J	10 J	9 J
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	10 J	9 J	8.4 J	9.3 J	9.2 J	8.4 J
Dibenzothiophene (ng/g wet weight)	ND	ND	0.33 J	0.34 J	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	1.8	1.6	2.9	2.2	2.4	2.5
C_2-Dibenzothiophenes (ng/g wet weight)	8.5	8.7	9.1	11	8.7	8.4
C_3-Dibenzothiophenes (ng/g wet weight)	18	18	18	19	16	16
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	0.63 J	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	2.7 J	2.8 J	2.5 J	2.9 J	2.9 J	2.1 J
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-78. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-067)	Analysis 2 (SVT-068)	Analysis 1 (SVT-069)	Analysis 2 (SVT-070)	Analysis 1 (SVT-071)	Analysis 2 (SVT-072)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	2.1 J	2.1 J	1.7 J	2 J	1.9 J	1.5 J
C_2-Chrysenes (ng/g wet weight)	4.2	4.1	3.1	3.7	4.7	3.3
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	36 JB	ND	34 JB	54 JB	66 JB	75 JB
Benzo[e]pyrene (ng/g wet weight)	1.3 J	2 J	1.4 J	1.1 J	2 J	1.5 J
Benzo[a]pyrene (ng/g wet weight)	1.4 J	2.1 J	2 J	1.2 J	2 J	1.2 J
Perylene (ng/g wet weight)	5	4.8	4.8	5	6.2	5.3
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	0.88 J	0.97 J	ND	1 J	ND
Phenol (ng/g dry weight)	120 J	140 J	140 J	190 J	220 J	130 J
Naphthalene (ng/g dry weight)	ND	ND	ND	12 J	17 J	ND
2-Methylnaphthalene (ng/g dry weight)	4.7 J	6 J	6 J	9.8 J	11 J	5.7 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	5.5 J	6.2 J	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	6.6 J	6 J	8.7 J	11 J	6.8 J	6.8 J
2,3,5-Trimethylnaphthalene (ng/g dry weight)	3.2 J	2.5 J	3.6 J	3.8 J	3 J	3 J
C_1-Naphthalenes (ng/g dry weight)	4.9 J	6 J	6 J	10 J	11 J	5.2 J
C_2-Naphthalenes (ng/g dry weight)	15 J	14 J	17 J	24 J	20 J	14 J
C_3-Naphthalenes (ng/g dry weight)	27 J	22 J	32 J	40	26 J	24 J
C_4-Naphthalenes (ng/g dry weight)	41	42	51	54	45	44
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	3.1 J	ND	6 J	6.8 J	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	23 J	11 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	3.6 J	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	4 J	3.6 J	4.4 J	3.6 J	4.4 J	3.6 J
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	9.9 J	ND	12 J	12 J	16 J	11 J

Table D-78. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-067)	Analysis 2 (SVT-068)	Analysis 1 (SVT-069)	Analysis 2 (SVT-070)	Analysis 1 (SVT-071)	Analysis 2 (SVT-072)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	50 J	48 J	49 J	47 J	45 J	39 J
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	60 J	60 J	55 J	60 J	57 J	51 J
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	55 J	49 J	46 J	51 J	52 J	48 J
Dibenzothiophene (ng/g dry weight)	ND	ND	1.8 J	1.8 J	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	9.9	8.8	16	12	14	14
C_2-Dibenzothiophenes (ng/g dry weight)	47	48	50	60	49	48
C_3-Dibenzothiophenes (ng/g dry weight)	99	99	98	100	91	91
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	3.6 J	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	15 J	15 J	14 J	16 J	16 J	12 J
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	12 J	12 J	9.3 J	11 J	11 J	8.5 J
C_2-Chrysenes (ng/g dry weight)	23	22	17	20	27	19
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	200 JB	ND	180 JB	300 JB	380 JB	430 JB
Benzo[e]pyrene (ng/g dry weight)	7.1 J	11 J	7.6 J	6 J	11 J	8.5 J
Benzo[a]pyrene (ng/g dry weight)	7.7 J	12 J	11 J	6.6 J	11 J	6.8 J
Perylene (ng/g dry weight)	27	26	26	27	35	30
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	4.8 J	5.3 J	ND	5.7 J	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-79. Results of the semivolatile organic compound analysis of composite yellow chub tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-073)	Analysis 2 (SVT-074)	Analysis 1 (SVT-075)	Analysis 2 (SVT-076)	Analysis 1 (SVT-077)	Analysis 2 (SVT-078)
Phenol (ng/g wet weight)	25 J	120	16 J	23 J	34 J	34 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	ND	0.7 J	0.6 J	0.81 J	0.63 J	0.69 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	ND	0.72 J	ND	0.84 J	ND	0.7 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	1.5 J	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	5.3	4.7	3.6 J	4.5	2.9 J	3 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	0.92 J	0.89 J	ND	0.95 J	ND	0.87 J
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-79. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-073)	Analysis 2 (SVT-074)	Analysis 1 (SVT-075)	Analysis 2 (SVT-076)	Analysis 1 (SVT-077)	Analysis 2 (SVT-078)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	120 J	550	70 J	100 J	160 J	160 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	ND	3.2 J	2.6 J	3.6 J	2.9 J	3.2 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	ND	3.3 J	ND	3.7 J	ND	3.2 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	6.6 J	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	24	22	16 J	20	13 J	14 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	4.2 J	4.1 J	ND	4.2 J	ND	4 J
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-79. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-073)	Analysis 2 (SVT-074)	Analysis 1 (SVT-075)	Analysis 2 (SVT-076)	Analysis 1 (SVT-077)	Analysis 2 (SVT-078)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-80. Results of the semivolatile organic compound analysis of composite creole-fish tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-079)	Analysis 2 (SVT-080)	Analysis 1 (SVT-081)	Analysis 2 (SVT-082)	Analysis 1 (SVT-083)	Analysis 2 (SVT-084)
Phenol (ng/g wet weight)	37 J	--	16 J	15 J	54	16 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	0.75 J	0.8 J	0.68 J	0.73 J	0.69 J	0.58 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	0.75 J	0.69 J	ND	0.73 J	0.66 J	ND
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	1 J	0.99 J	ND	1 J	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-80. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-079)	Analysis 2 (SVT-080)	Analysis 1 (SVT-081)	Analysis 2 (SVT-082)	Analysis 1 (SVT-083)	Analysis 2 (SVT-084)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	190 J	--	82 J	76 J	280	83 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	3.8 J	4.1 J	3.5 J	3.7 J	3.6 J	3 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	3.8 J	3.5 J	ND	3.7 J	3.4 J	ND
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	5.1 J	5 J	ND	5.1 J	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-80. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-079)	Analysis 2 (SVT-080)	Analysis 1 (SVT-081)	Analysis 2 (SVT-082)	Analysis 1 (SVT-083)	Analysis 2 (SVT-084)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.
-- = Sample lost in laboratory.

Table D-81. Results of the semivolatile organic compound analysis of composite gray triggerfish tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-085)	Analysis 2 (SVT-086)	Analysis 1 (SVT-087)	Analysis 2 (SVT-088)	Analysis 1 (SVT-089)	Analysis 2 (SVT-090)
Phenol (ng/g wet weight)	89	95	70	76	130	120
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-81. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-085)	Analysis 2 (SVT-086)	Analysis 1 (SVT-087)	Analysis 2 (SVT-088)	Analysis 1 (SVT-089)	Analysis 2 (SVT-090)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	430	460	330	360	640	590
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-81. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-085)	Analysis 2 (SVT-086)	Analysis 1 (SVT-087)	Analysis 2 (SVT-088)	Analysis 1 (SVT-089)	Analysis 2 (SVT-090)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-82. Results of the semivolatile organic compound analysis of composite jewel box tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-091)	Analysis 2 (SVT-092)	Analysis 1 (SVT-093)	Analysis 2 (SVT-094)	Analysis 1 (SVT-095)	Analysis 2 (SVT-096)
Phenol (ng/g wet weight)	23 JB	20 JB	20 JB	20 JB	52	47 B
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	1.2 J	1.2 J	1.9 J	2.5 J	2.8	2.5 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	0.54 J	0.76 J	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	0.99 J	ND	1.6 J	1.7 J	1.8 J	1.7 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	1.7 J	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	0.7 J
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	1.3 JB	1.3 JB	1.1 JB	0.95 JB
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	1.4 J	1.2 J	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	1.4 J	1.2 J	1.1 J	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-82. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-091)	Analysis 2 (SVT-092)	Analysis 1 (SVT-093)	Analysis 2 (SVT-094)	Analysis 1 (SVT-095)	Analysis 2 (SVT-096)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	ND	59 J	270
Benzo[e]pyrene (ng/g wet weight)	1.8 J	2.4 J	1.9 J	2.6 J	3.2	3.6
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	3.2 J	3.8 J	3.6 J	3.9 J	5.2	5.8
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	210 JB	180 JB	140 JB	140 JB	370	340 B
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	11 J	11 J	14 J	18 J	20	18 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	3.9 J	5.5 J	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	9 J	ND	12 J	12 J	13 J	12 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	12 J	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	5 J
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	9.4 JB	9.4 JB	7.8 JB	6.8 JB
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-82. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-091)	Analysis 2 (SVT-092)	Analysis 1 (SVT-093)	Analysis 2 (SVT-094)	Analysis 1 (SVT-095)	Analysis 2 (SVT-096)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	10 J	8.6 J	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	10 J	8.6 J	7.8 J	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	ND	420 J	1900
Benzo[e]pyrene (ng/g dry weight)	16 J	22 J	14 J	19 J	23	26
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	29 J	34 J	26 J	28 J	37	41
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-83. Results of the semivolatile organic compound analysis of composite thorny oyster tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-097)	Analysis 2 (SVT-098)	Analysis 1 (SVT-099)	Analysis 2 (SVT-100)	Analysis 1 (SVT-101)	Analysis 2 (SVT-102)
Phenol (ng/g wet weight)	14 J	15 J	21 J	19 J	12 J	12 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	ND	0.57 J	ND	ND	0.62 J	0.75 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	0.82 J	0.69 J	0.66 J	0.8 J	0.98 J	0.89 J
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	0.71 J
C_2-Naphthalenes (ng/g wet weight)	1.2 J	1.2 J	ND	ND	1.4 J	1.3 J
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	3.3	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	2 J	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	1.6 J	1.3 J	ND	ND	1.2 J	1 J
C_3-Dibenzothiophenes (ng/g wet weight)	2.4	2.1	ND	ND	1.5	1.4 J
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-83. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-097)	Analysis 2 (SVT-098)	Analysis 1 (SVT-099)	Analysis 2 (SVT-100)	Analysis 1 (SVT-101)	Analysis 2 (SVT-102)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	91 J	34 J	41 J	35 J	34 J	240
Benzo[e]pyrene (ng/g wet weight)	ND	ND	0.68 J	0.66 J	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	0.86 J	0.93 J	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	80 J	85 J	120 J	110 J	75 J	75 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	ND	3.2 J	ND	ND	3.9 J	4.7 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	4.6 J	3.9 J	3.9 J	4.7 J	6.1 J	5.6 J
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	4.4 J
C_2-Naphthalenes (ng/g dry weight)	6.8 J	6.8 J	ND	ND	8.8 J	8.1 J
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	19	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	11 J	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-83. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-097)	Analysis 2 (SVT-098)	Analysis 1 (SVT-099)	Analysis 2 (SVT-100)	Analysis 1 (SVT-101)	Analysis 2 (SVT-102)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	9.1 J	7.4 J	ND	ND	7.5 J	6.2 J
C_3-Dibenzothiophenes (ng/g dry weight)	14	12	ND	ND	9.4	8.8 J
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	520 J	190 J	240 J	200 J	210 J	1500
Benzo[e]pyrene (ng/g dry weight)	ND	ND	4 J	3.9 J	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	5 J	5.4 J	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

I = Interference.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-84. Results of the semivolatile organic compound analysis of composite yellow chub tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-103)	Analysis 2 (SVT-104)	Analysis 1 (SVT-105)	Analysis 2 (SVT-106)	Analysis 1 (SVT-107)	Analysis 2 (SVT-108)
Phenol (ng/g wet weight)	44 J	39 J	21 J	21 J	20 J	16 J
Naphthalene (ng/g wet weight)	ND	ND	ND	3.2 J	ND	ND
2-Methylnaphthalene (ng/g wet weight)	1.2 J	1.5 J	0.94 J	1.5 J	1.2 J	1.1 J
1-Methylnaphthalene (ng/g wet weight)	ND	0.72 J	ND	0.81 J	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	1.3 J	1.7 J	0.98 J	1.6 J	1.2 J	1.1 J
C_2-Naphthalenes (ng/g wet weight)	2.2 J	2.6 J	1.3 J	1.9 J	1.9 J	1.8 J
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	0.54 J	0.66 J	ND	0.71 J	0.58 J	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	2.3 J	3.1 J	2.5 J	2 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-84. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-103)	Analysis 2 (SVT-104)	Analysis 1 (SVT-105)	Analysis 2 (SVT-106)	Analysis 1 (SVT-107)	Analysis 2 (SVT-108)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	36 JB	ND	200 B
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	180 J	160 J	80 J	80 J	83 J	66 J
Naphthalene (ng/g dry weight)	ND	ND	ND	12 J	ND	ND
2-Methylnaphthalene (ng/g dry weight)	5 J	6.3 J	3.6 J	5.7 J	5 J	4.6 J
1-Methylnaphthalene (ng/g dry weight)	ND	3 J	ND	3.1 J	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	5.4 J	7.1 J	3.8 J	6.1 J	5 J	4.6 J
C_2-Naphthalenes (ng/g dry weight)	9.2 J	11 J	5 J	7.3 J	7.9 J	7.5 J
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	2.2 J	2.8 J	ND	2.7 J	2.4 J	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	8.8 J	12 J	10 J	8.3 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-84. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-103)	Analysis 2 (SVT-104)	Analysis 1 (SVT-105)	Analysis 2 (SVT-106)	Analysis 1 (SVT-107)	Analysis 2 (SVT-108)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	140 JB	ND	830 B
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-85. Results of the semivolatile organic compound analysis of composite creole-fish tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-109)	Analysis 2 (SVT-110)	Analysis 1 (SVT-111)	Analysis 2 (SVT-112)	Analysis 1 (SVT-113)	Analysis 2 (SVT-114)
Phenol (ng/g wet weight)	ND	9.4 J	ND	ND	17 J	22 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	ND	ND	0.59 J	0.57 J	0.7 J	0.94 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	0.73 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	1 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-85. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-109)	Analysis 2 (SVT-110)	Analysis 1 (SVT-111)	Analysis 2 (SVT-112)	Analysis 1 (SVT-113)	Analysis 2 (SVT-114)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	140 JB	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	ND	49 J	ND	ND	87 J	110 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	ND	ND	2.9 J	2.8 J	3.6 J	4.8 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	3.7 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	5.1 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-85. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-109)	Analysis 2 (SVT-110)	Analysis 1 (SVT-111)	Analysis 2 (SVT-112)	Analysis 1 (SVT-113)	Analysis 2 (SVT-114)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	690 JB	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-86. Results of the semivolatile organic compound analysis of composite gray triggerfish tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-115)	Analysis 2 (SVT-116)	Analysis 1 (SVT-117)	Analysis 2 (SVT-118)	Analysis 1 (SVT-119)	Analysis 2 (SVT-120)
Phenol (ng/g wet weight)	43 J	37 J	21 J	23 J	29 J	16 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	ND	ND	0.59 J	ND	ND	ND
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	1.6 J	1.1 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	0.76 J	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-86. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-115)	Analysis 2 (SVT-116)	Analysis 1 (SVT-117)	Analysis 2 (SVT-118)	Analysis 1 (SVT-119)	Analysis 2 (SVT-120)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	0.74 J	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	210 J	180 J	100 J	110 J	150 J	81 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	ND	ND	2.9 J	ND	ND	ND
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	8.1 J	5.6 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	3.7 J	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-86. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-115)	Analysis 2 (SVT-116)	Analysis 1 (SVT-117)	Analysis 2 (SVT-118)	Analysis 1 (SVT-119)	Analysis 2 (SVT-120)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	3.6 J	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-87. Results of the semivolatile organic compound analysis of composite jewel box tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-121)	Analysis 2 (SVT-122)	Analysis 1 (SVT-123)	Analysis 2 (SVT-124)	Analysis 1 (SVT-125)	Analysis 2 (SVT-126)
Phenol (ng/g wet weight)	44 JB	45 JB	49	46 B	34 JB	55
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	1.2 J	1.2 J	0.79 J	0.71 J	0.88 J	1.1 J
1-Methylnaphthalene (ng/g wet weight)	0.78 J	0.71 J	0.96 J	1.1 J	0.79 J	0.8 J
2,6-Dimethylnaphthalene (ng/g wet weight)	0.83 J	ND	0.78 J	0.67 J	4.2 I	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	0.42 J	0.49 J
C_1-Naphthalenes (ng/g wet weight)	1.3 J	1.4 J	1.2 J	1.4 J	1.3 J	1.3 J
C_2-Naphthalenes (ng/g wet weight)	3.1 J	ND	3.5 J	3 J	2.8 J	2.8 J
C_3-Naphthalenes (ng/g wet weight)	3.9 J	ND	ND	ND	3.5 J	5.1 J
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	0.58 JB	0.67 JB	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	3.2 J	2.8 J	1.5 J	2 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	0.64 J	0.68 J	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	64 I	58 I	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	1.8 J	ND	1.7 J	1.7 J	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	2.3	3.2	2.2	2.4
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	2	2.8
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	6.6	4.7	ND	ND

Table D-87. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-121)	Analysis 2 (SVT-122)	Analysis 1 (SVT-123)	Analysis 2 (SVT-124)	Analysis 1 (SVT-125)	Analysis 2 (SVT-126)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	41 JB	51 JB	ND	ND	63 JB	120 JB
Benzo[e]pyrene (ng/g wet weight)	0.58 J	ND	ND	ND	0.62 J	ND
Benzo[a]pyrene (ng/g wet weight)	0.79 J	ND	0.83 J	0.87 J	0.98 J	1 J
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	380 JB	380 JB	430	410 B	280 JB	450
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	10 J	10 J	7 J	6.3 J	7.2 J	9 J
1-Methylnaphthalene (ng/g dry weight)	6.7 J	6.1 J	8.5 J	9.7 J	6.5 J	6.6 J
2,6-Dimethylnaphthalene (ng/g dry weight)	7.1 J	ND	6.9 J	5.9 J	34 I	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	3.4 J	4 J
C_1-Naphthalenes (ng/g dry weight)	11 J	12 J	11 J	12 J	11 J	11 J
C_2-Naphthalenes (ng/g dry weight)	26 J	ND	31 J	26 J	23 J	23 J
C_3-Naphthalenes (ng/g dry weight)	33 J	ND	ND	ND	29 J	42 J
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	5.1 JB	5.9 JB	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	28 J	25 J	12 J	16 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	5.7 J	6 J	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	570 I	510 I	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	15 J	ND	15 J	15 J	ND	ND

Table D-87. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-121)	Analysis 2 (SVT-122)	Analysis 1 (SVT-123)	Analysis 2 (SVT-124)	Analysis 1 (SVT-125)	Analysis 2 (SVT-126)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	20	28	18	20
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	16	23
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	58	42	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	350 JB	440 JB	ND	ND	520 JB	980 JB
Benzo[e]pyrene (ng/g dry weight)	5 J	ND	ND	ND	5.1 J	ND
Benzo[a]pyrene (ng/g dry weight)	6.8 J	ND	7.3 J	7.7 J	8 J	8.2 J
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
I = Interference.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-88. Results of the semivolatile organic compound analysis of composite thorny oyster tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-127)	Analysis 2 (SVT-128)	Analysis 1 (SVT-129)	Analysis 2 (SVT-130)	Analysis 1 (SVT-131)	Analysis 2 (SVT-132)
Phenol (ng/g wet weight)	53	53	45 JB	41 JB	86	42 JB
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	ND	ND	0.89 J	0.68 J	0.8 J	1.1 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	0.53 J	0.51 J	0.86 J	0.77 J	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	0.92 J	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	0.71 J	ND	1.1 J	0.9 J	1 J	1.2 J
C_2-Naphthalenes (ng/g wet weight)	1.5 J	1.9 J	3.3 J	2.9 J	2 J	3 J
C_3-Naphthalenes (ng/g wet weight)	1.6 J	1.5 J	3.9 J	3.8 J	2.1 J	3.6 J
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	2 J	3.9 J	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	1.4 J	1.2 J	1 J	1 J	1.4 J	1.3 J
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	2.1 J	2.3 J	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	5.7 J	5.6 J	ND	4 J	6.1 J	5.2 J
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	2.5	4	2.2	3.3
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	2.2	3.1	1.7	2.1
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-88. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-127)	Analysis 2 (SVT-128)	Analysis 1 (SVT-129)	Analysis 2 (SVT-130)	Analysis 1 (SVT-131)	Analysis 2 (SVT-132)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	40 J	ND	ND	ND	140 J	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	320	320	380 JB	340 JB	610	300 JB
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	ND	ND	7.4 J	5.7 J	5.7 J	7.8 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	3.2 J	3.1 J	7.2 J	6.4 J	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	7.7 J	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	4.4 J	ND	9.2 J	7.5 J	7.1 J	8.6 J
C_2-Naphthalenes (ng/g dry weight)	9.2 J	12 J	28 J	24 J	14 J	21 J
C_3-Naphthalenes (ng/g dry weight)	9.8 J	9.2 J	32 J	32 J	15 J	26 J
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	12 J	24 J	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	8.6 J	7.4 J	8.3 J	8.3 J	10 J	9.3 J
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	18 J	19 J	ND	ND

Table D-88. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-127)	Analysis 2 (SVT-128)	Analysis 1 (SVT-129)	Analysis 2 (SVT-130)	Analysis 1 (SVT-131)	Analysis 2 (SVT-132)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	35 J	34 J	ND	33 J	44 J	37 J
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	21	33	16	24
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	18	26	12	15
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	240 J	ND	ND	ND	1000 J	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-89. Results of the semivolatile organic compound analysis of composite yellow chub tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-133)	Analysis 2 (SVT-134)	Analysis 1 (SVT-135)	Analysis 2 (SVT-136)	Analysis 1 (SVT-137)	Analysis 2 (SVT-138)
Phenol (ng/g wet weight)	41 J	42 J	35 J	47	30 J	30 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	1.1 J	0.76 J	0.96 JB	0.9 JB	0.92 J	1 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	1.2 J	0.98 J	1 JB	1 JB	1 J	0.98 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	1.3 J
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	1 J	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-89. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-133)	Analysis 2 (SVT-134)	Analysis 1 (SVT-135)	Analysis 2 (SVT-136)	Analysis 1 (SVT-137)	Analysis 2 (SVT-138)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	120 J	640 L	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	180 J	180 J	150 J	200	130 J	130 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	4.7 J	3.3 J	4.1 JB	3.8 JB	4 J	4.3 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	5.2 J	4.2 J	4.3 JB	4.3 JB	4.3 J	4.2 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	5.6 J
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-89. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-133)	Analysis 2 (SVT-134)	Analysis 1 (SVT-135)	Analysis 2 (SVT-136)	Analysis 1 (SVT-137)	Analysis 2 (SVT-138)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	4.3 J	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	520 J	2800 L	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
L = Analyte concentration is reported from a dilution.
ND = Concentration below the MDL.

Table D-90. Results of the semivolatile organic compound analysis of composite creole-fish tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-139)	Analysis 2 (SVT-140)	Analysis 1 (SVT-141)	Analysis 2 (SVT-142)	Analysis 1 (SVT-143)	Analysis 2 (SVT-144)
Phenol (ng/g wet weight)	12 JB	14 JB	23 J	11 JB	ND	ND
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	0.7 JB	0.78 JB	ND	ND	0.77 J	0.79 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	0.79 JB	0.93 JB	0.71 J	0.66 J	0.95 J	0.85 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-90. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-139)	Analysis 2 (SVT-140)	Analysis 1 (SVT-141)	Analysis 2 (SVT-142)	Analysis 1 (SVT-143)	Analysis 2 (SVT-144)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	220 L	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	59 JB	69 JB	110 J	54 JB	ND	ND
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	3.4 JB	3.8 JB	ND	ND	3.8 J	3.9 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	3.9 JB	4.6 JB	3.5 J	3.3 J	4.7 J	4.2 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-90. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-139)	Analysis 2 (SVT-140)	Analysis 1 (SVT-141)	Analysis 2 (SVT-142)	Analysis 1 (SVT-143)	Analysis 2 (SVT-144)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	1100 L	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
L = Analyte concentration is reported from a dilution.
ND = Concentration below the MDL.

Table D-91. Results of the semivolatile organic compound analysis of composite sergeant major tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-145)	Analysis 2 (SVT-146)	Analysis 1 (SVT-147)	Analysis 2 (SVT-148)	Analysis 1 (SVT-149)	Analysis 2 (SVT-150)
Phenol (ng/g wet weight)	9.1 JB	9.9 JB	20 JB	14 JB	13 JB	13 JB
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	0.75 JB	0.99 JB	0.98 JB	1.4 JB	0.72 JB	0.79 JB
1-Methylnaphthalene (ng/g wet weight)	ND	0.72 JB	0.81 JB	1 J	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	0.87 JB	1.1 JB	1.2 JB	1.4 JB	1 JB	0.85 JB
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-91. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-145)	Analysis 2 (SVT-146)	Analysis 1 (SVT-147)	Analysis 2 (SVT-148)	Analysis 1 (SVT-149)	Analysis 2 (SVT-150)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	52 JB	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	45 JB	49 JB	94 JB	66 JB	64 JB	64 JB
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	3.7 JB	4.9 JB	4.6 JB	6.6 JB	3.6 JB	3.9 JB
1-Methylnaphthalene (ng/g dry weight)	ND	3.6 JB	3.8 JB	4.7 J	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	4.3 JB	5.4 JB	5.7 JB	6.6 JB	5 JB	4.2 JB
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-91. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-145)	Analysis 2 (SVT-146)	Analysis 1 (SVT-147)	Analysis 2 (SVT-148)	Analysis 1 (SVT-149)	Analysis 2 (SVT-150)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	240 JB	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-92. Results of the semivolatile organic compound analysis of composite jewel box tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-151)	Analysis 2 (SVT-152)	Analysis 1 (SVT-153)	Analysis 2 (SVT-154)	Analysis 1 (SVT-155)	Analysis 2 (SVT-156)
Phenol (ng/g wet weight)	32 J	23 JB	28 J	32 J	20 J	15 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	1.4 J	1.1 J	0.78 J	0.86 J	0.62 J	0.88 J
1-Methylnaphthalene (ng/g wet weight)	0.86 J	0.74 J	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	2 J	2.3 J	2.2 J	2.2 J
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	0.4 J
C_1-Naphthalenes (ng/g wet weight)	1.7 J	1.4 J	0.92 J	1.1 J	0.74 J	1.1 J
C_2-Naphthalenes (ng/g wet weight)	2.7 J	2.9 J	3.7 J	3.8 J	3.1 J	3.2 J
C_3-Naphthalenes (ng/g wet weight)	2.6 J	2.4 J	3.8 J	3.6 J	1.3 J	1.5 J
C_4-Naphthalenes (ng/g wet weight)	ND	ND	4 J	4.1 J	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	1.7 J	1.8 J	2.7 J	3.9 J	1.8 J	2 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	1 JB	ND	ND
1-Methylphenanthrene (ng/g wet weight)	0.61 J	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	1.8 J	ND	2.5 J	2.8 J	ND	1.9 J
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	6.8 J	6.9 J	5.8 J	5.7 J
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	2.6	3.4	1.7	1.9
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	2.1	2.6	1.5	1.5
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	0.68 J
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-92. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-151)	Analysis 2 (SVT-152)	Analysis 1 (SVT-153)	Analysis 2 (SVT-154)	Analysis 1 (SVT-155)	Analysis 2 (SVT-156)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	35 J	38 J	ND	130 J
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	0.73 J	0.83 J	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	330 J	240 JB	230 J	270 J	120 J	91 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	14 J	11 J	6.5 J	7.2 J	3.8 J	5.4 J
1-Methylnaphthalene (ng/g dry weight)	8.9 J	7.6 J	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	17 J	19 J	13 J	13 J
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	2.4 J
C_1-Naphthalenes (ng/g dry weight)	18 J	14 J	7.7 J	9.2 J	4.5 J	6.7 J
C_2-Naphthalenes (ng/g dry weight)	28 J	30 J	31 J	32 J	19 J	20 J
C_3-Naphthalenes (ng/g dry weight)	27 J	25 J	32 J	30 J	7.9 J	9.1 J
C_4-Naphthalenes (ng/g dry weight)	ND	ND	33 J	34 J	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	18 J	19 J	22 J	32 J	11 J	12 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	8.3 JB	ND	ND
1-Methylphenanthrene (ng/g dry weight)	6.3 J	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	19 J	ND	21 J	23 J	ND	12 J

Table D-92. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-151)	Analysis 2 (SVT-152)	Analysis 1 (SVT-153)	Analysis 2 (SVT-154)	Analysis 1 (SVT-155)	Analysis 2 (SVT-156)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	57 J	58 J	35 J	35 J
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	22	28	10	12
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	18	22	9.1	9.1
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	4.1 J
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	290 J	320 J	ND	790 J
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	7.5 J	8.6 J	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-93. Results of the semivolatile organic compound analysis of composite thorny oyster tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-157)	Analysis 2 (SVT-158)	Analysis 1 (SVT-159)	Analysis 2 (SVT-160)	Analysis 1 (SVT-161)	Analysis 2 (SVT-162)
Phenol (ng/g wet weight)	20 JB	25 JB	20 JB	16 JB	29 J	24 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	1.1 J	0.98 J	0.68 J	0.71 J	0.66 J	ND
1-Methylnaphthalene (ng/g wet weight)	ND	0.71 J	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	2.6	2.4 J	1.4 J	1.5 J	0.52 J	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	3.3	3.4	2.3	2.2	ND	ND
C_1-Naphthalenes (ng/g wet weight)	1.2 J	1.1 J	0.91 J	0.98 J	0.71 J	ND
C_2-Naphthalenes (ng/g wet weight)	6.4	6.7	4.2 J	3.8 J	1.6 J	1.5 J
C_3-Naphthalenes (ng/g wet weight)	15	16	8.6	9.6	2.6 J	1.9 J
C_4-Naphthalenes (ng/g wet weight)	19	20	9.2	12	3.4 J	2.9 J
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	4.8	4.3 J	3.5 J	2.6 J	1.9 J	1.8 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	0.72 J	0.6 J	0.79 J	ND	1.5 J	0.99 J
Phenanthrene (ng/g wet weight)	1.6 J	1.6 J	1.1 J	1.1 J	ND	ND
1-Methylphenanthrene (ng/g wet weight)	1.7 J	1.7 J	0.97 J	0.98 J	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	8.8	9.4	5.4 J	4.9 J	1.7 J	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	13 J	14 J	6.2 J	5.6 J	5.4 J	5.8 J
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	0.7 J	0.71 J	0.55 J	0.52 J	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	4.2	4.1	2.7	2.8	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	8.3	8.2	4.7	4.5	2.1	1.9
C_3-Dibenzothiophenes (ng/g wet weight)	5.4	5.5	2.6	3.3	1.2 J	1.3 J
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	1.2 J	2 J	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-93. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-157)	Analysis 2 (SVT-158)	Analysis 1 (SVT-159)	Analysis 2 (SVT-160)	Analysis 1 (SVT-161)	Analysis 2 (SVT-162)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	ND	150 J	100 J
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	170 JB	210 JB	140 JB	110 JB	180 J	150 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	9.3 J	8.3 J	4.6 J	4.8 J	4.1 J	ND
1-Methylnaphthalene (ng/g dry weight)	ND	6 J	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	22	20 J	9.5 J	10 J	3.2 J	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	28	29	16	15	ND	ND
C_1-Naphthalenes (ng/g dry weight)	10 J	9.3 J	6.2 J	6.7 J	4.4 J	ND
C_2-Naphthalenes (ng/g dry weight)	54	57	28 J	26 J	10 J	9.4 J
C_3-Naphthalenes (ng/g dry weight)	130	140	58	65	16 J	12 J
C_4-Naphthalenes (ng/g dry weight)	160	170	62	82	21 J	18 J
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	41	36 J	24 J	18 J	12 J	11 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	6.1 J	5.1 J	5.4 J	ND	9.4 J	6.2 J
Phenanthrene (ng/g dry weight)	14 J	14 J	7.5 J	7.5 J	ND	ND
1-Methylphenanthrene (ng/g dry weight)	14 J	14 J	6.6 J	6.7 J	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	74	80	37 J	33 J	11 J	ND

Table D-93. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-157)	Analysis 2 (SVT-158)	Analysis 1 (SVT-159)	Analysis 2 (SVT-160)	Analysis 1 (SVT-161)	Analysis 2 (SVT-162)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	110 J	120 J	42 J	38 J	34 J	36 J
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	5.9 J	6 J	3.7 J	3.5 J	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	36	35	18	19	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	70	69	32	31	13	12
C_3-Dibenzothiophenes (ng/g dry weight)	46	47	18	22	7.5 J	8.1 J
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	10 J	17 J	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	ND	940 J	620 J
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-94. Results of the semivolatile organic compound analysis of composite yellow chub tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-163)	Analysis 2 (SVT-164)	Analysis 1 (SVT-165)	Analysis 2 (SVT-166)	Analysis 1 (SVT-167)	Analysis 2 (SVT-168)
Phenol (ng/g wet weight)	31 J	30 J	30 J	19 J	20 J	17 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	0.84 J	0.89 J	0.72 J	0.65 J	0.72 J	0.76 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	0.94 J	1 J	0.8 J	0.72 J	0.9 J	0.92 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	1.4 J	1.6 J
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-94. (Continued).

Analyte	Composite Sample		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-163)	Analysis 2 (SVT-164)	Analysis 1 (SVT-165)	Analysis 2 (SVT-166)	Analysis 1 (SVT-167)	Analysis 2 (SVT-168)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	140 J	140 J	130 J	83 J	90 J	76 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	3.8 J	4 J	3.1 J	2.8 J	3.2 J	3.4 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	4.2 J	4.5 J	3.5 J	3.1 J	4 J	4.1 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	6.3 J	7.2 J
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-94. (Continued).

Analyte	Composite Sample		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-163)	Analysis 2 (SVT-164)	Analysis 1 (SVT-165)	Analysis 2 (SVT-166)	Analysis 1 (SVT-167)	Analysis 2 (SVT-168)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-95. Results of the semivolatile organic compound analysis of composite creole-fish tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-169)	Analysis 2 (SVT-170)	Analysis 1 (SVT-171)	Analysis 2 (SVT-172)	Analysis 1 (SVT-173)	Analysis 2 (SVT-174)
Phenol (ng/g wet weight)	20 J	31 J	28 J	27 J	28 J	37 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	ND	0.6 J	0.59 J	0.74 J	0.59 J	0.82 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	0.73 J	ND	0.75 J	0.85 J	0.76 J	0.79 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	1.7 J	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	1.8 J	2 J	2.1 J	2 J	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	2.9	2.5 J	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	2.2 J	1.9 J	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-95. (Continued).

Analyte	Composite Sample		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-169)	Analysis 2 (SVT-170)	Analysis 1 (SVT-171)	Analysis 2 (SVT-172)	Analysis 1 (SVT-173)	Analysis 2 (SVT-174)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	ND	34 J	630 L
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	99 J	150 J	140 J	130 J	140 J	180 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	ND	3 J	2.9 J	3.6 J	2.9 J	4 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	3.6 J	ND	3.7 J	4.2 J	3.7 J	3.8 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	8.3 J	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	8.9 J	9.9 J	10 J	9.8 J	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	14	12 J	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	11 J	9.4 J	ND	ND	ND	ND

Table D-95. (Continued).

Analyte	Composite Sample		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-169)	Analysis 2 (SVT-170)	Analysis 1 (SVT-171)	Analysis 2 (SVT-172)	Analysis 1 (SVT-173)	Analysis 2 (SVT-174)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	ND	160 J	3000 L
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
L = Analyte concentration is reported from a dilution.
ND = Concentration below the MDL.

Table D-96. Results of the semivolatile organic compound analysis of composite sergeant major tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-175)	Analysis 2 (SVT-176)	Analysis 1 (SVT-177)	Analysis 2 (SVT-178)	Analysis 1 (SVT-179)	Analysis 2 (SVT-180)
Phenol (ng/g wet weight)	16 JB	19 JB	16 JB	13 JB	14 JB	16 JB
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	0.68 JB	0.72 JB	0.9 JB	0.68 JB	0.88 J	0.95 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	0.77 JB	0.72 JB	0.86 JB	0.8 JB	1.1 J	1.2 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-96. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-175)	Analysis 2 (SVT-176)	Analysis 1 (SVT-177)	Analysis 2 (SVT-178)	Analysis 1 (SVT-179)	Analysis 2 (SVT-180)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	120 J	160 J	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	75 JB	89 JB	75 JB	61 JB	61 JB	70 JB
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	3.2 JB	3.4 JB	4.2 JB	3.2 JB	3.8 J	4.1 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	3.6 JB	3.4 JB	4 JB	3.7 JB	4.8 J	5.2 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-96. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-175)	Analysis 2 (SVT-176)	Analysis 1 (SVT-177)	Analysis 2 (SVT-178)	Analysis 1 (SVT-179)	Analysis 2 (SVT-180)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	560 J	750 J	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-97. Results of the semivolatile organic compound analysis of composite jewel box tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-181)	Analysis 2 (SVT-182)	Analysis 1 (SVT-183)	Analysis 2 (SVT-184)	Analysis 1 (SVT-185)	Analysis 2 (SVT-186)
Phenol (ng/g wet weight)	31 J	54	27 J	26 J	27 JB	23 JB
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	1.1 J	1.1 J	0.95 J	0.78 J	0.79 J	0.85 J
1-Methylnaphthalene (ng/g wet weight)	0.88 J	0.73 J	0.71 J	ND	0.74 J	0.69 J
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	3.1	4.5	4.2	4.1
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	1.3 J	1.3 J	1.1 J	1 J	1 J	1 J
C_2-Naphthalenes (ng/g wet weight)	3.6 J	3.3 J	3.6 J	4.7 J	4.6 J	5 J
C_3-Naphthalenes (ng/g wet weight)	2.4 J	1.7 J	2 J	2.5 J	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	0.92 J	1.1 J	3.2 J	2.3 J	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	5.1 J	6.1 J	4 J	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	3	2.4	2.1	2.1
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	3.7	3.3	3.4	3.2
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-97. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-181)	Analysis 2 (SVT-182)	Analysis 1 (SVT-183)	Analysis 2 (SVT-184)	Analysis 1 (SVT-185)	Analysis 2 (SVT-186)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	74 J	ND	52 JB	ND
Benzo[e]pyrene (ng/g wet weight)	1.3 J	1.1 J	ND	ND	1.1 J	1.9 J
Benzo[a]pyrene (ng/g wet weight)	2.8 J	2.3 J	ND	ND	2.1 J	3.3 J
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	190 J	340	190 J	190 J	170 JB	150 JB
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	6.8 J	6.8 J	6.8 J	5.6 J	5 J	5.4 J
1-Methylnaphthalene (ng/g dry weight)	5.5 J	4.5 J	5.1 J	ND	4.7 J	4.4 J
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	22	32	27	26
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	8.1 J	8.1 J	7.9 J	7.2 J	6.4 J	6.4 J
C_2-Naphthalenes (ng/g dry weight)	22 J	20 J	26 J	34 J	29 J	32 J
C_3-Naphthalenes (ng/g dry weight)	15 J	10 J	14 J	18 J	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	5.7 J	6.8 J	23 J	16 J	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-97. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-181)	Analysis 2 (SVT-182)	Analysis 1 (SVT-183)	Analysis 2 (SVT-184)	Analysis 1 (SVT-185)	Analysis 2 (SVT-186)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	37 J	44 J	25 J	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	22	17	13	13
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	27	24	22	20
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	530 J	ND	330 JB	ND
Benzo[e]pyrene (ng/g dry weight)	8.1 J	6.8 J	ND	ND	7 J	12 J
Benzo[a]pyrene (ng/g dry weight)	17 J	14 J	ND	ND	13 J	21 J
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-98. Results of the semivolatile organic compound analysis of composite thorny oyster tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-187)	Analysis 2 (SVT-188)	Analysis 1 (SVT-189)	Analysis 2 (SVT-190)	Analysis 1 (SVT-191)	Analysis 2 (SVT-192)
Phenol (ng/g wet weight)	43 JB	81	29 J	31 J	26 J	28 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	0.56 J	0.68 J	ND	ND	ND	ND
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	0.56 J
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	0.77 J	0.82 J	0.71 J	0.68 J	ND	ND
C_2-Naphthalenes (ng/g wet weight)	ND	1.6 J	1.8 J	2 J	1.4 J	1.4 J
C_3-Naphthalenes (ng/g wet weight)	ND	ND	2.5 J	2.3 J	1.5 J	2 J
C_4-Naphthalenes (ng/g wet weight)	ND	ND	6.4	6.5	4.5 J	4.5 J
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	2.3 J	2.1 J	3 J	3.4 J	2.7 J	3.8 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	0.68 J	0.61 J	1.6 J	1.5 J	1.1 J	0.79 J
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	4.7 J	4.3 J	7.8 J	8.5 J	6.9 J	9.5 J
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	6 J	7.7 J	15 J	30
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	8.3 J	9.4 J	5.6 J	6.8 J	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	4.2	4	6	6.8	4.7	5.2
C_3-Dibenzothiophenes (ng/g wet weight)	7.1	6.5	9.4	11	7.4	9.4
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-98. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-187)	Analysis 2 (SVT-188)	Analysis 1 (SVT-189)	Analysis 2 (SVT-190)	Analysis 1 (SVT-191)	Analysis 2 (SVT-192)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	0.84 J	1 J	0.76 J	1 J
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	140 JB	88 JB	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	0.56 J	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	0.93 J	0.88 J	1.2 J	1.3 J	1 J	1 J
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	270 JB	520	170 J	180 J	160 J	170 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	3.6 J	4.3 J	ND	ND	ND	ND
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	3.4 J
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	4.9 J	5.2 J	4.2 J	4 J	ND	ND
C_2-Naphthalenes (ng/g dry weight)	ND	10 J	11 J	12 J	8.4 J	8.4 J
C_3-Naphthalenes (ng/g dry weight)	ND	ND	15 J	14 J	9 J	12 J
C_4-Naphthalenes (ng/g dry weight)	ND	ND	38	38	27 J	27 J
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	15 J	13 J	18 J	20 J	16 J	23 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	4.3 J	3.9 J	9.5 J	8.9 J	6.6 J	4.8 J
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-98. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-187)	Analysis 2 (SVT-188)	Analysis 1 (SVT-189)	Analysis 2 (SVT-190)	Analysis 1 (SVT-191)	Analysis 2 (SVT-192)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	30 J	27 J	46 J	50 J	42 J	57 J
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	36 J	46 J	90 J	180
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	53 J	60 J	33 J	40 J	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	27	25	36	40	28	31
C_3-Dibenzothiophenes (ng/g dry weight)	45	41	56	65	44	57
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	5 J	5.9 J	4.6 J	6 J
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	890 JB	560 JB	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	3.3 J	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	5.9 J	5.6 J	7.1 J	7.7 J	6 J	6 J
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-99. Results of the semivolatile organic compound analysis of composite yellow chub tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-193)	Analysis 2 (SVT-194)	Analysis 1 (SVT-195)	Analysis 2 (SVT-196)	Analysis 1 (SVT-197)	Analysis 2 (SVT-198)
Phenol (ng/g wet weight)	21 J	34 J	20 JB	20 JB	23 J	31 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	0.87 J	0.72 J	1.2 J	1.3 J	0.79 J	0.72 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	0.77 J	0.73 J	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	1 J	0.83 J	1.3 J	1.6 J	0.76 J	0.91 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-99. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-193)	Analysis 2 (SVT-194)	Analysis 1 (SVT-195)	Analysis 2 (SVT-196)	Analysis 1 (SVT-197)	Analysis 2 (SVT-198)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	ND	ND	ND	73 J	39 J
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	81 J	130 J	82 JB	82 JB	99 J	130 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	3.4 J	2.8 J	4.9 J	5.4 J	3.4 J	3.1 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	3.2 J	3 J	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	3.9 J	3.2 J	5.4 J	6.6 J	3.3 J	3.9 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-99. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-193)	Analysis 2 (SVT-194)	Analysis 1 (SVT-195)	Analysis 2 (SVT-196)	Analysis 1 (SVT-197)	Analysis 2 (SVT-198)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	ND	ND	ND	310 J	170 J
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-100. Results of the semivolatile organic compound analysis of composite creole-fish tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-199)	Analysis 2 (SVT-200)	Analysis 1 (SVT-201)	Analysis 2 (SVT-202)	Analysis 1 (SVT-203)	Analysis 2 (SVT-204)
Phenol (ng/g wet weight)	ND	ND	14 J	13 J	ND	ND
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	0.64 J	ND	0.72 J	0.85 J	0.64 J	0.69 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	ND	ND	0.81 J	1 J	0.67 J	0.81 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-100. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-199)	Analysis 2 (SVT-200)	Analysis 1 (SVT-201)	Analysis 2 (SVT-202)	Analysis 1 (SVT-203)	Analysis 2 (SVT-204)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	72 J	ND	52 J	75 J	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	ND	ND	71 J	66 J	ND	ND
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	3.3 J	ND	3.6 J	4.3 J	3.3 J	3.5 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	ND	ND	4.1 J	5.1 J	3.4 J	4.1 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-100. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-199)	Analysis 2 (SVT-200)	Analysis 1 (SVT-201)	Analysis 2 (SVT-202)	Analysis 1 (SVT-203)	Analysis 2 (SVT-204)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	370 J	ND	260 J	380 J	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-101. Results of the semivolatile organic compound analysis of composite gray triggerfish tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-205)	Analysis 2 (SVT-206)	Analysis 1 (SVT-207)	Analysis 2 (SVT-208)	Analysis 1 (SVT-209)	Analysis 2 (SVT-210)
Phenol (ng/g wet weight)	62	89	120	150	200	180
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	ND	ND	0.74 J	0.74 J	0.64 J	0.59 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	ND	ND	0.9 J	0.86 J	0.79 J	ND
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	1 J	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	0.96 J	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	0.84 J	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	1.8 J	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-101. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-205)	Analysis 2 (SVT-206)	Analysis 1 (SVT-207)	Analysis 2 (SVT-208)	Analysis 1 (SVT-209)	Analysis 2 (SVT-210)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	58 J	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	310	440	580	730	1000	900
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	ND	ND	3.6 J	3.6 J	3.2 J	3 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	ND	ND	4.4 J	4.2 J	4 J	ND
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	4.8 J	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	4.8 J	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-101. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-205)	Analysis 2 (SVT-206)	Analysis 1 (SVT-207)	Analysis 2 (SVT-208)	Analysis 1 (SVT-209)	Analysis 2 (SVT-210)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	4.2 J	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	9 J	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	290 J	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-102. Results of the semivolatile organic compound analysis of composite jewel box tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-211)	Analysis 2 (SVT-212)	Analysis 1 (SVT-213)	Analysis 2 (SVT-214)	Analysis 1 (SVT-215)	Analysis 2 (SVT-216)
Phenol (ng/g wet weight)	32 J	30 J	47	94	47	45 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	0.81 J	0.86 J	0.87 J	1 J	1 J	1.1 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	0.74 J	ND	0.71 J
2,6-Dimethylnaphthalene (ng/g wet weight)	1.6 J	1.7 J	1.1 J	0.51 J	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	0.94 J	0.99 J	0.95 J	1.3 J	1.3 J	1.3 J
C_2-Naphthalenes (ng/g wet weight)	2.2 J	2.6 J	2.4 J	2.9 J	2.3 J	1.5 J
C_3-Naphthalenes (ng/g wet weight)	ND	ND	1.5 J	ND	2.4 J	1.4 J
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	1.2 J	1.3 J	1.5 J	1.9 J	0.98 J	1.3 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	55 I	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	1.8 J	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	4.1 J	4.2 J	4.4 J	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	1.5	1.7	2	2.2	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	1.8	1.9	2	2.1	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-102. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-211)	Analysis 2 (SVT-212)	Analysis 1 (SVT-213)	Analysis 2 (SVT-214)	Analysis 1 (SVT-215)	Analysis 2 (SVT-216)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	130 J	100 J	110 J	41 JB	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	0.82 J	0.92 J
Benzo[a]pyrene (ng/g wet weight)	ND	0.83 J	0.76 J	1 J	1.8 J	2.1 J
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	250 J	240 J	400	800	480	460 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	6.4 J	6.8 J	7.4 J	8.5 J	10 J	11 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	6.3 J	ND	7.3 J
2,6-Dimethylnaphthalene (ng/g dry weight)	13 J	13 J	9.4 J	4.4 J	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	7.4 J	7.8 J	8.1 J	11 J	13 J	13 J
C_2-Naphthalenes (ng/g dry weight)	17 J	20 J	20 J	25 J	24 J	15 J
C_3-Naphthalenes (ng/g dry weight)	ND	ND	13 J	ND	24 J	14 J
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	9.4 J	10 J	13 J	16 J	10 J	13 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	470 I	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	15 J	ND	ND

Table D-102. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-211)	Analysis 2 (SVT-212)	Analysis 1 (SVT-213)	Analysis 2 (SVT-214)	Analysis 1 (SVT-215)	Analysis 2 (SVT-216)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	32 J	33 J	38 J	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	12	13	17	19	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	14	15	17	18	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	1000 J	790 J	940 J	350 JB	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	8.4 J	9.4 J
Benzo[a]pyrene (ng/g dry weight)	ND	6.5 J	6.5 J	8.5 J	18 J	21 J
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
I = Interference.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-103. Results of the semivolatile organic compound analysis of composite thorny oyster tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-217)	Analysis 2 (SVT-218)	Analysis 1 (SVT-219)	Analysis 2 (SVT-220)	Analysis 1 (SVT-221)	Analysis 2 (SVT-222)
Phenol (ng/g wet weight)	17 J	24 J	23 JB	35 JB	21 JB	21 JB
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	0.84 J	0.87 J	1 J	0.96 J	0.74 J	0.77 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	0.85 J	0.81 J	0.73 J	0.76 J	0.59 J	0.64 J
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	1.1 J	0.96 J	1.3 J	1.3 J	0.84 J	0.8 J
C_2-Naphthalenes (ng/g wet weight)	2.2 J	2 J	2.4 J	2.3 J	1.3 J	1.9 J
C_3-Naphthalenes (ng/g wet weight)	1.3 J	1.4 J	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	3 J	3.5 J	2.5 J	2 J	2.2 J	2.3 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	0.86 J	1 J	0.85 J	0.65 J	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	6.2 J	5.9 J	4.7 J	4.1 J	5.3 J	4.8 J
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	2.4	2.6	3.4	3.6	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	3.2	3.2	3.7	4	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	0.73 J
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	1.8 J
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	0.85 J	1 J	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	0.65 J	ND	ND

Table D-103. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-217)	Analysis 2 (SVT-218)	Analysis 1 (SVT-219)	Analysis 2 (SVT-220)	Analysis 1 (SVT-221)	Analysis 2 (SVT-222)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	0.7 J	0.86 J	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	160 J	ND	ND	500 E	570 E
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	110 J	150 J	140 JB	220 JB	130 JB	130 JB
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	5.4 J	5.6 J	6.2 J	6.0 J	4.7 J	4.9 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	5.5 J	5.2 J	4.6 J	4.8 J	3.8 J	4.1 J
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	7.1 J	6.2 J	8.1 J	8.1 J	5.4 J	5.1 J
C_2-Naphthalenes (ng/g dry weight)	14 J	13 J	15 J	14 J	8.3 J	12 J
C_3-Naphthalenes (ng/g dry weight)	8.4 J	9 J	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	19 J	22 J	16 J	12 J	14 J	15 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	5.5 J	6.4 J	5.3 J	4.1 J	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-103. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-217)	Analysis 2 (SVT-218)	Analysis 1 (SVT-219)	Analysis 2 (SVT-220)	Analysis 1 (SVT-221)	Analysis 2 (SVT-222)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	40 J	38 J	29 J	26 J	34 J	30 J
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	15	17	21	22	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	21	21	23	25	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	4.6 J
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	11 J
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	5.5 J	6.4 J	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	4.1 J	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	4.5 J	5.5 J	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	1000 J	ND	ND	3200 E	3600 E
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
E = Analyte concentration exceeds calibration range of instrument.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-104. Results of the semivolatile organic compound analysis of composite yellow chub tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-223)	Analysis 2 (SVT-224)	Analysis 1 (SVT-225)	Analysis 2 (SVT-226)	Analysis 1 (SVT-227)	Analysis 2 (SVT-228)
Phenol (ng/g wet weight)	30 J	18 JB	15 J	20 J	11 J	21 J
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	1.8 J	2.1 J	3.8	4.1	1.5 J	1.5 J
1-Methylnaphthalene (ng/g wet weight)	0.99 J	1.2 J	1.8 J	1.9 J	0.89 J	0.84 J
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	0.58 J	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	1.9 JB	2.1 J	4.1	4	1.7 J	1.6 J
C_2-Naphthalenes (ng/g wet weight)	1.9 J	2.6 J	3.7 J	4 J	1.7 J	2.1 J
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	0.6 J	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-104. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-223)	Analysis 2 (SVT-224)	Analysis 1 (SVT-225)	Analysis 2 (SVT-226)	Analysis 1 (SVT-227)	Analysis 2 (SVT-228)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	54 JB	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	120 J	75 JB	60 J	80 J	44 J	85 J
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	7.5 J	8.8 J	15	16	6 J	6 J
1-Methylnaphthalene (ng/g dry weight)	4.1 J	5 J	7.2 J	7.6 J	3.6 J	3.4 J
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	2.3 J	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	8 JB	8.8 J	16	16	6.8 J	6.4 J
C_2-Naphthalenes (ng/g dry weight)	8 J	11 J	15 J	16 J	6.8 J	8.5 J
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	2.4 J	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-104. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-223)	Analysis 2 (SVT-224)	Analysis 1 (SVT-225)	Analysis 2 (SVT-226)	Analysis 1 (SVT-227)	Analysis 2 (SVT-228)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	220 JB	ND	ND	ND	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-105. Results of the semivolatile organic compound analysis of composite creole-fish tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-229)	Analysis 2 (SVT-230)	Analysis 1 (SVT-231)	Analysis 2 (SVT-232)	Analysis 1 (SVT-233)	Analysis 2 (SVT-234)
Phenol (ng/g wet weight)	32 J	23 J	18 JB	27 J	12 JB	11 JB
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	0.92 J	0.76 J	0.68 JB	0.79 JB	0.87 J	0.95 J
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	0.7 J
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	0.9 J	0.96 J	0.77 JB	0.94 JB	1.1 J	1.2 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	2.6 J	2.4 J	ND	ND	ND	ND
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-105. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-229)	Analysis 2 (SVT-230)	Analysis 1 (SVT-231)	Analysis 2 (SVT-232)	Analysis 1 (SVT-233)	Analysis 2 (SVT-234)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	ND	45 J	100 J	63 JB	ND	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	160 J	110 J	88 JB	130 J	59 JB	54 JB
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	4.5 J	3.7 J	3.3 JB	3.8 JB	4.3 J	4.6 J
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	3.4 J
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	4.4 J	4.7 J	3.8 JB	4.6 JB	5.4 J	5.9 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	13 J	12 J	ND	ND	ND	ND
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-105. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-229)	Analysis 2 (SVT-230)	Analysis 1 (SVT-231)	Analysis 2 (SVT-232)	Analysis 1 (SVT-233)	Analysis 2 (SVT-234)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	ND	220 J	490 J	310 JB	ND	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-106. Results of the semivolatile organic compound analysis of composite gray triggerfish tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-235)	Analysis 2 (SVT-236)	Analysis 1 (SVT-237)	Analysis 2 (SVT-238)	Analysis 1 (SVT-239)	Analysis 2 (SVT-240)
Phenol (ng/g wet weight)	59	43 J	18 JB	15 JB	19 JB	18 JB
Naphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g wet weight)	ND	ND	0.72 JB	0.75 JB	0.61 J	ND
1-Methylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g wet weight)	ND	ND	0.84 JB	0.82 JB	0.67 J	0.69 J
C_2-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g wet weight)	1.7 J	2.3 J	ND	ND	1.2 J	1.1 J
C_2-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND

Table D-106. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-235)	Analysis 2 (SVT-236)	Analysis 1 (SVT-237)	Analysis 2 (SVT-238)	Analysis 1 (SVT-239)	Analysis 2 (SVT-240)
Chrysene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g wet weight)	68 J	ND	ND	ND	62 JB	ND
Benzo[e]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Phenol (ng/g dry weight)	280	210 J	86 JB	72 JB	90 JB	85 JB
Naphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g dry weight)	ND	ND	3.4 JB	3.6 JB	2.9 J	ND
1-Methylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g dry weight)	ND	ND	4 JB	3.9 JB	3.2 J	3.3 J
C_2-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Biphenyl (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluorene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g dry weight)	8.2 J	11 J	ND	ND	5.7 J	5.2 J
C_2-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND

Table D-106. (Continued).

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (SVT-235)	Analysis 2 (SVT-236)	Analysis 1 (SVT-237)	Analysis 2 (SVT-238)	Analysis 1 (SVT-239)	Analysis 2 (SVT-240)
C_2-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Chrysene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/g dry weight)	330 J	ND	ND	ND	290 JB	ND
Benzo[e]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-107. Metal concentrations in produced water samples collected at East Breaks 165A during Cruise 2.

Analyte	Sample 1	Sample 2	Sample 3
Arsenic (µg/L)	5.5	5.7	6.1
Barium (mg/L)	250	240	240
Cadmium (µg/L)	ND	ND	ND
Mercury (µg/L)	ND	ND	ND
Salinity (g/L)	130	130	130

ND = Concentration below the method detection limit.

Table D-108. Metal concentrations in produced water samples collected at Green Canyon 19A during Cruise 2.

Analyte	Sample 1	Sample 2	Sample 3
Arsenic (µg/L)	27	26	29
Barium (mg/L)	150	150	160
Cadmium (µg/L)	0.57	ND	ND
Mercury (µg/L)	ND	ND	ND
Salinity (g/L)	120	120	120

ND = Concentration below the method detection limit.

Table D-109. Metal concentrations in ambient seawater samples collected at East Breaks 165A during Cruise 2.

Analyte	Sample 1	Sample 2	Sample 3
Arsenic (µg/L)	1.1	1.1	1.1
Barium (µg/L)	12	12	12
Cadmium (µg/L)	0.040	0.65	0.24
Mercury (µg/L)	ND	ND	ND
Salinity (g/L)	36	36	36

ND = Concentration below the method detection limit.

Table D-110. Metal concentrations in ambient seawater samples collected at High Island A 356A during Cruise 2.

Analyte	Sample 1	Sample 2	Sample 3
Arsenic (µg/L)	0.92	0.86	0.90
Barium (µg/L)	14	15	15
Cadmium (µg/L)	0.018 J	0.18	1.4
Mercury (µg/L)	ND	ND	ND
Salinity (g/L)	34	34	34

ND = Concentration below the method detection limit.

Table D-111. Metal concentrations in ambient seawater samples collected at Green Canyon 19A during Cruise 2.

Analyte	Sample 1	Sample 2	Sample 3
Arsenic (µg/L)	1.4	1.4	1.4
Barium (µg/L)	6.5	6.9	6.7
Cadmium (µg/L)	0.016	0.010	0.010
Mercury (µg/L)	ND	ND	ND
Salinity (g/L)	36	36	36

ND = Concentration below the method detection limit.

Table D-112. Metal concentrations in ambient seawater samples collected at Eugene Island 361A during Cruise 2.

Analyte	Sample 1	Sample 2	Sample 3
Arsenic (µg/L)	1.4	1.4	1.4
Barium (µg/L)	8.5	8.6	8.4
Cadmium (µg/L)	0.015 J	0.010 J	0.011 J
Mercury (µg/L)	ND	ND	ND
Salinity (g/L)	36	36	36

ND = Concentration below the method detection limit.

Table D-113. Metal concentrations in produced water samples collected at East Breaks 165A during Cruise 3.

Analyte	Sample 1	Sample 2	Sample 3
Arsenic (µg/L)	4.5	4.8	4.9
Barium (mg/L)	250	240	260
Cadmium (µg/L)	ND	ND	ND
Mercury (µg/L)	ND	ND	ND
Salinity (g/L)	130	130	130

ND = Concentration below the method detection limit.

Table D-114. Metal concentrations in produced water samples collected from the primary high-volume discharge at Green Canyon 19A during Cruise 3.

Analyte	Sample 1	Sample 2	Sample 3
Arsenic (µg/L)	22	22	23
Barium (mg/L)	130	130	130
Cadmium (µg/L)	1.25 J	ND	0.85 J
Mercury (µg/L)	ND	ND	ND
Salinity (g/L)	110	110	110

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-115. Metal concentrations in produced water samples collected from the secondary low-volume discharge at Green Canyon 19A during Cruise 3.

Analyte	Sample 1	Sample 2	Sample 3
Arsenic (µg/L)	4.8	4.8	4.3
Barium (mg/L)	86	93	87
Cadmium (µg/L)	14	13	16
Mercury (µg/L)	ND	ND	ND
Salinity (g/L)	220	220	220

ND = Concentration below the method detection limit.

Table D-116. Metal concentrations in ambient seawater samples collected at East Breaks 165A during Cruise 3.

Analyte	Sample 1	Sample 2	Sample 3
Arsenic (µg/L)	1.4	1.6	1.3
Barium (µg/L)	8.9	9.1	8.2
Cadmium (µg/L)	ND	0.005 J	ND
Mercury (µg/L)	ND	ND	ND
Salinity (g/L)	36	36	36

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-117. Metal concentrations in ambient seawater samples collected at High Island A 356A during Cruise 3.

Analyte	Sample 1	Sample 2	Sample 3
Arsenic (µg/L)	1.6	1.7	1.6
Barium (µg/L)	8.9	9.0	8.7
Cadmium (µg/L)	0.008 J	0.058	0.007 J
Mercury (µg/L)	ND	ND	ND
Salinity (g/L)	36	36	36

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-118. Metal concentrations in ambient seawater samples collected at Green Canyon 19A during Cruise 3.

Analyte	Sample 1	Sample 2	Sample 3
Arsenic (µg/L)	1.4	1.4	1.5
Barium (µg/L)	7.9	7.7	7.8
Cadmium (µg/L)	ND	ND	ND
Mercury (µg/L)	ND	ND	ND
Salinity (g/L)	36	36	36

ND = Concentration below the method detection limit.

Table D-119 .Metal concentrations in ambient seawater samples collected at Eugene Island 361A during Cruise 3.

Analyte	Sample 1	Sample 2	Sample 3
Arsenic (µg/L)	1.4	1.4	1.4
Barium (µg/L)	7.9	7.8	7.8
Cadmium (µg/L)	ND	ND	ND
Mercury (µg/L)	ND	ND	ND
Salinity (g/L)	36	36	36

ND = Concentration below the method detection limit.

Table D-120. Results of the trace metal analysis of composite jewel box tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-001)	Analysis 2 (MT-002)	Analysis 1 (MT-003)	Analysis 2 (MT-004)	Analysis 1 (MT-005)	Analysis 2 (MT-006)
Arsenic (µg/g wet weight)	6.41	6.45	5.58	5.59	7.16	7.19
Barium (µg/g wet weight)	2.25	1.97	1.56	1.63	1.93	1.91
Cadmium (µg/g wet weight)	1.09	1.06	0.778	0.795	1.09	1.10
Mercury (µg/g wet weight)	0.010	0.007	0.010	0.010	0.009	0.008
Arsenic (µg/g dry weight)	45.8	46.1	42.9	43.0	44.7	44.9
Barium (µg/g dry weight)	16.1	14.1	12.0	12.6	12.0	11.9
Cadmium (µg/g dry weight)	7.79	7.55	5.98	6.11	6.84	6.86
Mercury (µg/g dry weight)	0.068	0.053	0.077	0.079	0.054	0.049

Table D-121. Results of the trace metal analysis of composite thorny oyster tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-007)	Analysis 2 (MT-008)	Analysis 1 (MT-009)	Analysis 2 (MT-010)	Analysis 1 (MT-011)	Analysis 2 (MT-012)
Arsenic (µg/g wet weight)	16.7	17.4	11.5	11.6	15.1	15.2
Barium (µg/g wet weight)	3.07	3.21	2.92	3.19	3.07	2.69
Cadmium (µg/g wet weight)	5.65	6.03	4.12	4.47	5.43	5.13
Mercury (µg/g wet weight)	0.021	0.029	0.027	0.021	0.027	0.024
Arsenic (µg/g dry weight)	83.6	87.0	60.3	61.0	75.5	76.2
Barium (µg/g dry weight)	15.3	16.0	15.3	16.8	15.4	13.4
Cadmium (µg/g dry weight)	28.3	30.1	21.7	23.5	27.1	25.6
Mercury (µg/g dry weight)	0.104	0.144	0.144	0.110	0.133	0.118

Table D-122. Results of the trace metal analysis of composite yellow chub tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-013)	Analysis 2 (MT-014)	Analysis 1 (MT-015)	Analysis 2 (MT-016)	Analysis 1 (MT-017)	Analysis 2 (MT-018)
Arsenic (µg/g wet weight)	1.50	1.27	1.60	1.60	1.18	1.32
Barium (µg/g wet weight)	0.35	0.15	0.48	0.40	0.43	0.61
Cadmium (µg/g wet weight)	0.005	0.005	0.005	0.005	0.003	0.003
Mercury (µg/g wet weight)	0.020	0.020	0.030	0.021	0.024	0.022
Arsenic (µg/g dry weight)	6.53	5.52	6.94	6.96	5.13	5.74
Barium (µg/g dry weight)	1.54	0.67	2.10	1.73	1.86	2.65
Cadmium (µg/g dry weight)	0.020	0.020	0.021	0.020	0.013	0.013
Mercury (µg/g dry weight)	0.088	0.086	0.130	0.090	0.105	0.095

Table D-123. Results of the trace metal analysis of composite creole-fish tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-019)	Analysis 2 (MT-020)	Analysis 1 (MT-021)	Analysis 2 (MT-022)	Analysis 1 (MT-023)	Analysis 2 (MT-024)
Arsenic (µg/g wet weight)	2.22	2.10	2.09	2.19	2.11	2.01
Barium (µg/g wet weight)	0.38	0.15	0.20	0.45	0.34	0.31
Cadmium (µg/g wet weight)	0.003	0.002	0.004	0.003	0.003	0.003
Mercury (µg/g wet weight)	0.036	0.034	0.029	0.027	0.029	0.028
Arsenic (µg/g dry weight)	11.1	10.5	10.0	10.4	9.59	9.12
Barium (µg/g dry weight)	1.92	0.77	0.97	2.16	1.54	1.40
Cadmium (µg/g dry weight)	0.013	0.010	0.018	0.012	0.012	0.013
Mercury (µg/g dry weight)	0.179	0.169	0.140	0.130	0.132	0.126

Table D-124. Results of the trace metal analysis of composite rockhind tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-025)	Analysis 2 (MT-026)	Analysis 1 (MT-027)	Analysis 2 (MT-028)	Analysis 1 (MT-029)	Analysis 2 (MT-030)
Arsenic (µg/g wet weight)	1.86	2.02	1.99	2.03	2.05	1.98
Barium (µg/g wet weight)	0.05	0.09	0.13	0.04	0.05	0.08
Cadmium (µg/g wet weight)	0.001 J	0.001 J	0.001 J	ND	ND	ND
Mercury (µg/g wet weight)	0.071	0.061	0.061	0.061	0.085	0.079
Arsenic (µg/g dry weight)	8.87	9.63	9.06	9.23	9.33	9.00
Barium (µg/g dry weight)	0.23	0.44	0.57	0.20	0.22	0.36
Cadmium (µg/g dry weight)	0.004 J	0.003 J	0.003 J	ND	ND	ND
Mercury (µg/g dry weight)	0.337	0.292	0.275	0.275	0.388	0.358

ND = Concentration below the method detection limit (MDL).
J = Qualifier indicating the value is between the MDL and the practical quantitation level (defined as five times MDL).

Table D-125. Results of the trace metal analysis of composite jewel box tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-031)	Analysis 2 (MT-032)	Analysis 1 (MT-033)	Analysis 2 (MT-034)	Analysis 1 (MT-035)	Analysis 2 (MT-036)
Arsenic (µg/g wet weight)	7.13	7.15	6.17	6.27	7.03	7.16
Barium (µg/g wet weight)	2.45	2.56	1.85	3.23	2.87	2.43
Cadmium (µg/g wet weight)	1.11	1.13	0.694	0.768	1.16	1.17
Mercury (µg/g wet weight)	0.009	0.009	0.007	0.008	0.010	0.010
Arsenic (µg/g dry weight)	54.8	55.0	56.1	57.0	54.1	55.1
Barium (µg/g dry weight)	18.9	19.7	16.8	29.4	22.1	18.7
Cadmium (µg/g dry weight)	8.52	8.66	6.31	6.98	8.96	9.04
Mercury (µg/g dry weight)	0.069	0.068	0.064	0.071	0.079	0.079

Table D-126. Results of the trace metal analysis of composite thorny oyster tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-037)	Analysis 2 (MT-038)	Analysis 1 (MT-039)	Analysis 2 (MT-040)	Analysis 1 (MT-041)	Analysis 2 (MT-042)
Arsenic (µg/g wet weight)	11.4	11.7	12.7	13.1	11.2	11.3
Barium (µg/g wet weight)	3.29	3.56	3.36	3.28	4.25	3.60
Cadmium (µg/g wet weight)	3.66	3.72	4.15	4.23	2.66	2.95
Mercury (µg/g wet weight)	0.030	0.025	0.025	0.026	0.023	0.033
Arsenic (µg/g dry weight)	67.1	68.8	74.7	77.0	55.8	56.6
Barium (µg/g dry weight)	19.4	21.0	19.8	19.3	21.2	18.0
Cadmium (µg/g dry weight)	21.5	21.9	24.4	24.9	13.3	14.7
Mercury (µg/g dry weight)	0.174	0.145	0.145	0.155	0.115	0.167

Table D-127. Results of the trace metal analysis of composite yellow chub tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-043)	Analysis 2 (MT-044)	Analysis 1 (MT-045)	Analysis 2 (MT-046)	Analysis 1 (MT-047)	Analysis 2 (MT-048)
Arsenic (µg/g wet weight)	1.16	1.14	1.20	1.27	1.30	1.32
Barium (µg/g wet weight)	0.17	0.70	0.20	0.30	0.16	0.34
Cadmium (µg/g wet weight)	0.004	0.004	0.003	0.003	0.004	0.003
Mercury (µg/g wet weight)	0.017	0.019	0.025	0.026	0.025	0.022
Arsenic (µg/g dry weight)	5.06	4.97	4.98	5.30	4.82	4.89
Barium (µg/g dry weight)	0.76	3.06	0.84	1.25	0.58	1.27
Cadmium (µg/g dry weight)	0.016	0.016	0.013	0.011	0.013	0.012
Mercury (µg/g dry weight)	0.076	0.08	0.104	0.109	0.092	0.081

Table D-128. Results of the trace metal analysis of composite creole-fish tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-049)	Analysis 2 (MT-050)	Analysis 1 (MT-051)	Analysis 2 (MT-052)	Analysis 1 (MT-053)	Analysis 2 (MT-054)
Arsenic (µg/g wet weight)	1.77	1.87	1.50	1.47	1.45	1.50
Barium (µg/g wet weight)	0.19	0.35	0.32	0.17	0.15	0.15
Cadmium (µg/g wet weight)	0.002 J	0.002 J	0.001 J	0.001 J	0.003	0.003
Mercury (µg/g wet weight)	0.032	0.032	0.027	0.029	0.027	0.026
Arsenic (µg/g dry weight)	8.44	8.90	7.14	7.02	6.89	7.12
Barium (µg/g dry weight)	0.93	1.65	1.54	0.79	0.71	0.72
Cadmium (µg/g dry weight)	0.008 J	0.008 J	0.006 J	0 J	0.012	0.012
Mercury (µg/g dry weight)	0	0.152	0.130	0	0.129	0.125

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-129. Results of the trace metal analysis of composite rockhind tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-055)	Analysis 2 (MT-056)	Analysis 1 (MT-057)	Analysis 2 (MT-058)	Analysis 1 (MT-059)	Analysis 2 (MT-060)
Arsenic (µg/g wet weight)	1.22	1.27	1.21	1.40	0.78	0.89
Barium (µg/g wet weight)	0.04	0.04	0.09	0.03 J	0.05	0.16
Cadmium (µg/g wet weight)	ND	0.001 J	0.001 J	0.001 J	0.001 J	ND
Mercury (µg/g wet weight)	0.104	0.085	0.195	0.162	0.123	0.126
Arsenic (µg/g dry weight)	5.10	5.29	4.18	4.82	3.71	4.23
Barium (µg/g dry weight)	0.16	0.18	0.30	0.10 J	0.22	0.76
Cadmium (µg/g dry weight)	ND	0.003 J	0 J	0 J	0 J	ND
Mercury (µg/g dry weight)	0.43	0.356	1	1	1	0.6

ND = Concentration below the method detection limit (MDL).
J = Qualifier indicating the value is between the MDL and the practical quantitation level (defined as five times MDL).

Table D-130. Results of the trace metal analysis of composite jewel box tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-061)	Analysis 2 (MT-062)	Analysis 1 (MT-063)	Analysis 2 (MT-064)	Analysis 1 (MT-065)	Analysis 2 (MT-066)
Arsenic (µg/g wet weight)	4.16	4.21	4.93	5.03	4.23	4.20
Barium (µg/g wet weight)	6.41	12.6	3.80	4.86	3.03	2.49
Cadmium (µg/g wet weight)	0.620	0.687	0.819	0.807	0.727	0.771
Mercury (µg/g wet weight)	0.009	0.008	0.009	0.009	0.009	0.010
Arsenic (µg/g dry weight)	41.6	42.1	44.9	45.7	42.3	42.0
Barium (µg/g dry weight)	64.1	126	34.6	44.2	30.3	24.9
Cadmium (µg/g dry weight)	6.20	6.87	7.45	7.33	7.27	7.71
Mercury (µg/g dry weight)	0.086	0.081	0.080	0.083	0.090	0.096

Table D-131. Results of the trace metal analysis of composite thorny oyster tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-067)	Analysis 2 (MT-068)	Analysis 1 (MT-069)	Analysis 2 (MT-070)	Analysis 1 (MT-071)	Analysis 2 (MT-072)
Arsenic (µg/g wet weight)	20.5	19.7	17.6	18.1	23.0	22.9
Barium (µg/g wet weight)	3.45	3.89	4.31	4.43	3.35	3.66
Cadmium (µg/g wet weight)	3.51	3.73	4.82	5.36	6.15	4.85
Mercury (µg/g wet weight)	0.029	0.024	0.031	0.035	0.063	0.054
Arsenic (µg/g dry weight)	108	104	87.8	90.4	121	121
Barium (µg/g dry weight)	18.2	20.5	21.5	22.2	17.7	19.3
Cadmium (µg/g dry weight)	18.5	19.6	24.1	26.8	32.3	25.5
Mercury (µg/g dry weight)	0.151	0.128	0.155	0.173	0.330	0.286

Table D-132. Results of the trace metal analysis of composite yellow chub tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-073)	Analysis 2 (MT-074)	Analysis 1 (MT-075)	Analysis 2 (MT-076)	Analysis 1 (MT-077)	Analysis 2 (MT-078)
Arsenic (µg/g wet weight)	1.00	0.991	0.978	1.01	1.01	1.06
Barium (µg/g wet weight)	0.31	0.25	0.57	0.34	0.31	0.15
Cadmium (µg/g wet weight)	0.003	0.003	0.003	0.003	0.003	0.003
Mercury (µg/g wet weight)	0.022	0.023	0.017	0.013	0.018	0.016
Arsenic (µg/g dry weight)	4.18	4.13	4.07	4.20	4.39	4.60
Barium (µg/g dry weight)	1.28	1.04	2.38	1.41	1.36	0.66
Cadmium (µg/g dry weight)	0.012	0.013	0.012	0.012	0.011	0.011
Mercury (µg/g dry weight)	0.093	0.096	0.071	0.055	0.077	0.070

Table D-133. Results of the trace metal analysis of composite creole-fish tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-079)	Analysis 2 (MT-080)	Analysis 1 (MT-081)	Analysis 2 (MT-082)	Analysis 1 (MT-083)	Analysis 2 (MT-084)
Arsenic (µg/g wet weight)	1.18	1.23	0.956	0.940	1.19	1.05
Barium (µg/g wet weight)	0.31	0.15	0.26	0.31	0.34	0.22
Cadmium (µg/g wet weight)	0.002	0.002 J	0.003	0.003	0.003	0.002
Mercury (µg/g wet weight)	0.039	0.042	0.035	0.036	0.032	0.031
Arsenic (µg/g dry weight)	5.63	5.87	4.55	4.48	5.97	5.24
Barium (µg/g dry weight)	1.46	0.69	1.22	1.48	1.72	1.11
Cadmium (µg/g dry weight)	0.011	0.009 J	0.013	0.012	0.013	0.012
Mercury (µg/g dry weight)	0.188	0.198	0.165	0.170	0.159	0.154

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-134. Results of the trace metal analysis of composite gray triggerfish tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-085)	Analysis 2 (MT-086)	Analysis 1 (MT-087)	Analysis 2 (MT-088)	Analysis 1 (MT-089)	Analysis 2 (MT-090)
Arsenic (µg/g wet weight)	4.78	5.02	5.59	5.69	5.27	5.18
Barium (µg/g wet weight)	0.05	0.14	0.01 J	ND	0.12	0.04
Cadmium (µg/g wet weight)	0.001 J	0.001 J	ND	ND	ND	ND
Mercury (µg/g wet weight)	0.069	0.072	0.046	0.053	0.056	0.058
Arsenic (µg/g dry weight)	22.8	23.9	26.6	27.1	25.1	24.7
Barium (µg/g dry weight)	0.24	0.67	0.03 J	ND	0.59	0.20
Cadmium (µg/g dry weight)	0.005 J	0.006 J	ND	ND	ND	ND
Mercury (µg/g dry weight)	0.327	0.344	0.219	0.254	0.266	0.276

ND = Concentration below the method detection limit (MDL).
J = Qualifier indicating the value is between the MDL and the practical quantitation level (defined as five times MDL).

Table D-135. Results of the trace metal analysis of composite jewel box tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-091)	Analysis 2 (MT-092)	Analysis 1 (MT-093)	Analysis 2 (MT-094)	Analysis 1 (MT-095)	Analysis 2 (MT-096)
Arsenic (µg/g wet weight)	5.38	5.39	6.06	6.06	8.15	7.50
Barium (µg/g wet weight)	1.64	2.74	4.49	5.56	2.19	2.13
Cadmium (µg/g wet weight)	1.01	1.04	1.21	1.17	1.71	1.72
Mercury (µg/g wet weight)	0.008	0.007	0.007	0.006	0.015	0.013
Arsenic (µg/g dry weight)	48.9	49.0	55.1	55.1	54.4	50.0
Barium (µg/g dry weight)	14.9	24.9	40.8	50.5	14.6	14.2
Cadmium (µg/g dry weight)	9.16	9.49	11.0	10.6	11.4	11.4
Mercury (µg/g dry weight)	0.069	0.063	0.066	0.056	0.097	0.087

Table D-136. Results of the trace metal analysis of composite thorny oyster tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-097)	Analysis 2 (MT-098)	Analysis 1 (MT-099)	Analysis 2 (MT-100)	Analysis 1 (MT-101)	Analysis 2 (MT-102)
Arsenic (µg/g wet weight)	20.2	20.6	14.6	13.8	15.0	15.0
Barium (µg/g wet weight)	2.91	3.15	3.13	3.22	4.36	3.28
Cadmium (µg/g wet weight)	4.00	4.65	5.84	5.68	4.55	3.80
Mercury (µg/g wet weight)	0.022	0.020	0.024	0.021	0.024	0.023
Arsenic (µg/g dry weight)	101	103	76.6	72.9	79.0	79.0
Barium (µg/g dry weight)	14.6	15.8	16.5	16.9	22.9	17.3
Cadmium (µg/g dry weight)	20.0	23.3	30.8	29.9	23.9	20.0
Mercury (µg/g dry weight)	0.110	0.098	0.128	0.110	0.127	0.119

Table D-137. Results of the trace metal analysis of composite yellow chub tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-103)	Analysis 2 (MT-104)	Analysis 1 (MT-105)	Analysis 2 (MT-106)	Analysis 1 (MT-107)	Analysis 2 (MT-108)
Arsenic (µg/g wet weight)	0.851	0.772	0.760	0.693	0.806	0.890
Barium (µg/g wet weight)	0.37	0.18	0.20	0.45	0.47	0.36
Cadmium (µg/g wet weight)	0.003	0.002	0.002 J	0.003	0.003	0.002 J
Mercury (µg/g wet weight)	0.020	0.021	0.019	0.020	0.016	0.018
Arsenic (µg/g dry weight)	3.54	3.22	2.92	2.67	3.36	3.71
Barium (µg/g dry weight)	1.53	0.76	0.75	1.73	1.95	1.49
Cadmium (µg/g dry weight)	0.011	0.010	0.008 J	0.010	0.011	0.009 J
Mercury (µg/g dry weight)	0.084	0.086	0.074	0.077	0.068	0.074

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-138. Results of the trace metal analysis of composite creole-fish tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-109)	Analysis 2 (MT-110)	Analysis 1 (MT-111)	Analysis 2 (MT-112)	Analysis 1 (MT-113)	Analysis 2 (MT-114)
Arsenic (µg/g wet weight)	1.02	1.02	1.50	1.50	1.21	1.17
Barium (µg/g wet weight)	0.12	0.34	0.21	0.14	0.33	0.20
Cadmium (µg/g wet weight)	ND	0.002	0.002 J	0.002	0.002 J	0.002 J
Mercury (µg/g wet weight)	0.024	0.027	0.028	0.029	0.029	0.027
Arsenic (µg/g dry weight)	5.10	5.11	7.49	7.48	5.77	5.59
Barium (µg/g dry weight)	0.61	1.68	1.05	0.69	1.57	0.93
Cadmium (µg/g dry weight)	ND	0.010	0.009 J	0.010	0.009 J	0.009 J
Mercury (µg/g dry weight)	0.12	0.136	0.139	0.143	0.138	0.130

ND = Concentration below the method detection limit (MDL).
J = Qualifier indicating the value is between the MDL and the practical quantitation level (defined as five times MDL).

Table D-139. Results of the trace metal analysis of composite gray triggerfish tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-115)	Analysis 2 (MT-116)	Analysis 1 (MT-117)	Analysis 2 (MT-118)	Analysis 1 (MT-119)	Analysis 2 (MT-120)
Arsenic (µg/g wet weight)	5.31	4.69	6.79	6.25	6.37	6.56
Barium (µg/g wet weight)	0.09	0.41	0.13	0.16	0.07	0.09
Cadmium (µg/g wet weight)	0.001 J	0.001 J	0.001 J	ND	ND	ND
Mercury (µg/g wet weight)	0.033	0.036	0.019	0.019	0.028	0.026
Arsenic (µg/g dry weight)	25.3	22.3	32.3	29.7	31.9	32.8
Barium (µg/g dry weight)	0.43	2	0.61	0.74	0.33	0.46
Cadmium (µg/g dry weight)	0.004 J	0.005 J	0 J	ND	ND	ND
Mercury (µg/g dry weight)	0.16	0.170	0	0.09	0.14	0.13

ND = Concentration below the method detection limit (MDL).
J = Qualifier indicating the value is between the MDL and the practical quantitation level (defined as five times MDL).

Table D-140. Results of the trace metal analysis of composite jewel box tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-121)	Analysis 2 (MT-122)	Analysis 1 (MT-123)	Analysis 2 (MT-124)	Analysis 1 (MT-125)	Analysis 2 (MT-126)
Arsenic (µg/g wet weight)	7.1	6.9	7.0	6.8	8.4	8.4
Barium (µg/g wet weight)	1.2	1.4	1.6	1.6	2.4	2.0
Cadmium (µg/g wet weight)	0.97	0.89	0.93	0.96	1.2	1.2
Mercury (µg/g wet weight)	0.009	0.007	0.008	0.007	0.011	0.011
Arsenic (µg/g dry weight)	64.2	62.4	58.2	57.0	60.4	60.1
Barium (µg/g dry weight)	10.9	13.2	13.7	13.0	17.2	14.4
Cadmium (µg/g dry weight)	8.8	8.1	7.8	8.0	8.4	8.3
Mercury (µg/g dry weight)	0.080	0.068	0.065	0.061	0.076	0.080

Table D-141. Results of the trace metal analysis of composite thorny oyster tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-127)	Analysis 2 (MT-128)	Analysis 1 (MT-129)	Analysis 2 (MT-130)	Analysis 1 (MT-131)	Analysis 2 (MT-132)
Arsenic (µg/g wet weight)	16.2	15.4	16.9	17.6	14.2	14.9
Barium (µg/g wet weight)	2.8	2.4	2.5	2.8	2.4	2.8
Cadmium (µg/g wet weight)	5.9	5.5	4.1	4.5	5.2	5.7
Mercury (µg/g wet weight)	0.027	0.027	0.029	0.032	0.029	0.026
Arsenic (µg/g dry weight)	95.5	90.6	110	120	94.9	93.2
Barium (µg/g dry weight)	16.5	14.2	16.4	19.8	16.1	17.6
Cadmium (µg/g dry weight)	34.5	32.4	27.5	32.0	34.8	35.6
Mercury (µg/g dry weight)	0.16	0.16	0.21	0.23	0.18	0.16

Table D-142. Results of the trace metal analysis of composite yellow chub tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-133)	Analysis 2 (MT-134)	Analysis 1 (MT-135)	Analysis 2 (MT-136)	Analysis 1 (MT-137)	Analysis 2 (MT-138)
Arsenic (µg/g wet weight)	0.8	1.0	0.8	0.6	0.8	0.9
Barium (µg/g wet weight)	0.014 J	0.026 J	0.013 J	0.012 J	0.012 J	0.11
Cadmium (µg/g wet weight)	0.003 J	0.002 J	0.003 J	0.003 J	0.002 J	0.002 J
Mercury (µg/g wet weight)	0.016	0.016	0.018	0.017	0.010	0.011
Arsenic (µg/g dry weight)	3.4	3.8	3.2	2.5	3.1	3.9
Barium (µg/g dry weight)	0.057 J	0.10 J	0.053 J	0.046 J	0.050 J	0.44
Cadmium (µg/g dry weight)	0.010 J	0.009 J	0.010 J	0.010 J	0 J	0.008 J
Mercury (µg/g dry weight)	0.063	0.064	0.072	0.066	0.042	0.045

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-143. Results of the trace metal analysis of composite creole-fish tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-139)	Analysis 2 (MT-140)	Analysis 1 (MT-141)	Analysis 2 (MT-142)	Analysis 1 (MT-143)	Analysis 2 (MT-144)
Arsenic (µg/g wet weight)	1.7	1.7	1.2	1.2	1.7	1.6
Barium (µg/g wet weight)	0.016 J	0.013 J	0.030	0.022	0.022	0.038
Cadmium (µg/g wet weight)	0.003	0.003	0.001 J	0.001 J	0.003	0.004
Mercury (µg/g wet weight)	0.032	0.030	0.021	0.022	0.030	0.029
Arsenic (µg/g dry weight)	8.0	8.0	5.8	5.8	8.1	8.2
Barium (µg/g dry weight)	0.08 J	0.06 J	0.14	0.11	0.11	0.19
Cadmium (µg/g dry weight)	0.014	0.014	0.006 J	0.006 J	0.015	0.018
Mercury (µg/g dry weight)	0.15	0.14	0.11	0.11	0.15	0.15

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-144. Results of the trace metal analysis of composite sergeant major tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-145)	Analysis 2 (MT-146)	Analysis 1 (MT-147)	Analysis 2 (MT-148)	Analysis 1 (MT-149)	Analysis 2 (MT-150)
Arsenic (µg/g wet weight)	3.7	3.6	5.0	5.0	4.6	4.6
Barium (µg/g wet weight)	0.070	0.044	0.050	0.057	0.11	0.083
Cadmium (µg/g wet weight)	0.003	0.003	0.005	0.005	0.006	0.006
Mercury (µg/g wet weight)	0.054	0.053	0.057	0.059	0.053	0.059
Arsenic (µg/g dry weight)	17.7	17.3	23.9	22.9	21.8	21.9
Barium (µg/g dry weight)	0.33	0.21	0.24	0.26	0.53	0.39
Cadmium (µg/g dry weight)	0.015	0.016	0.022	0.023	0.027	0.029
Mercury (µg/g dry weight)	0.26	0.25	0.27	0.28	0.25	0.28

Table D-145. Results of the trace metal analysis of composite jewel box tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-151)	Analysis 2 (MT-152)	Analysis 1 (MT-153)	Analysis 2 (MT-154)	Analysis 1 (MT-155)	Analysis 2 (MT-156)
Arsenic (µg/g wet weight)	6.2	6.3	5.8	5.9	6.9	6.2
Barium (µg/g wet weight)	1.4	1.6	3.5	4.5	1.5	1.8
Cadmium (µg/g wet weight)	0.86	0.87	0.81	0.98	0.87	0.85
Mercury (µg/g wet weight)	0.006	0.006	0.007	0.007	0.007	0.007
Arsenic (µg/g dry weight)	62.2	63.2	58.2	53.6	69.4	69.3
Barium (µg/g dry weight)	13.5	15.8	35.3	41.4	15.0	19.6
Cadmium (µg/g dry weight)	8.6	8.7	8.1	8.9	8.7	9.5
Mercury (µg/g dry weight)	0.059	0.059	0.069	0.065	0.069	0.072

Table D-146. Results of the trace metal analysis of composite thorny oyster tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-157)	Analysis 2 (MT-158)	Analysis 1 (MT-159)	Analysis 2 (MT-160)	Analysis 1 (MT-161)	Analysis 2 (MT-162)
Arsenic (µg/g wet weight)	8.8	9.5	9.9	10.9	15.1	14.8
Barium (µg/g wet weight)	3.1	3.5	2.4	2.8	3.3	3.0
Cadmium (µg/g wet weight)	3.6	3.6	3.5	3.9	4.1	4.2
Mercury (µg/g wet weight)	0.028	0.030	0.031	0.024	0.024	0.028
Arsenic (µg/g dry weight)	62.7	68.2	66.2	72.9	83.9	82.2
Barium (µg/g dry weight)	22.3	25.0	16.1	18.9	18.2	16.7
Cadmium (µg/g dry weight)	25.6	25.9	23.4	25.9	22.7	23.6
Mercury (µg/g dry weight)	0.21	0.23	0.24	0.18	0.14	0.16

Table D-147. Results of the trace metal analysis of composite yellow chub tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-163)	Analysis 2 (MT-164)	Analysis 1 (MT-165)	Analysis 2 (MT-166)	Analysis 1 (MT-167)	Analysis 2 (MT-168)
Arsenic (µg/g wet weight)	0.5	0.6	0.8	0.7	0.6	0.6
Barium (µg/g wet weight)	0.024	0.042	0.011 J	0.010 J	0.015 J	0.008 J
Cadmium (µg/g wet weight)	0.003	0.003	0.002 J	0.002 J	0.003	0.002 J
Mercury (µg/g wet weight)	0.018	0.019	0.017	0.016	0.016	0.015
Arsenic (µg/g dry weight)	2.3	2.6	3.2	2.9	2.4	2.4
Barium (µg/g dry weight)	0.11	0.18	0.045 J	0.040 J	0.061 J	0.034 J
Cadmium (µg/g dry weight)	0.011	0.012	0.010 J	0.010 J	0.012	0.009 J
Mercury (µg/g dry weight)	0.079	0.081	0.069	0.066	0.068	0.063

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-148. Results of the trace metal analysis of composite creole-fish tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-169)	Analysis 2 (MT-170)	Analysis 1 (MT-171)	Analysis 2 (MT-172)	Analysis 1 (MT-173)	Analysis 2 (MT-174)
Arsenic (µg/g wet weight)	1.9	2.0	1.7	1.5	2.1	2.2
Barium (µg/g wet weight)	0.023	0.051	0.010 J	0.006 J	0.018 J	0.016 J
Cadmium (µg/g wet weight)	0.003	0.003	0.002 J	0.002 J	0.002	0.003
Mercury (µg/g wet weight)	0.030	0.031	0.026	0.026	0.019	0.017
Arsenic (µg/g dry weight)	9.2	9.3	8.0	7.4	9.9	10.5
Barium (µg/g dry weight)	0.11	0.24	0.05 J	0.03 J	0.09 J	0.08 J
Cadmium (µg/g dry weight)	0.016	0.015	0.010 J	0 J	0.011	0.012
Mercury (µg/g dry weight)	0.14	0.15	0.12	0.12	0.093	0.086

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-149. Results of the trace metal analysis of composite sergeant major tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-175)	Analysis 2 (MT-176)	Analysis 1 (MT-177)	Analysis 2 (MT-178)	Analysis 1 (MT-179)	Analysis 2 (MT-180)
Arsenic (µg/g wet weight)	7.8	7.8	7.1	7.0	6.7	6.1
Barium (µg/g wet weight)	0.11	0.26	0.19	0.11	0.094	0.13
Cadmium (µg/g wet weight)	0.002 J	0.002 J	0.002 J	0.002 J	0.002 J	0.002 J
Mercury (µg/g wet weight)	0.049	0.048	0.047	0.050	0.039	0.041
Arsenic (µg/g dry weight)	35.4	35.5	30.9	32.0	29.3	27.8
Barium (µg/g dry weight)	0.48	1.2	0.83	0.49	0.41	0.59
Cadmium (µg/g dry weight)	0.010 J	0.010 J	0 J	0 J	0 J	0 J
Mercury (µg/g dry weight)	0.22	0.22	0.20	0.22	0.18	0.19

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-150. Results of the trace metal analysis of composite jewel box tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-181)	Analysis 2 (MT-182)	Analysis 1 (MT-183)	Analysis 2 (MT-184)	Analysis 1 (MT-185)	Analysis 2 (MT-186)
Arsenic (µg/g wet weight)	6.0	6.3	6.6	7.0	7.1	6.9
Barium (µg/g wet weight)	10	9.7	26	22	37	21
Cadmium (µg/g wet weight)	0.51	0.52	0.48	0.53	0.79	0.77
Mercury (µg/g wet weight)	0.009	0.010	0.011	0.011	0.017	0.020
Arsenic (µg/g dry weight)	46.2	48.4	47.5	46.9	41.7	43.0
Barium (µg/g dry weight)	80.1	74.8	180	150	220	130
Cadmium (µg/g dry weight)	3.9	4.0	3.4	3.5	4.6	4.8
Mercury (µg/g dry weight)	0.068	0.076	0.073	0.074	0.10	0.12

Table D-151. Results of the trace metal analysis of composite thorny oyster tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-187)	Analysis 2 (MT-188)	Analysis 1 (MT-189)	Analysis 2 (MT-190)	Analysis 1 (MT-191)	Analysis 2 (MT-192)
Arsenic (µg/g wet weight)	20.5	20.7	16.2	16.9	14.5	13.1
Barium (µg/g wet weight)	2.9	3.4	3.8	4.7	5.3	4.7
Cadmium (µg/g wet weight)	3.4	3.7	4.3	4.3	4.0	3.8
Mercury (µg/g wet weight)	0.028	0.034	0.032	0.038	0.027	0.028
Arsenic (µg/g dry weight)	120	120	95.5	99.5	85.1	77.3
Barium (µg/g dry weight)	17.0	20.0	22.4	27.8	31.0	27.6
Cadmium (µg/g dry weight)	20.1	21.7	25.0	25.2	23.8	22.5
Mercury (µg/g dry weight)	0.17	0.20	0.19	0.22	0.16	0.17

Table D-152. Results of the trace metal analysis of composite yellow chub tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-193)	Analysis 2 (MT-194)	Analysis 1 (MT-195)	Analysis 2 (MT-196)	Analysis 1 (MT-197)	Analysis 2 (MT-198)
Arsenic (µg/g wet weight)	1.1	1.1	1.1	0.9	1.0	1.0
Barium (µg/g wet weight)	0.015 J	0.062	0.020 J	0.035	0.037	0.028
Cadmium (µg/g wet weight)	0.001 J	0.002 J	0.002 J	0.002 J	0.002 J	0.002 J
Mercury (µg/g wet weight)	0.041	0.040	0.025	0.024	0.025	0.025
Arsenic (µg/g dry weight)	4.4	4.3	4.2	3.7	4.0	4.3
Barium (µg/g dry weight)	0.056 J	0.24	0.08 J	0.14	0.15	0.12
Cadmium (µg/g dry weight)	0.005 J	0.007 J	0.007 J	0.007 J	0 J	0.007 J
Mercury (µg/g dry weight)	0.16	0.15	0.10	0.097	0.10	0.10

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-153. Results of the trace metal analysis of composite creole-fish tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-199)	Analysis 2 (MT-200)	Analysis 1 (MT-201)	Analysis 2 (MT-202)	Analysis 1 (MT-203)	Analysis 2 (MT-204)
Arsenic (µg/g wet weight)	1.3	1.2	1.1	1.0	1.5	1.4
Barium (µg/g wet weight)	0.046	0.038	0.011 J	0.011 J	0.009 J	0.012 J
Cadmium (µg/g wet weight)	0.003	0.003	0.003	0.004	0.003	0.003
Mercury (µg/g wet weight)	0.026	0.029	0.025	0.028	0.028	0.027
Arsenic (µg/g dry weight)	6.5	6.1	5.2	5.2	7.3	6.9
Barium (µg/g dry weight)	0.23	0.19	0.05 J	0.06 J	0.04 J	0.06 J
Cadmium (µg/g dry weight)	0.014	0.016	0.015	0.020	0.016	0.015
Mercury (µg/g dry weight)	0.20	0.22	0.18	0.19	0.16	0.17

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-154. Results of the trace metal analysis of composite gray triggerfish tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-205)	Analysis 2 (MT-206)	Analysis 1 (MT-207)	Analysis 2 (MT-208)	Analysis 1 (MT-209)	Analysis 2 (MT-210)
Arsenic (µg/g wet weight)	5.9	5.9	6.1	5.9	4.9	5.0
Barium (µg/g wet weight)	0.020 J	0.030	0.12	0.005 J	0.021 J	0.054
Cadmium (µg/g wet weight)	0.003	0.002 J	0.002 J	0.002 J	0.002 J	0.002 J
Mercury (µg/g wet weight)	0.028	0.023	0.020	0.019	0.027	0.022
Arsenic (µg/g dry weight)	26.7	27.0	29.1	28.3	23.3	22.5
Barium (µg/g dry weight)	0.09 J	0.14	0.59	0.026 J	0.098 J	0.24
Cadmium (µg/g dry weight)	0.012	0.010 J	0.009 J	0.008 J	0.008 J	0.009 J
Mercury (µg/g dry weight)	0.13	0.11	0.097	0.092	0.12	0.098

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-155. Results of the trace metal analysis of composite jewel box tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-211)	Analysis 2 (MT-212)	Analysis 1 (MT-213)	Analysis 2 (MT-214)	Analysis 1 (MT-215)	Analysis 2 (MT-216)
Arsenic (µg/g wet weight)	6.8	6.3	6.2	6.5	10.6	7.2
Barium (µg/g wet weight)	2.1	2.0	2.3	2.4	10	6.5
Cadmium (µg/g wet weight)	1.2	1.1	1.3	1.3	1.5	1.0
Mercury (µg/g wet weight)	0.008	0.007	0.007	0.008	0.008	0.009
Arsenic (µg/g dry weight)	62.2	57.6	62.2	59.2	66.1	65.2
Barium (µg/g dry weight)	18.6	18.4	23.2	22.0	64.1	59.4
Cadmium (µg/g dry weight)	11.2	10.1	12.6	11.9	9.6	9.5
Mercury (µg/g dry weight)	0.069	0.066	0.068	0.071	0.060	0.062

Table D-156. Results of the trace metal analysis of composite thorny oyster tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-217)	Analysis 2 (MT-218)	Analysis 1 (MT-219)	Analysis 2 (MT-220)	Analysis 1 (MT-221)	Analysis 2 (MT-222)
Arsenic (µg/g wet weight)	16.7	16.6	20.9	18.2	15.4	17.0
Barium (µg/g wet weight)	2.9	2.9	7.5	5.4	3.6	3.3
Cadmium (µg/g wet weight)	5.7	5.7	5.5	4.8	5.4	5.3
Mercury (µg/g wet weight)	0.027	0.028	0.028	0.029	0.030	0.027
Arsenic (µg/g dry weight)	98.3	97.7	120	110	90.4	100
Barium (µg/g dry weight)	17.0	17.3	43.9	31.9	21.0	19.6
Cadmium (µg/g dry weight)	33.5	33.4	32.1	28.1	32.0	31.3
Mercury (µg/g dry weight)	0.16	0.17	0.17	0.17	0.18	0.16

Table D-157. Results of the trace metal analysis of composite yellow chub tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-223)	Analysis 2 (MT-224)	Analysis 1 (MT-225)	Analysis 2 (MT-226)	Analysis 1 (MT-227)	Analysis 2 (MT-228)
Arsenic (µg/g wet weight)	0.9	0.7	0.9	0.7	0.8	0.9
Barium (µg/g wet weight)	0.019 J	0.013 J	0.021 J	0.017 J	0.026 J	0.015 J
Cadmium (µg/g wet weight)	0.002 J	0.002 J	0.002 J	0.002 J	0.002 J	0.002 J
Mercury (µg/g wet weight)	0.018	0.016	0.018	0.017	0.016	0.016
Arsenic (µg/g dry weight)	3.6	2.8	3.6	2.9	2.9	3.6
Barium (µg/g dry weight)	0.076 J	0.054 J	0.083 J	0.069 J	0.10 J	0.059 J
Cadmium (µg/g dry weight)	0.008 J	0.008 J	0.008 J	0.008 J	0.008 J	0.009 J
Mercury (µg/g dry weight)	0.072	0.065	0.073	0.067	0.063	0.060

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-158. Results of the trace metal analysis of composite creole-fish tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-229)	Analysis 2 (MT-230)	Analysis 1 (MT-231)	Analysis 2 (MT-232)	Analysis 1 (MT-233)	Analysis 2 (MT-234)
Arsenic (µg/g wet weight)	0.9	0.8	0.8	0.8	1.3	1.3
Barium (µg/g wet weight)	0.045	0.037	0.031	0.021 J	0.040	0.032
Cadmium (µg/g wet weight)	0.003	0.003	0.002 J	0.002 J	0.002	0.003
Mercury (µg/g wet weight)	0.035	0.035	0.031	0.034	0.036	0.032
Arsenic (µg/g dry weight)	4.3	3.8	3.7	3.6	6.5	6.6
Barium (µg/g dry weight)	0.22	0.18	0.15	0.10 J	0.20	0.16
Cadmium (µg/g dry weight)	0.014	0.013	0.009 J	0.009 J	0.012	0.014
Mercury (µg/g dry weight)	0.17	0.17	0.16	0.17	0.17	0.15

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-159. Results of the trace metal analysis of composite gray triggerfish tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (MT-235)	Analysis 2 (MT-236)	Analysis 1 (MT-237)	Analysis 2 (MT-238)	Analysis 1 (MT-239)	Analysis 2 (MT-240)
Arsenic (µg/g wet weight)	6.0	6.6	6.0	6.2	5.1	4.7
Barium (µg/g wet weight)	0.004 J	0.007 J	0.11	0.012 J	0.017 J	0.009 J
Cadmium (µg/g wet weight)	0.001 J	0.001 J	0.001 J	0.001 J	0.001 J	0.0004 J
Mercury (µg/g wet weight)	0.090	0.12	0.11	0.11	0.077	0.079
Arsenic (µg/g dry weight)	28.4	31.2	27.1	28.1	23.2	21.5
Barium (µg/g dry weight)	0.020 J	0.033 J	0.48	0.054 J	0.078 J	0.044 J
Cadmium (µg/g dry weight)	0.003 J	0.003 J	0.003 J	0.003 J	0.004 J	0.002 J
Mercury (µg/g dry weight)	0.43	0.58	0.51	0.48	0.35	0.36

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table D-160. Activities (pCi/L) of radionuclides in produced water samples collected at East Breaks 165A during Cruise 2.

Analyte	Sample 1 (RW-01)	Sample 2 (RW-02)	Sample 3 (RW-03)
^{226}Ra	260	260	260
^{228}Ra	940	960	940

Table D-161. Activities (pCi/L) of radionuclides in produced water samples collected at Green Canyon 19A during Cruise 2.

Analyte	Sample 1 (RW-04)	Sample 2 (RW-05)	Sample 3 (RW-06)
^{226}Ra	250	250	260
^{228}Ra	840	840	820

Table D-162. Activities (pCi/L) of radionuclides in ambient seawater samples collected at East Breaks 165A during Cruise 2.

Analyte	Sample 1 (RW-07)	Sample 2 (RW-08)	Sample 3 (RW-09)
^{226}Ra	0.070	0.11	0.030
^{228}Ra	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-163. Activities (pCi/L) of radionuclides in ambient seawater samples collected at High Island A 356A during Cruise 2.

Analyte	Sample 1 (RW-10)	Sample 2 (RW-11)	Sample 3 (RW-12)
^{226}Ra	ND	0.090	ND
^{228}Ra	ND	2.7	ND

ND = Concentration below the method detection limit.

Table D-164. Activities (pCi/L) of radionuclides in ambient seawater samples collected at Green Canyon 19A during Cruise 2.

Analyte	Sample 1 (RW-13)	Sample 2 (RW-14)	Sample 3 (RW-15)
^{226}Ra	0.19	0.22	0.16
^{228}Ra	ND	0.24	ND

ND = Concentration below the method detection limit.

Table D-165. Activities (pCi/L) of radionuclides in ambient seawater samples collected at Eugene Island 361A during Cruise 2.

Analyte	Sample 1 (RW-16)	Sample 2 (RW-17)	Sample 3 (RW-18)
^{226}Ra	0.090	0.29	0.17
^{228}Ra	0.28	ND	0.58

ND = Concentration below the method detection limit.

Table D-166. Activities (pCi/L) of radionuclides in produced water samples collected at East Breaks 165A during Cruise 3.

Analyte	Sample 1 (RW-19)	Sample 2 (RW-20)	Sample 3 (RW-21)
^{226}Ra	360	350	350
^{228}Ra	790	730	730

Table D-167. Activities (pCi/L) of radionuclides in produced water samples collected from the primary high-volume discharge at Green Canyon 19A during Cruise 3.

Analyte	Sample 1 (RW-22)	Sample 2 (RW-23)	Sample 3 (RW-24)
^{226}Ra	250	230	290
^{228}Ra	460	460	460

Table D-168. Activities (pCi/L) of radionuclides in produced water samples collected from the secondary low-volume discharge at Green Canyon 19A during Cruise 3.

Analyte	Sample 1 (RW-25)	Sample 2 (RW-26)	Sample 3 (RW-27)
^{226}Ra	360	380	380
^{228}Ra	920	900	860

Table D-169. Activities (pCi/L) of radionuclides in ambient seawater samples collected at East Breaks 165A during Cruise 3.

Analyte	Sample 1 (RW-28)	Sample 2 (RW-29)	Sample 3 (RW-30)
^{226}Ra	0.030	ND	ND
^{228}Ra	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-170. Activities (pCi/L) of radionuclides in ambient seawater samples collected at High Island A 356A during Cruise 3.

Analyte	Sample 1 (RW-31)	Sample 2 (RW-32)	Sample 3 (RW-33)
^{226}Ra	0.040	0.050	0.17
^{228}Ra	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-171. Activities (pCi/L) of radionuclides in ambient seawater samples collected at Green Canyon 19A during Cruise 3.

Analyte	Sample 1 (RW-34)	Sample 2 (RW-35)	Sample 3 (RW-36)
^{226}Ra	0.060	ND	ND
^{228}Ra	0.26	ND	0.10

ND = Concentration below the method detection limit.

Table D-172. Activities (pCi/L) of radionuclides in ambient seawater samples collected at Eugene Island 361A during Cruise 3.

Analyte	Sample 1 (RW-37)	Sample 2 (RW-38)	Sample 3 (RW-39)
^{226}Ra	ND	ND	ND
^{228}Ra	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-173. Results of the radionuclide analysis of composite jewel box tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-001)	Analysis 2 (RT-002)	Analysis 1 (RT-003)	Analysis 2 (RT-004)	Analysis 1 (RT-005)	Analysis 2 (RT-006)
^{226}Ra (pCi/g wet weight)	0.014	0.017	0.013	0.010	0.022	0.027
^{228}Ra (pCi/g wet weight)	ND	0.010	ND	0.011	ND	0.022
^{226}Ra (pCi/g dry weight)	0.109	0.133	0.108	0.083	0.145	0.178
^{228}Ra (pCi/g dry weight)	ND	0.078	ND	0.091	ND	0.145

ND = Concentration below the method detection limit.

Table D-174. Results of the radionuclide analysis of composite thorny oyster tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-007)	Analysis 2 (RT-008)	Analysis 1 (RT-009)	Analysis 2 (RT-010)	Analysis 1 (RT-011)	Analysis 2 (RT-012)
^{226}Ra (pCi/g wet weight)	0.032	0.023	0.024	0.026	0.025	0.023
^{228}Ra (pCi/g wet weight)	ND	ND	ND	ND	ND	ND
^{226}Ra (pCi/g dry weight)	0.186	0.133	0.142	0.154	0.146	0.135
^{228}Ra (pCi/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-175. Results of the radionuclide analysis of composite yellow chub tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-013)	Analysis 2 (RT-014)	Analysis 1 (RT-015)	Analysis 2 (RT-016)	Analysis 1 (RT-017)	Analysis 2 (RT-018)
^{226}Ra (pCi/g wet weight)	0.003	0.004	ND	ND	ND	ND
^{228}Ra (pCi/g wet weight)	0.018	ND	ND	ND	ND	ND
^{226}Ra (pCi/g dry weight)	0.013	0.017	ND	ND	ND	ND
^{228}Ra (pCi/g dry weight)	0.078	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-176. Results of the radionuclide analysis of composite creole-fish tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-019)	Analysis 2 (RT-020)	Analysis 1 (RT-021)	Analysis 2 (RT-022)	Analysis 1 (RT-023)	Analysis 2 (RT-024)
^{226}Ra (pCi/g wet weight)	0.005	ND	0.002	0.005	ND	ND
^{228}Ra (pCi/g wet weight)	0.018	ND	ND	ND	ND	ND
^{226}Ra (pCi/g dry weight)	0.026	ND	0.010	0.026	ND	ND
^{228}Ra (pCi/g dry weight)	0.092	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-177. Results of the radionuclide analysis of composite rockhind tissue samples collected at East Breaks 165A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-025)	Analysis 2 (RT-026)	Analysis 1 (RT-027)	Analysis 2 (RT-028)	Analysis 1 (RT-029)	Analysis 2 (RT-030)
^{226}Ra (pCi/g wet weight)	0.003	0.003	0.003	0.002	0.010	0.012
^{228}Ra (pCi/g wet weight)	ND	ND	ND	ND	0.019	0.029
^{226}Ra (pCi/g dry weight)	0.015	0.015	0.015	0.010	0.045	0.054
^{228}Ra (pCi/g dry weight)	ND	ND	ND	ND	0.086	0.131

ND = Concentration below the method detection limit.

Table D-178 .Results of the radionuclide analysis of composite jewel box tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-031)	Analysis 2 (RT-032)	Analysis 1 (RT-033)	Analysis 2 (RT-034)	Analysis 1 (RT-035)	Analysis 2 (RT-036)
^{226}Ra (pCi/g wet weight)	0.004	0.003	0.030	0.019	0.009	0.007
^{228}Ra (pCi/g wet weight)	ND	ND	ND	ND	ND	ND
^{226}Ra (pCi/g dry weight)	0.036	0.027	0.255	0.161	0.068	0.053
^{228}Ra (pCi/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-179. Results of the radionuclide analysis of composite thorny oyster tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-037)	Analysis 2 (RT-038)	Analysis 1 (RT-039)	Analysis 2 (RT-040)	Analysis 1 (RT-041)	Analysis 2 (RT-042)
^{226}Ra (pCi/g wet weight)	0.015	0.017	0.021	0.019	0.015	0.020
^{228}Ra (pCi/g wet weight)	0.008	ND	0.022	ND	ND	ND
^{226}Ra (pCi/g dry weight)	0.091	0.103	0.140	0.126	0.078	0.104
^{228}Ra (pCi/g dry weight)	0.048	ND	0.146	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-180. Results of the radionuclide analysis of composite yellow chub tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-043)	Analysis 2 (RT-044)	Analysis 1 (RT-045)	Analysis 2 (RT-046)	Analysis 1 (RT-047)	Analysis 2 (RT-048)
^{226}Ra (pCi/g wet weight)	ND	0.002	ND	0.002	0.004	0.005
^{228}Ra (pCi/g wet weight)	0.023	ND	ND	0.005	0.029	0.009
^{226}Ra (pCi/g dry weight)	ND	0.009	ND	0.008	0.019	0.023
^{228}Ra (pCi/g dry weight)	0.098	ND	ND	0.020	0.136	0.042

ND = Concentration below the method detection limit.

Table D-181. Results of the radionuclide analysis of composite creole-fish tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample BA		Composite Sample C	
	Analysis 1 (RT-049)	Analysis 2 (RT-050)	Analysis 1 (RT-051)	Analysis 2 (RT-052)	Analysis 1 (RT-053)	Analysis 2 (RT-054)
^{226}Ra (pCi/g wet weight)	0.005	0.003	0.005	0.005	0.002	ND
^{228}Ra (pCi/g wet weight)	ND	ND	ND	ND	ND	0.009
^{226}Ra (pCi/g dry weight)	0.024	0.015	0.024	0.024	0.010	ND
^{228}Ra (pCi/g dry weight)	ND	ND	ND	ND	ND	0.046

ND = Concentration below the method detection limit.

Table D-182. Results of the radionuclide analysis of composite rockhind tissue samples collected at High Island A 356A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-055)	Analysis 2 (RT-056)	Analysis 1 (RT-057)	Analysis 2 (RT-058)	Analysis 1 (RT-059)	Analysis 2 (RT-060)
^{226}Ra (pCi/g wet weight)	0.002	0.003	ND	ND	ND	0.004
^{228}Ra (pCi/g wet weight)	ND	ND	ND	ND	ND	0.025
^{226}Ra (pCi/g dry weight)	0.009	0.013	ND	ND	ND	0.020
^{228}Ra (pCi/g dry weight)	ND	ND	ND	ND	ND	0.124

ND = Concentration below the method detection limit.

Table D-183. Results of the radionuclide analysis of composite jewel box tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-061)	Analysis 2 (RT-062)	Analysis 1 (RT-063)	Analysis 2 (RT-064)	Analysis 1 (RT-065)	Analysis 2 (RT-066)
^{226}Ra (pCi/g wet weight)	0.005	0.007	0.011	0.008	ND	0.004
^{228}Ra (pCi/g wet weight)	ND	ND	ND	ND	ND	ND
^{226}Ra (pCi/g dry weight)	0.048	0.067	0.101	0.073	ND	0.038
^{228}Ra (pCi/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-184. Results of the radionuclide analysis of composite thorny oyster tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-067)	Analysis 2 (RT-068)	Analysis 1 (RT-069)	Analysis 2 (RT-070)	Analysis 1 (RT-071)	Analysis 2 (RT-072)
^{226}Ra (pCi/g wet weight)	0.039	0.029	0.029	0.062	0.028	0.034
^{228}Ra (pCi/g wet weight)	ND	ND	0.007	ND	0.016	ND
^{226}Ra (pCi/g dry weight)	0.214	0.159	0.158	0.338	0.159	0.194
^{228}Ra (pCi/g dry weight)	ND	ND	0.038	ND	0.091	ND

ND = Concentration below the method detection limit.

Table D-185. Results of the radionuclide analysis of composite yellow chub tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-073)	Analysis 2 (RT-074)	Analysis 1 (RT-075)	Analysis 2 (RT-076)	Analysis 1 (RT-077)	Analysis 2 (RT-078)
^{226}Ra (pCi/g wet weight)	0.005	0.006	ND	ND	0.006	0.004
^{228}Ra (pCi/g wet weight)	0.015	0.010	ND	ND	0.009	0.040
^{226}Ra (pCi/g dry weight)	0.023	0.028	ND	ND	0.028	0.018
^{228}Ra (pCi/g dry weight)	0.069	0.046	ND	ND	0.042	0.185

ND = Concentration below the method detection limit.

Table D-186. Results of the radionuclide analysis of composite creole-fish tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-079)	Analysis 2 (RT-080)	Analysis 1 (RT-081)	Analysis 2 (RT-082)	Analysis 1 (RT-083)	Analysis 2 (RT-084)
^{226}Ra (pCi/g wet weight)	0.001	0.002	0.005	0.010	ND	0.002
^{228}Ra (pCi/g wet weight)	0.044	0.007	ND	0.007	ND	ND
^{226}Ra (pCi/g dry weight)	0.005	0.010	0.025	0.051	ND	0.010
^{228}Ra (pCi/g dry weight)	0.223	0.036	ND	0.036	ND	ND

ND = Concentration below the method detection limit.

Table D-187. Results of the radionuclide analysis of composite gray triggerfish tissue samples collected at Green Canyon 19A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-085)	Analysis 2 (RT-086)	Analysis 1 (RT-087)	Analysis 2 (RT-088)	Analysis 1 (RT-089)	Analysis 2 (RT-090)
^{226}Ra (pCi/g wet weight)	ND	0.003	0.011	0.008	ND	0.004
^{228}Ra (pCi/g wet weight)	ND	ND	0.018	0.014	ND	0.021
^{226}Ra (pCi/g dry weight)	ND	0.015	0.053	0.038	ND	0.020
^{228}Ra (pCi/g dry weight)	ND	ND	0.086	0.067	ND	0.103

ND = Concentration below the method detection limit.

Table D-188. Results of the radionuclide analysis of composite jewel box tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-091)	Analysis 2 (RT-092)	Analysis 1 (RT-093)	Analysis 2 (RT-094)	Analysis 1 (RT-095)	Analysis 2 (RT-096)
^{226}Ra (pCi/g wet weight)	0.011	0.005	0.016	0.010	0.005	0.011
^{228}Ra (pCi/g wet weight)	ND	ND	ND	ND	ND	ND
^{226}Ra (pCi/g dry weight)	0.100	0.045	0.115	0.072	0.036	0.079
^{228}Ra (pCi/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-189. Results of the radionuclide analysis of composite thorny oyster tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-097)	Analysis 2 (RT-098)	Analysis 1 (RT-099)	Analysis 2 (RT-100)	Analysis 1 (RT-101)	Analysis 2 (RT-102)
^{226}Ra (pCi/g wet weight)	0.026	0.012	0.049	0.018	0.052	0.051
^{228}Ra (pCi/g wet weight)	ND	ND	ND	ND	ND	ND
^{226}Ra (pCi/g dry weight)	0.148	0.068	0.287	0.105	0.325	0.319
^{228}Ra (pCi/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-190. Results of the radionuclide analysis of composite yellow chub tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-103)	Analysis 2 (RT-104)	Analysis 1 (RT-105)	Analysis 2 (RT-106)	Analysis 1 (RT-107)	Analysis 2 (RT-108)
^{226}Ra (pCi/g wet weight)	0.008	0.001	ND	0.008	0.005	0.006
^{228}Ra (pCi/g wet weight)	0.021	ND	ND	ND	ND	ND
^{226}Ra (pCi/g dry weight)	0.033	0.004	ND	0.031	0.021	0.025
^{228}Ra (pCi/g dry weight)	0.088	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-191. Results of the radionuclide analysis of composite creole-fish tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-109)	Analysis 2 (RT-110)	Analysis 1 (RT-111)	Analysis 2 (RT-112)	Analysis 1 (RT-113)	Analysis 2 (RT-114)
^{226}Ra (pCi/g wet weight)	0.011	0.002	ND	ND	0.002	0.003
^{228}Ra (pCi/g wet weight)	0.013	ND	ND	0.014	0.013	ND
^{226}Ra (pCi/g dry weight)	0.058	0.011	ND	ND	0.010	0.015
^{228}Ra (pCi/g dry weight)	0.069	ND	ND	0.069	0.066	ND

ND = Concentration below the method detection limit.

Table D-192. Results of the radionuclide analysis of composite gray triggerfish tissue samples collected at Eugene Island 361A during Cruise 2.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-115)	Analysis 2 (RT-116)	Analysis 1 (RT-117)	Analysis 2 (RT-118)	Analysis 1 (RT-119)	Analysis 2 (RT-120)
^{226}Ra (pCi/g wet weight)	ND	0.002	0.004	0.005	0.002	0.002
^{228}Ra (pCi/g wet weight)	0.016	ND	0.020	0.008	ND	ND
^{226}Ra (pCi/g dry weight)	ND	0.010	0.019	0.024	0.010	0.010
^{228}Ra (pCi/g dry weight)	0.078	ND	0.097	0.039	ND	ND

ND = Concentration below the method detection limit.

Table D-193. Results of the radionuclide analysis of composite jewel box tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-121)	Analysis 2 (RT-122)	Analysis 1 (RT-123)	Analysis 2 (RT-124)	Analysis 1 (RT-125)	Analysis 2 (RT-126)
^{226}Ra (pCi/g wet weight)	0.013	0.007	0.009	0.004	0.010	0.007
^{228}Ra (pCi/g wet weight)	0.005	0.004	ND	ND	ND	0.005
^{226}Ra (pCi/g dry weight)	0.111	0.060	0.080	0.035	0.082	0.058
^{228}Ra (pCi/g dry weight)	0.043	0.034	ND	ND	ND	0.041

ND = Concentration below the method detection limit.

Table D-194. Results of the radionuclide analysis of composite thorny oyster tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-127)	Analysis 2 (RT-128)	Analysis 1 (RT-129)	Analysis 2 (RT-130)	Analysis 1 (RT-131)	Analysis 2 (RT-132)
^{226}Ra (pCi/g wet weight)	0.012	0.014	0.011	0.010	0.012	0.017
^{228}Ra (pCi/g wet weight)	0.009	ND	ND	0.005	ND	0.018
^{226}Ra (pCi/g dry weight)	0.074	0.086	0.091	0.083	0.086	0.121
^{228}Ra (pCi/g dry weight)	0.055	ND	ND	0.042	ND	0.128

ND = Concentration below the method detection limit.

Table D-195. Results of the radionuclide analysis of composite yellow chub tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-133)	Analysis 2 (RT-134)	Analysis 1 (RT-135)	Analysis 2 (RT-136)	Analysis 1 (RT-137)	Analysis 2 (RT-138)
^{226}Ra (pCi/g wet weight)	ND	ND	0.002	ND	ND	0.001
^{228}Ra (pCi/g wet weight)	ND	0.006	ND	ND	ND	ND
^{226}Ra (pCi/g dry weight)	ND	ND	0.009	ND	ND	0.004
^{228}Ra (pCi/g dry weight)	ND	0.026	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-196. Results of the radionuclide analysis of composite creole-fish tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-139)	Analysis 2 (RT-140)	Analysis 1 (RT-141)	Analysis 2 (RT-142)	Analysis 1 (RT-143)	Analysis 2 (RT-144)
^{226}Ra (pCi/g wet weight)	ND	0.004	ND	0.002	0.002	ND
^{228}Ra (pCi/g wet weight)	ND	ND	0.039	ND	0.006	0.007
^{226}Ra (pCi/g dry weight)	ND	0.020	ND	0.010	0.010	ND
^{228}Ra (pCi/g dry weight)	ND	ND	0.193	ND	0.030	0.035

ND = Concentration below the method detection limit.

Table D-197. Results of the radionuclide analysis of composite sergeant major tissue samples collected at East Breaks 165A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-145)	Analysis 2 (RT-146)	Analysis 1 (RT-147)	Analysis 2 (RT-148)	Analysis 1 (RT-149)	Analysis 2 (RT-150)
^{226}Ra (pCi/g wet weight)	0.004	0.001	ND	0.001	0.005	0.006
^{228}Ra (pCi/g wet weight)	ND	0.008	ND	ND	0.007	ND
^{226}Ra (pCi/g dry weight)	0.020	0.005	ND	0.005	0.025	0.030
^{228}Ra (pCi/g dry weight)	ND	0.040	ND	ND	0.035	ND

ND = Concentration below the method detection limit.

Table D-198. Results of the radionuclide analysis of composite jewel box tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-151)	Analysis 2 (RT-152)	Analysis 1 (RT-153)	Analysis 2 (RT-154)	Analysis 1 (RT-155)	Analysis 2 (RT-156)
^{226}Ra (pCi/g wet weight)	0.009	0.006	0.007	0.013	0.021	0.006
^{228}Ra (pCi/g wet weight)	ND	0.009	0.007	0.004	0.011	0.009
^{226}Ra (pCi/g dry weight)	0.093	0.062	0.058	0.108	0.128	0.037
^{228}Ra (pCi/g dry weight)	ND	0.093	0.058	0.033	0.067	0.055

ND = Concentration below the method detection limit.

Table D-199. Results of the radionuclide analysis of composite thorny oyster tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-157)	Analysis 2 (RT-158)	Analysis 1 (RT-159)	Analysis 2 (RT-160)	Analysis 1 (RT-161)	Analysis 2 (RT-162)
^{226}Ra (pCi/g wet weight)	0.011	0.020	0.009	0.015	0.015	0.016
^{228}Ra (pCi/g wet weight)	0.024	0.014	ND	0.006	ND	ND
^{226}Ra (pCi/g dry weight)	0.093	0.170	0.061	0.102	0.094	0.100
^{228}Ra (pCi/g dry weight)	0.204	0.119	ND	0.041	ND	ND

ND = Concentration below the method detection limit.

Table D-200. Results of the radionuclide analysis of composite yellow chub tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-163)	Analysis 2 (RT-164)	Analysis 1 (RT-165)	Analysis 2 (RT-166)	Analysis 1 (RT-167)	Analysis 2 (RT-168)
^{226}Ra (pCi/g wet weight)	ND	ND	ND	ND	ND	ND
^{228}Ra (pCi/g wet weight)	ND	0.005	ND	ND	ND	ND
^{226}Ra (pCi/g dry weight)	ND	ND	ND	ND	ND	ND
^{228}Ra (pCi/g dry weight)	ND	0.022	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-201. Results of the radionuclide analysis of composite creole-fish tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-169)	Analysis 2 (RT-170)	Analysis 1 (RT-171)	Analysis 2 (RT-172)	Analysis 1 (RT-173)	Analysis 2 (RT-174)
^{226}Ra (pCi/g wet weight)	ND	ND	ND	ND	ND	0.002
^{228}Ra (pCi/g wet weight)	ND	ND	ND	ND	ND	0.006
^{226}Ra (pCi/g dry weight)	ND	ND	ND	ND	ND	0.010
^{228}Ra (pCi/g dry weight)	ND	ND	ND	ND	ND	0.029

ND = Concentration below the method detection limit.

Table D-202. Results of the radionuclide analysis of composite sergeant major tissue samples collected at High Island A 356A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-175)	Analysis 2 (RT-176)	Analysis 1 (RT-177)	Analysis 2 (RT-178)	Analysis 1 (RT-179)	Analysis 2 (RT-180)
^{226}Ra (pCi/g wet weight)	ND	ND	0.001	0.001	0.001	0.003
^{228}Ra (pCi/g wet weight)	ND	ND	ND	ND	ND	0.010
^{226}Ra (pCi/g dry weight)	ND	ND	0.005	0.005	0.004	0.013
^{228}Ra (pCi/g dry weight)	ND	ND	ND	ND	ND	0.044

ND = Concentration below the method detection limit.

Table D-203. Results of the radionuclide analysis of composite jewel box tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-181)	Analysis 2 (RT-182)	Analysis 1 (RT-183)	Analysis 2 (RT-184)	Analysis 1 (RT-185)	Analysis 2 (RT-186)
^{226}Ra (pCi/g wet weight)	0.015	0.010	0.013	0.009	0.016	0.009
^{228}Ra (pCi/g wet weight)	0.009	ND	ND	0.008	ND	0.006
^{226}Ra (pCi/g dry weight)	0.093	0.062	0.094	0.065	0.102	0.057
^{228}Ra (pCi/g dry weight)	0.056	ND	ND	0.058	ND	0.038

ND = Concentration below the method detection limit.

Table D-204. Results of the radionuclide analysis of composite thorny oyster tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-187)	Analysis 2 (RT-188)	Analysis 1 (RT-189)	Analysis 2 (RT-190)	Analysis 1 (RT-191)	Analysis 2 (RT-192)
^{226}Ra (pCi/g wet weight)	0.013	0.013	0.015	0.017	0.013	0.013
^{228}Ra (pCi/g wet weight)	ND	0.013	ND	0.006	0.012	ND
^{226}Ra (pCi/g dry weight)	0.083	0.083	0.089	0.100	0.078	0.078
^{228}Ra (pCi/g dry weight)	ND	0.083	ND	0.035	0.072	ND

ND = Concentration below the method detection limit.

Table D-205. Results of the radionuclide analysis of composite yellow chub tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-193)	Analysis 2 (RT-194)	Analysis 1 (RT-195)	Analysis 2 (RT-196)	Analysis 1 (RT-197)	Analysis 2 (RT-198)
^{226}Ra (pCi/g wet weight)	0.003	0.004	0.001	ND	ND	0.001
^{228}Ra (pCi/g wet weight)	ND	ND	ND	0.005	ND	ND
^{226}Ra (pCi/g dry weight)	0.012	0.015	0.004	ND	ND	0.004
^{228}Ra (pCi/g dry weight)	ND	ND	ND	0.021	ND	ND

ND = Concentration below the method detection limit.

Table D-206. Results of the radionuclide analysis of composite creole-fish tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-199)	Analysis 2 (RT-200)	Analysis 1 (RT-201)	Analysis 2 (RT-202)	Analysis 1 (RT-203)	Analysis 2 (RT-204)
^{226}Ra (pCi/g wet weight)	0.003	0.004	ND	ND	0.002	0.001
^{228}Ra (pCi/g wet weight)	ND	ND	ND	0.007	ND	ND
^{226}Ra (pCi/g dry weight)	0.015	0.020	ND	ND	0.010	0.005
^{228}Ra (pCi/g dry weight)	ND	ND	ND	0.035	ND	ND

ND = Concentration below the method detection limit.

Table D-207. Results of the radionuclide analysis of composite gray triggerfish tissue samples collected at Green Canyon 19A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-205)	Analysis 2 (RT-206)	Analysis 1 (RT-207)	Analysis 2 (RT-208)	Analysis 1 (RT-209)	Analysis 2 (RT-210)
^{226}Ra (pCi/g wet weight)	0.001	ND	ND	ND	ND	0.001
^{228}Ra (pCi/g wet weight)	0.006	ND	0.008	ND	ND	ND
^{226}Ra (pCi/g dry weight)	0.005	ND	ND	ND	ND	0.005
^{228}Ra (pCi/g dry weight)	0.030	ND	0.039	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-208. Results of the radionuclide analysis of composite jewel box tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-211)	Analysis 2 (RT-212)	Analysis 1 (RT-213)	Analysis 2 (RT-214)	Analysis 1 (RT-215)	Analysis 2 (RT-216)
^{226}Ra (pCi/g wet weight)	0.009	0.010	0.012	0.005	0.007	0.011
^{228}Ra (pCi/g wet weight)	ND	0.007	0.012	ND	ND	0.006
^{226}Ra (pCi/g dry weight)	0.071	0.079	0.103	0.043	0.072	0.112
^{228}Ra (pCi/g dry weight)	ND	0.055	0.103	ND	ND	0.061

ND = Concentration below the method detection limit.

Table D-209. Results of the radionuclide analysis of composite thorny oyster tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-217)	Analysis 2 (RT-218)	Analysis 1 (RT-219)	Analysis 2 (RT-220)	Analysis 1 (RT-221)	Analysis 2 (RT-222)
^{226}Ra (pCi/g wet weight)	0.011	0.012	0.015	0.016	0.010	0.015
^{228}Ra (pCi/g wet weight)	ND	0.012	0.007	0.010	ND	0.007
^{226}Ra (pCi/g dry weight)	0.071	0.078	0.094	0.100	0.064	0.096
^{228}Ra (pCi/g dry weight)	ND	0.078	0.044	0.062	ND	0.045

ND = Concentration below the method detection limit.

Table D-210. Results of the radionuclide analysis of composite yellow chub tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-223)	Analysis 2 (RT-224)	Analysis 1 (RT-225)	Analysis 2 (RT-226)	Analysis 1 (RT-227)	Analysis 2 (RT-228)
^{226}Ra (pCi/g wet weight)	0.001	ND	0.002	0.001	0.001	0.001
^{228}Ra (pCi/g wet weight)	0.009	ND	0.005	0.008	ND	0.010
^{226}Ra (pCi/g dry weight)	0.004	ND	0.008	0.004	0.004	0.004
^{228}Ra (pCi/g dry weight)	0.038	ND	0.020	0.032	ND	0.040

ND = Concentration below the method detection limit.

Table D-211. Results of the radionuclide analysis of composite creole-fish tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-229)	Analysis 2 (RT-230)	Analysis 1 (RT-231)	Analysis 2 (RT-232)	Analysis 1 (RT-233)	Analysis 2 (RT-234)
^{226}Ra (pCi/g wet weight)	ND	0.001	ND	ND	ND	0.002
^{228}Ra (pCi/g wet weight)	ND	0.009	0.007	ND	0.016	0.010
^{226}Ra (pCi/g dry weight)	ND	0.005	ND	ND	ND	0.010
^{228}Ra (pCi/g dry weight)	ND	0.044	0.034	ND	0.078	0.049

ND = Concentration below the method detection limit.

Table D-212. Results of the radionuclide analysis of composite gray triggerfish tissue samples collected at Eugene Island 361A during Cruise 3.

Analyte	Composite Sample A		Composite Sample B		Composite Sample C	
	Analysis 1 (RT-235)	Analysis 2 (RT-236)	Analysis 1 (RT-237)	Analysis 2 (RT-238)	Analysis 1 (RT-239)	Analysis 2 (RT-240)
^{226}Ra (pCi/g wet weight)	0.001	ND	0.001	0.002	ND	0.002
^{228}Ra (pCi/g wet weight)	ND	ND	ND	ND	ND	ND
^{226}Ra (pCi/g dry weight)	0.005	ND	0.005	0.010	ND	0.009
^{228}Ra (pCi/g dry weight)	ND	ND	ND	ND	ND	ND

ND = Concentration below the method detection limit.

Table D-213. Sample specific data and surrogate recoveries for volatile organic compound analyses of water samples.

Sample ID	Cruise	Field ID	Lab ID	Associated Blank	Surrogate Recovery (%)		
					Benzene-d6	Toluene-d8	Ethylbenzene-d10
VOW-01	2	EB165-PW-VOC-A	QZ80-D	RL61PB	90	105	96
VOW-02	2	EB165-PW-VOC-B	QZ81-D	RL61PB	91	110	103
VOW-03	2	EB165-PW-VOC-C	QZ82-D	RL61PB	89	106	100
VOW-04	2	GC19-PW-VOC-A	RL46-D	RR65PB	111	105	103
VOW-05	2	GC19-PW-VOC-B	RL47-D	RR65PB	106	105	99
VOW-06	2	GC19-PW-VOC-C	RL48-D	RR65PB	108	102	101
VOW-07	2	EB165-AW-VOC-A	QZ83	RL61PB	103	102	97
VOW-08	2	EB165-AW-VOC-B	QZ84	RL61PB	103	106	97
VOW-09	2	EB165-AW-VOC-C	QZ85	RL61PB	105	106	100
VOW-10	2	HI356-AW-VOC-A	QZ89-1	RL61PB	105	103	99
VOW-11	2	HI356-AW-VOC-B	QZ90	RL61PB	110	110	107
VOW-12	2	HI356-AW-VOC-C	QZ91	RL61PB	114	112	109
VOW-13	2	GC19-AW-VOC-A	RL50	RR65PB	101	101	96
VOW-14	2	GC19-AW-VOC-B	RL51	RR65PB	102	103	97
VOW-15	2	GC19-AW-VOC-C	RL52	RR65PB	104	102	99
VOW-16	2	EI361A-AW-VOC-A	RL54	RR65PB	114	115	114
VOW-17	2	EI361A-AW-VOC-B	RL55	RR65PB	111	105	102
VOW-18	2	EI361A-AW-VOC-C	RL56	RR65PB	115	106	107
VOW-19	3	EB165-PW-VOC-A	SY19	TU05PB	107	101	103
VOW-20	3	EB165-PW-VOC-B	SY20	TU05PB	103	111	105
VOW-21	3	EB165-PW-VOC-C	SY21	TU05PB	109	117	108
VOW-22	3	GC19-PW-VOC-A	TC33	TU05PB	87	86	91
VOW-23	3	GC19-PW-VOC-B	TC34	TU05PB	91	89	94
VOW-24	3	GC19-PW-VOC-C	TC35	TU05PB	93	90	95
VOW-25	3	KM-PW-VOC-A	TC60	TU05PB	93	87	92
VOW-26	3	KM-PW-VOC-B	TC61	TU05PB	93	89	90
VOW-27	3	KM-PW-VOC-C	TC62	TU05PB	92	89	95
VOW-28	3	EB165-AW-VOC-A	SY37-1	TU05PB	103	100	103
VOW-29	3	EB165-AW-VOC-B	SY38	TU05PB	108	102	104
VOW-30	3	EB165-AW-VOC-C	SY39	TU05PB	92	91	94
VOW-31	3	HI356-AW-VOC-A	TC63	TU05PB	93	91	93
VOW-32	3	HI356-AW-VOC-B	TC64	TU05PB	91	89	93
VOW-33	3	HI356-AW-VOC-C	TC65	TU05PB	98	96	101
VOW-34	3	GC19-AW-VOC-C	TC30	TU05PB	95	92	96
VOW-35	3	GC19-AW-VOC-A	TC31	TU05PB	90	88	91
VOW-36	3	GC19-AW-VOC-B	TC32	TU05PB	89	87	91
VOW-37	3	EI361-AW-VOC-A	TC27	TU05PB	90	85	92
VOW-38	3	EI361-AW-VOC-B	TC28	TU05PB	94	88	92
VOW-39	3	EI361-AW-VOC-C	TC29	TU05PB	94	92	96

Table D-214. Results of volatile organic compound analysis of field quality control samples.

Cruise	2	2	3	3	3
Field ID	DA-AWVOC-TB	DB-AW-VOC-TB	RA-VOC-TB	GC19-PW-VOC-FB	DB-VOC-TB
Lab ID	QZ88-1	RL53	SY42	TC36	TC37
Blank Type	Trip Blank	Trip Blank	Trip Blank	Field Blank	Trip Blank
Assoc. Blank	RL61PB	RR65PB	TU05PB	TU05PB	TU05PB
Benzene (µg/L)	ND	ND	2.00	ND	ND
Toluene (µg/L)	0.22J	0.17J	0.63	0.22J	0.77
Ethylbenzene (µg/L)	ND	ND	ND	ND	ND
m/p-Xylene (µg/L)	ND	ND	ND	ND	0.39J
o-Xylene (µg/L)	ND	ND	ND	ND	0.16J
C_3-Benzenes (µg/L)	ND	ND	ND	ND	ND
C_4-Benzenes (µg/L)	ND	ND	ND	ND	ND
Surrogate Recovery (%)					
Benzene-d6	107	108	106	92	90
Toluene-d8	103	107	100	91	87
Ethylbenzene-d10	99	103	107	96	93

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-215. Results of volatile organic compound analysis of procedural blank samples.

Lab ID	RZ33PB	RZ37PB	RZ45PB	SA91PB	SB75PB-1	SC23PB
Sample Wet Weight (g)	5.45	5.39	5.32	5.53	5.86	5.78
Sample Dry Weight (g)	0.75	0.74	0.87	1.17	1.23	1.27
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m-/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Benzenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Benzenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m-/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Benzenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Benzenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Surrogate Recovery (%)						
Benzene-d6	65	86	81	87	86	95
Toluene-d8	81	90	82	90	95	97
Ethylbenzene-d10	91	82	76	80	92	94

Lab ID	SG26PB	SG30PB	TV88PB	TV92PB	TV96PB-1	TW01PB
Sample Wet Weight (g)	5.93	6.14	4.68	4.75	4.71	5.31
Sample Dry Weight (g)	1.22	1.31	0.67	0.73	0.58	1.14
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
m-/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_3-Benzenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
C_4-Benzenes (ng/g wet weight)	ND	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
m-/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_3-Benzenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
C_4-Benzenes (ng/g dry weight)	ND	ND	ND	ND	ND	ND
Surrogate Recovery (%)						
Benzene-d6	86	93	75	81	91	103
Toluene-d8	89	93	77	93	92	96
Ethylbenzene-d10	79	81	88	96	93	85

Table D-215. (Continued).

Lab ID	TX50PB	TX54PB	TX58PB	TX62PB	TZ28PB
Sample Wet Weight (g)	5.05	5.00	5.25	5.15	5.23
Sample Dry Weight (g)	1.13	1.06	1.08	1.11	1.19
Benzene (ng/g wet weight)	ND	ND	ND	ND	ND
Toluene (ng/g wet weight)	ND	1.1J	ND	ND	ND
Ethylbenzene (ng/g wet weight)	ND	ND	ND	ND	ND
m-/p-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND
o-Xylene (ng/g wet weight)	ND	ND	ND	ND	ND
C_3-Benzenes (ng/g wet weight)	ND	ND	ND	ND	ND
C_4-Benzenes (ng/g wet weight)	ND	ND	ND	ND	ND
Benzene (ng/g dry weight)	ND	ND	ND	ND	ND
Toluene (ng/g dry weight)	ND	5.1J	ND	ND	ND
Ethylbenzene (ng/g dry weight)	ND	ND	ND	ND	ND
m-/p-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND
o-Xylene (ng/g dry weight)	ND	ND	ND	ND	ND
C_3-Benzenes (ng/g dry weight)	ND	ND	ND	ND	ND
C_4-Benzenes (ng/g dry weight)	ND	ND	ND	ND	ND
Surrogate Recovery (%)					
Benzene-d6	63	98	76	98	96
Toluene-d8	69	99	86	96	96
Ethylbenzene-d10	77	96	93	94	95

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table D-216. Results of volatile organic compound analysis of Cruise 3 matrix spike and matrix spike duplicate water samples. Percent recovered and relative percent difference (RPD) are reported.

Lab ID	Percent Recoveries		RPD
	TU07MS	TU08MSD	
Benzene	111	116	4
Toluene	118	98	16
Ethylbenzene	102	110	8
m-/p-Xylene	104	110	5
o-Xylene	109	116	7
Surrogate Recovery (%)			
Benzene-d6	103	100	
Toluene-d8	99	98	
Ethylbenzene-d10	104	98	

Table D-217. Sample specific data for volatile organic compound analyses of tissue samples.

Sample ID	Field ID	Lab ID	Associated Blank	Sample Size (g wet weight)	Percent Moisture
VOT-001	II-EB165-DEF-CHAMA-VOC-A	RV11	RZ45PB	5.54	87.2
VOT-002	II-EB165-DEF-CHAMA-VOC-A	RV11REP1	RZ45PB	5.19	87.2
VOT-003	II-EB165-DEF-CHAMA-VOC-B	RV01-1	RZ33PB	5.20	87.9
VOT-004	II-EB165-DEF-CHAMA-VOC-B	RV01REP1	RZ37PB	5.05	87.9
VOT-005	II-EB165-DEF-CHAMA-VOC-C	RV02	RZ33PB	5.47	84.9
VOT-006	II-EB165-DEF-CHAMA-VOC-C	RV02REP1	RZ37PB	5.78	84.9
VOT-007	II-EB165-DEF-SPONDYLUS-VOC-A	RX85	RZ45PB	5.65	82.8
VOT-008	II-EB165-DEF-SPONDYLUS-VOC-A	RX85REP1	RZ45PB	5.15	82.8
VOT-009	II-EB165-DEF-SPONDYLUS-VOC-B	RX86	RZ45PB	5.35	83.2
VOT-010	II-EB165-DEF-SPONDYLUS-VOC-B	RX86REP1	RZ45PB	5.27	83.2
VOT-011	II-EB165-DEF-SPONDYLUS-VOC-C	RX87	RZ45PB	5.63	82.9
VOT-012	II-EB165-DEF-SPONDYLUS-VOC-C	RX87REP1	RZ45PB	5.08	82.9
VOT-013	II-EB165-DEF-CHUB-VOC-A	RZ28	SB75PB-1	6.01	77.0
VOT-014	II-EB165-DEF-CHUB-VOC-A	RZ28REP1	SB75PB-1	5.95	77.0
VOT-015	II-EB165-DEF-CHUB-VOC-B	RZ29-1	SB75PB-1	5.53	77.9
VOT-016	II-EB165-DEF-CHUB-VOC-B	RZ29REP1-1	SB75PB-1	6.00	77.9
VOT-017	II-EB165-DEF-CHUB-VOC-C	RZ30	SB75PB-1	5.75	78.0
VOT-018	II-EB165-DEF-CHUB-VOC-C	RZ30REP1	SB75PB-1	5.83	78.0
VOT-019	II-EB165-DEF-CREOLEFISH-VOC-A	RZ31-1	SB75PB-1	6.34	80.4
VOT-020	II-EB165-DEF-CREOLEFISH-VOC-A	RZ31REP1-1	SB75PB-1	5.83	80.4
VOT-021	II-EB165-DEF-CREOLEFISH-VOC-B	RZ32	SB75PB-1	5.72	80.6
VOT-022	II-EB165-DEF-CREOLEFISH-VOC-B	RZ32REP1	SB75PB-1	5.85	80.6
VOT-023	II-EB165-DEF-CREOLEFISH-VOC-C	RZ42-1	SB75PB-1	6.07	79.7
VOT-024	II-EB165-DEF-CREOLEFISH-VOC-C	RZ42REP1-1	SB75PB-1	5.67	79.7
VOT-025	II-EB165-DEF-ROCKHIND-VOC-A	RZ43-1	SB75PB-1	5.88	79.3
VOT-026	II-EB165-DEF-ROCKHIND-VOC-A	RZ43REP1-1	SB75PB-1	5.59	79.3
VOT-027	II-EB165-DEF-ROCKHIND-VOC-B	RZ44-1	SC23PB	6.10	80.2
VOT-028	II-EB165-DEF-ROCKHIND-VOC-B	RZ44REP1	SC23PB	5.50	80.2
VOT-029	II-EB165-DEF-ROCKHIND-VOC-C	RZ53	SC23PB	6.02	77.8
VOT-030	II-EB165-DEF-ROCKHIND-VOC-C	RZ53REP1	SC23PB	5.93	77.8
VOT-031	II-HI356-DEF-CHAMA-VOC-A	RV09	RZ33PB	5.33	89.0
VOT-032	II-HI356-DEF-CHAMA-VOC-A	RV09REP1	RZ37PB	5.28	89.0
VOT-033	II-HI356-DEF-CHAMA-VOC-B	RV10-1	RZ33PB	5.10	88.2
VOT-034	II-HI356-DEF-CHAMA-VOC-B	RV10REP1	RZ37PB	5.22	88.2
VOT-035	II-HI356-DEF-CHAMA-VOC-C	RU99	RZ45PB	5.83	86.9

Table D-217. (Continued).

Sample ID	Field ID	Lab ID	Associated Blank	Sample Size (g wet weight)	Percent Moisture
VOT-036	II-HI356-DEF-CHAMA-VOC-C	RU99REP1	RZ45PB	5.22	86.9
VOT-037	II-HI356-DEF-SPONDYLUS-VOC-A	RV81	RZ33PB	5.60	83.4
VOT-038	II-HI356-DEF-SPONDYLUS-VOC-A	RV81REP1	RZ37PB	5.44	83.4
VOT-039	II-HI356-DEF-SPONDYLUS-VOC-B	RV82	RZ33PB	5.40	85.0
VOT-040	II-HI356-DEF-SPONDYLUS-VOC-B	RV82REP1	RZ37PB	5.84	85.0
VOT-041	II-HI356-DEF-SPONDYLUS-VOC-C	RV83	RZ33PB	6.24	80.8
VOT-042	II-HI356-DEF-SPONDYLUS-VOC-C	RV83REP1	RZ37PB	5.12	80.8
VOT-043	II-HI356-DEF-CHUB-VOC-A	SB86	SG30PB	6.39	76.6
VOT-044	II-HI356-DEF-CHUB-VOC-A	SB86REP1	SG30PB	6.47	76.6
VOT-045	II-HI356-DEF-CHUB-VOC-B	SB87	SG30PB	6.09	75.6
VOT-046	II-HI356-DEF-CHUB-VOC-B	SB87REP1	SG30PB	6.33	75.6
VOT-047	II-HI356-DEF-CHUB-VOC-C	SB88	SC23PB	5.95	78.7
VOT-048	II-HI356-DEF-CHUB-VOC-C	SB88REP1	SC23PB	5.76	78.7
VOT-049	II-HI356-DEF-CREOLEFISH-VOC-A	SC02	SG30PB	6.12	79.5
VOT-050	II-HI356-DEF-CREOLEFISH-VOC-A	SC02REP1	SG30PB	6.19	79.5
VOT-051	II-HI356-DEF-CREOLEFISH-VOC-B	SC07	SG30PB	6.05	79.4
VOT-052	II-HI356-DEF-CREOLEFISH-VOC-B	SC07REP1	SG30PB	5.88	79.4
VOT-053	II-HI356-DEF-CREOLEFISH-VOC-C	SC06	SG30PB	5.82	80.4
VOT-054	II-HI356-DEF-CREOLEFISH-VOC-C	SC06REP1	SG30PB	5.89	80.4
VOT-055	II-HI356-DEF-ROCKHIND-VOC-A	SB28	SG26PB	5.51	77.2
VOT-056	II-HI356-DEF-ROCKHIND-VOC-A	SB28REP1	SG26PB	5.56	77.2
VOT-057	II-HI356-DEF-ROCKHIND-VOC-B	SB29	SG26PB	5.92	79.1
VOT-058	II-HI356-DEF-ROCKHIND-VOC-B	SB29REP1	SG26PB	5.45	79.1
VOT-059	II-HI356-DEF-ROCKHIND-VOC-C	SB30	SG26PB	5.93	79.9
VOT-060	II-HI356-DEF-ROCKHIND-VOC-C	SB30REP1	SG26PB	6.13	79.9
VOT-061	II-GC19-DEF-CHAMA-VOC-A	RX95	RZ33PB	5.70	89.6
VOT-062	II-GC19-DEF-CHAMA-VOC-A	RX95REP1-1	RZ37PB	5.17	89.6
VOT-063	II-GC19-DEF-CHAMA-VOC-B	RX96	RZ33PB	5.31	89.1
VOT-064	II-GC19-DEF-CHAMA-VOC-B	RX96REP1	RZ37PB	6.28	89.1
VOT-065	II-GC19-DEF-CHAMA-VOC-C	RX97	RZ33PB	5.25	89.5
VOT-066	II-GC19-DEF-CHAMA-VOC-C	RX97REP1	RZ37PB	5.13	89.5
VOT-067	II-GC19-DEF-SPONDYLUS-VOC-A	RX88	RZ45PB	5.17	81.8
VOT-068	II-GC19-DEF-SPONDYLUS-VOC-A	RX88REP1	RZ45PB	5.38	81.8
VOT-069	II-GC19-DEF-SPONDYLUS-VOC-B	RX89	RZ45PB	5.22	81.7
VOT-070	II-GC19-DEF-SPONDYLUS-VOC-B	RX89REP1	RZ45PB	5.06	81.7
VOT-071	II-GC19-DEF-SPONDYLUS-VOC-C	RX90	RZ45PB	5.04	82.4

Table D-217. (Continued).

Sample ID	Field ID	Lab ID	Associated Blank	Sample Size (g wet weight)	Percent Moisture
VOT-072	II-GC19-DEF-SPONDYLUS-VOC-C	RX90REP1	RZ45PB	5.22	82.4
VOT-073	II-GC19-DEF-CHUB-VOC-A	SA88	SC23PB	5.43	78.3
VOT-074	II-GC19-DEF-CHUB-VOC-A	SA88REP1	SC23PB	5.65	78.3
VOT-075	II-GC19-DEF-CHUB-VOC-B	SA89	SC23PB	6.02	77.3
VOT-076	II-GC19-DEF-CHUB-VOC-B	SA89REP1	SC23PB	6.05	77.3
VOT-077	II-GC19-DEF-CHUB-VOC-C	SA90	SG26PB	5.37	78.3
VOT-078	II-GC19-DEF-CHUB-VOC-C	SA90REP1	SG26PB	5.90	78.3
VOT-079	II-GC19-DEF-CREOLEFISH-VOC-A	SB31	SG26PB	6.54	80.3
VOT-080	II-GC19-DEF-CREOLEFISH-VOC-A	SB31REP1	SG26PB	6.06	80.3
VOT-081	II-GC19-DEF-CREOLEFISH-VOC-B	SB32	SG26PB	6.27	80.4
VOT-082	II-GC19-DEF-CREOLEFISH-VOC-B	SB32EP1	SG26PB	6.07	80.4
VOT-083	II-GC19-DEF-CREOLEFISH-VOC-C	SB85	SG26PB	6.23	80.8
VOT-084	II-GC19-DEF-CREOLEFISH-VOC-C	SB85REP1	SG26PB	6.13	80.8
VOT-085	II-GC19-DEF-TRIGGERFISH-VOC-A	SC05	SG30PB	5.89	79.4
VOT-086	II-GC19-DEF-TRIGGERFISH-VOC-A	SC05REP1	SG30PB	6.24	79.4
VOT-087	II-GC19-DEF-TRIGGERFISH-VOC-B	SC04	SG30PB	6.06	79.1
VOT-088	II-GC19-DEF-TRIGGERFISH-VOC-B	SC04REP1	SG30PB	6.39	79.1
VOT-089	II-GC19-DEF-TRIGGERFISH-VOC-C	SC03	SG30PB	6.29	79.6
VOT-090	II-GC19-DEF-TRIGGERFISH-VOC-C	SC03REP1	SG30PB	6.09	79.6
VOT-091	II-EI361-DEF-CHAMA-VOC-A	RX92	RZ33PB	5.26	89.0
VOT-092	II-EI361-DEF-CHAMA-VOC-A	RX92REP1	RZ37PB	5.30	89.0
VOT-093	II-EI361-DEF-CHAMA-VOC-B	RX93	RZ33PB	5.67	86.1
VOT-094	II-EI361-DEF-CHAMA-VOC-B	RX93REP1	RZ37PB	5.29	86.1
VOT-095	II-EI361-DEF-CHAMA-VOC-C	RX94	RZ33PB	5.78	86.0
VOT-096	II-EI361-DEF-CHAMA-VOC-C	RX94REP1-1	RZ37PB	5.73	86.0
VOT-097	II-EI361-DEF-SPONDYLUS-VOC-A	RV12	RZ33PB	5.23	82.4
VOT-098	II-EI361-DEF-SPONDYLUS-VOC-A	RV12REP1	RZ37PB	5.00	82.4
VOT-099	II-EI361-DEF-SPONDYLUS-VOC-B	RV13	RZ33PB	5.18	82.9
VOT-100	II-EI361-DEF-SPONDYLUS-VOC-B	RV13REP1	RZ37PB	5.18	82.9
VOT-101	II-EI361-DEF-SPONDYLUS-VOC-C	RV14	RZ45PB	5.67	84.0
VOT-102	II-EI361-DEF-SPONDYLUS-VOC-C	RV14REP1	RZ45PB	5.08	84.0
VOT-103	II-EI361-DEF-CHUB-VOC-A	RZ54	SA91PB	5.15	76.1
VOT-104	II-EI361-DEF-CHUB-VOC-A	RZ54REP1	SA91PB	4.97	76.1
VOT-105	II-EI361-DEF-CHUB-VOC-B	RZ55	SC23PB	5.82	73.9
VOT-106	II-EI361-DEF-CHUB-VOC-B	RZ55REP1	SC23PB	5.75	73.9
VOT-107	II-EI361-DEF-CHUB-VOC-C	RZ60	SA91PB	5.42	75.9

Table D-217. (Continued).

Sample ID	Field ID	Lab ID	Associated Blank	Sample Size (g wet weight)	Percent Moisture
VOT-108	II-EI361-DEF-CHUB-VOC-C	RZ60REP1	SA91PB	5.18	75.9
VOT-109	II-EI361-DEF-CREOLEFISH-VOC-A	RZ61	SA91PB	5.02	81.0
VOT-110	II-EI361-DEF-CREOLEFISH-VOC-A	RZ61REP1	SA91PB	5.14	81.0
VOT-111	II-EI361-DEF-CREOLEFISH-VOC-B	RZ62	SA91PB	5.25	79.7
VOT-112	II-EI361-DEF-CREOLEFISH-VOC-B	RZ62REP1-1	SA91PB	5.82	79.7
VOT-113	II-EI361-DEF-CREOLEFISH-VOC-C	SA82	SA91PB	5.93	80.4
VOT-114	II-EI361-DEF-CREOLEFISH-VOC-C	SA82REP1	SA91PB	5.98	80.4
VOT-115	II-EI361-DEF-TRIGGERFISH-VOC-A	SA80	SA91PB	5.88	79.5
VOT-116	II-EI361-DEF-TRIGGERFISH-VOC-A	SA80REP1	SA91PB	5.83	79.5
VOT-117	II-EI361-DEF-TRIGGERFISH-VOC-B	SA81	SA91PB	5.96	79.4
VOT-118	II-EI361-DEF-TRIGGERFISH-VOC-B	SA81REP1	SA91PB	5.82	79.4
VOT-119	II-EI361-DEF-TRIGGERFISH-VOC-C	SA87	SC23PB	5.61	80.2
VOT-120	II-EI361-DEF-TRIGGERFISH-VOC-C	SA87REP1	SC23PB	5.39	80.2
VOT-121	III-EB165-DEF-CHAMA-VOC-A	TK35	TV96PB-1	4.90	88.3
VOT-122	III-EB165-DEF-CHAMA-VOC-A	TK35REP1	TV96PB-1	5.19	88.3
VOT-123	III-EB165-DEF-CHAMA-VOC-B	TK36	TV96PB-1	4.71	88.7
VOT-124	III-EB165-DEF-CHAMA-VOC-B	TK36REP1	TV96PB-1	5.41	88.7
VOT-125	III-EB165-DEF-CHAMA-VOC-C	TK37	TV96PB-1	4.84	87.8
VOT-126	III-EB165-DEF-CHAMA-VOC-C	TK37REP1	TV96PB-1	4.77	87.8
VOT-127	III-EB165-DEF-SPONDYLUS-VOC-A	TK32	TV96PB-1	4.65	83.7
VOT-128	III-EB165-DEF-SPONDYLUS-VOC-A	TK32REP1-1	TV96PB-1	4.98	83.7
VOT-129	III-EB165-DEF-SPONDYLUS-VOC-B	TK33	TV96PB-1	3.88	88.0
VOT-130	III-EB165-DEF-SPONDYLUS-VOC-B	TK33REP1	TV96PB-1	3.45	88.0
VOT-131	III-EB165-DEF-SPONDYLUS-VOC-C	TK34	TV96PB-1	4.57	86.0
VOT-132	III-EB165-DEF-SPONDYLUS-VOC-C	TK34REP1	TV96PB-1	4.64	86.0
VOT-133	III-EB165-DEF-CHUB-VOC-A	TK38	TW01PB	4.93	76.8
VOT-134	III-EB165-DEF-CHUB-VOC-A	TK38REP1	TW01PB	4.85	76.8
VOT-135	III-EB165-DEF-CHUB-VOC-B	TK39	TW01PB	5.02	76.6
VOT-136	III-EB165-DEF-CHUB-VOC-B	TK39REP1	TW01PB	5.48	76.6
VOT-137	III-EB165-DEF-CHUB-VOC-C	TK40	TW01PB	4.77	76.9
VOT-138	III-EB165-DEF-CHUB-VOC-C	TK40REP1	TW01PB	5.19	76.9
VOT-139	III-EB165-DEF-CREOLEFISH-VOC-A	TK41	TW01PB	5.19	79.7
VOT-140	III-EB165-DEF-CREOLEFISH-VOC-A	TK41REP1	TW01PB	5.40	79.7
VOT-141	III-EB165-DEF-CREOLEFISH-VOC-B	TK42	TW01PB	5.69	79.8
VOT-142	III-EB165-DEF-CREOLEFISH-VOC-B	TK42REP1	TW01PB	5.51	79.8
VOT-143	III-EB165-DEF-CREOLEFISH-VOC-C	TK43	TW01PB	4.77	79.9

Table D-217. (Continued).

Sample ID	Field ID	Lab ID	Associated Blank	Sample Size (g wet weight)	Percent Moisture
VOT-144	III-EB165-DEF-CREOLEFISH-VOC-C	TK43REP1	TW01PB	5.22	79.9
VOT-145	III-EB165-DEF-SERGMAJOR-VOC-A	TK44	TW01PB	6.46	79.8
VOT-146	III-EB165-DEF-SERGMAJOR-VOC-A	TK44REP1	TW01PB	5.80	79.8
VOT-147	III-EB165-DEF-SERGMAJOR-VOC-B	TK45	TX50PB	5.72	78.8
VOT-148	III-EB165-DEF-SERGMAJOR-VOC-B	TK45REP1	TX50PB	5.21	78.8
VOT-149	III-EB165-DEF-SERGMAJOR-VOC-C	TK46	TX50PB	4.65	79.8
VOT-150	III-EB165-DEF-SERGMAJOR-VOC-C	TK46REP1	TX50PB	4.73	79.8
VOT-151	III-HI356-DEF-CHAMA-VOC-A	TK17	TV88PB	3.54	90.3
VOT-152	III-HI356-DEF-CHAMA-VOC-A	TK17REP1	TV88PB	3.85	90.3
VOT-153	III-HI356-DEF-CHAMA-VOC-B	TK18	TV88PB	4.94	88.0
VOT-154	III-HI356-DEF-CHAMA-VOC-B	TK18REP1	TV88PB	4.75	88.0
VOT-155	III-HI356-DEF-CHAMA-VOC-C	TK19	TV88PB	4.58	83.6
VOT-156	III-HI356-DEF-CHAMA-VOC-C	TK19REP1	TV88PB	4.63	83.6
VOT-157	III-HI356-DEF-SPONDYLUS-VOC-A	TK14	TV88PB	5.78	88.2
VOT-158	III-HI356-DEF-SPONDYLUS-VOC-A	TK14REP1	TV88PB	5.06	88.2
VOT-159	III-HI356-DEF-SPONDYLUS-VOC-B	TK15	TV88PB	5.25	85.3
VOT-160	III-HI356-DEF-SPONDYLUS-VOC-B	TK15REP1	TV88PB	4.45	85.3
VOT-161	III-HI356-DEF-SPONDYLUS-VOC-C	TK16	TV88PB	4.73	84.0
VOT-162	III-HI356-DEF-SPONDYLUS-VOC-C	TK16REP1	TV88PB	4.92	84.0
VOT-163	III-HI356-DEF-CHUB-VOC-A	TK65	TX58PB	5.63	77.7
VOT-164	III-HI356-DEF-CHUB-VOC-A	TK65REP1	TX58PB	6.02	77.7
VOT-165	III-HI356-DEF-CHUB-VOC-B	TK66	TX62PB	5.10	77.1
VOT-166	III-HI356-DEF-CHUB-VOC-B	TK66REP1	TX62PB	5.08	77.1
VOT-167	III-HI356-DEF-CHUB-VOC-C	TK67	TX62PB	5.35	77.8
VOT-168	III-HI356-DEF-CHUB-VOC-C	TK67REP1	TX62PB	4.93	77.8
VOT-169	III-HI356-DEF-CREOLEFISH-VOC-A	TK68	TX62PB	5.63	79.8
VOT-170	III-HI356-DEF-CREOLEFISH-VOC-A	TK68REP1	TX62PB	5.37	79.8
VOT-171	III-HI356-DEF-CREOLEFISH-VOC-B	TK69	TX62PB	4.73	79.7
VOT-172	III-HI356-DEF-CREOLEFISH-VOC-B	TK69REP1	TX62PB	5.12	79.7
VOT-173	III-HI356-DEF-CREOLEFISH-VOC-C	TK70	TX62PB	5.32	79.4
VOT-174	III-HI356-DEF-CREOLEFISH-VOC-C	TK70REP1	TX62PB	5.35	79.4
VOT-175	III-HI356-DEF-SERGMAJOR-VOC-A	TK71	TX62PB	4.80	78.6
VOT-176	III-HI356-DEF-SERGMAJOR-VOC-A	TK71REP1	TX62PB	5.16	78.6
VOT-177	III-HI356-DEF-SERGMAJOR-VOC-B	TK72	TX62PB	5.07	78.6
VOT-178	III-HI356-DEF-SERGMAJOR-VOC-B	TK72REP1	TX62PB	4.59	78.6
VOT-179	III-HI356-DEF-SERGMAJOR-VOC-C	TK73	TX62PB	5.00	77.1

Table D-217. (Continued).

Sample ID	Field ID	Lab ID	Associated Blank	Sample Size (g wet weight)	Percent Moisture
VOT-180	III-HI356-DEF-SERGMAJOR-VOC-C	TK73REP1	TX62PB	5.87	77.1
VOT-181	III-GC19-DEF-CHAMA-VOC-A	TK23	TV92PB	5.07	83.9
VOT-182	III-GC19-DEF-CHAMA-VOC-A	TK23REP1	TV92PB	5.74	83.9
VOT-183	III-GC19-DEF-CHAMA-VOC-B	TK24	TV92PB	4.79	86.1
VOT-184	III-GC19-DEF-CHAMA-VOC-B	TK24REP1	TV92PB	5.22	86.1
VOT-185	III-GC19-DEF-CHAMA-VOC-C	TK25	TV92PB	5.37	84.3
VOT-186	III-GC19-DEF-CHAMA-VOC-C	TK25REP1	TV92PB	4.71	84.3
VOT-187	III-GC19-DEF-SPONDYLUSVOC-A	TK20	TV92PB	3.20	84.3
VOT-188	III-GC19-DEF-SPONDYLUSVOC-A	TK20REP1	TV92PB	3.75	84.3
VOT-189	III-GC19-DEF-SPONDYLUS-VOC-B	TK21-1	TV92PB	4.70	83.1
VOT-190	III-GC19-DEF-SPONDYLUS-VOC-B	TK21REP1	TV88PB	4.17	83.1
VOT-191	III-GC19-DEF-SPONDYLUS-VOC-C	TK22	TV88PB	4.91	83.4
VOT-192	III-GC19-DEF-SPONDYLUS-VOC-C	TK22REP1	TV88PB	4.71	83.4
VOT-193	III-GC19-DEF-CHUB-VOC-A	TK56	TX54PB	5.35	74.1
VOT-194	III-GC19-DEF-CHUB-VOC-A	TK56REP1	TX54PB	5.13	74.1
VOT-195	III-GC19-DEF-CHUB-VOC-B	TK57	TX54PB	5.38	75.7
VOT-196	III-GC19-DEF-CHUB-VOC-B	TK57REP1	TX54PB	4.67	75.7
VOT-197	III-GC19-DEF-CHUB-VOC-C	TK58	TX54PB	5.00	76.8
VOT-198	III-GC19-DEF-CHUB-VOC-C	TK58REP1	TX54PB	4.84	76.8
VOT-199	III-GC19-DEF-CREOLEFISH-VOC-A	TK59	TX58PB	5.70	80.5
VOT-200	III-GC19-DEF-CREOLEFISH-VOC-A	TK59REP1	TX58PB	5.62	80.5
VOT-201	III-GC19-DEF-CREOLEFISH-VOC-B	TK60	TX58PB	5.08	80.3
VOT-202	III-GC19-DEF-CREOLEFISH-VOC-B	TK60REP1	TX58PB	5.70	80.3
VOT-203	III-GC19-DEF-CREOLEFISH-VOC-C	TK61	TX58PB	5.12	80.4
VOT-204	III-GC19-DEF-CREOLEFISH-VOC-C	TK61REP1	TX58PB	5.35	80.4
VOT-205	III-GC19-DEF-TRIGGERFISH-VOC-A	TK62	TX58PB	5.19	79.9
VOT-206	III-GC19-DEF-TRIGGERFISH-VOC-A	TK62REP1	TX58PB	4.93	79.9
VOT-207	III-GC19-DEF-TRIGGERFISH-VOC-B	TK63	TX58PB	5.32	79.4
VOT-208	III-GC19-DEF-TRIGGERFISH-VOC-B	TK63REP1	TX58PB	5.31	79.4
VOT-209	III-GC19-DEF-TRIGGERFISH-VOC-C	TK64	TX58PB	4.99	80.0
VOT-210	III-GC19-DEF-TRIGGERFISH-VOC-C	TK64REP1	TX58PB	5.17	80.0
VOT-211	III-EI361-DEF-CHAMA-VOC-A	TK29	TV92PB	4.96	87.3
VOT-212	III-EI361-DEF-CHAMA-VOC-A	TK29REP1	TV92PB	4.92	87.3
VOT-213	III-EI361-DEF-CHAMA-VOC-B	TK30	TV96PB-1	5.04	88.3
VOT-214	III-EI361-DEF-CHAMA-VOC-B	TK30REP1	TV96PB-1	5.10	88.3
VOT-215	III-EI361-DEF-CHAMA-VOC-C	TK31	TV96PB-1	4.47	90.2

Table D-217. (Continued).

Sample ID	Field ID	Lab ID	Associated Blank	Sample Size (g wet weight)	Percent Moisture
VOT-216	III-EI361-DEF-CHAMA-VOC-C	TK31REP1	TV96PB-1	4.75	90.2
VOT-217	III-EI361-DEF-SPONDYLUSVOC-A	TK26	TV92PB	4.46	84.5
VOT-218	III-EI361-DEF-SPONDYLUSVOC-A	TK26REP1	TV92PB	4.93	84.5
VOT-219	III-EI361-DEF-SPONDYLUSVOC-B	TK27	TV92PB	4.79	84.0
VOT-220	III-EI361-DEF-SPONDYLUSVOC-B	TK27REP1	TV92PB	4.72	84.0
VOT-221	III-EI361-DEF-SPONDYLUSVOC-C	TK28	TV92PB	4.33	84.3
VOT-222	III-EI361-DEF-SPONDYLUSVOC-C	TK28REP1	TV92PB	5.06	84.3
VOT-223	III-EI361-DEF-CHUB-EXC-A	TK47-1	TZ28PB	5.34	76.1
VOT-224	III-EI361-DEF-CHUB-VOC-A	TK47REP1	TX50PB	5.15	76.1
VOT-225	III-EI361-DEF-CHUB-EXC-B	TK48-1	TZ28PB	5.28	75.0
VOT-226	III-EI361-DEF-CHUB-VOC-B	TK48REP1	TX50PB	4.66	75.0
VOT-227	III-EI361-DEF-CHUB-VOC-C	TK49	TX50PB	5.12	75.2
VOT-228	III-EI361-DEF-CHUB-EXC-C	TK49REP1-1	TZ28PB	5.00	75.2
VOT-229	III-EI361-DEF-CREOLEFISH-EXC-A	TK50-1	TZ28PB	5.14	79.4
VOT-230	III-EI361-DEF-CREOLEFISH-EXC-A	TK50REP1-1	TZ28PB	5.15	79.4
VOT-231	III-EI361-DEF-CREOLEFISH-VOC-B	TK51	TX50PB	5.27	79.5
VOT-232	III-EI361-DEF-CREOLEFISH-VOC-B	TK51REP1	TX50PB	4.96	79.5
VOT-233	III-EI361-DEF-CREOLEFISH-VOC-C	TK52	TX54PB	5.01	79.5
VOT-234	III-EI361-DEF-CREOLEFISH-VOC-C	TK52REP1	TX54PB	4.75	79.5
VOT-235	III-EI361-DEF-TRIGGERFISH-VOC-A	TK53-1	TX58PB	4.73	79.3
VOT-236	III-EI361-DEF-TRIGGERFISH-VOC-A	TK53REP1	TX54PB	4.82	79.3
VOT-237	III-EI361-DEF-TRIGGERFISH-VOC-B	TK54	TX54PB	4.74	79.1
VOT-238	III-EI361-DEF-TRIGGERFISH-VOC-B	TK54REP1	TX54PB	5.23	79.1
VOT-239	III-EI361-DEF-TRIGGERFISH-VOC-C	TK55	TX54PB	5.22	78.9
VOT-240	III-EI361-DEF-TRIGGERFISH-VOC-C	TK55REP1	TX54PB	5.37	78.9

Table D-218. Surrogate recoveries for volatile organic compound analyses of tissue samples.

Sample ID	Surrogate Recoveries (%)		
	Benzene-d6	Toluene-d8	Ethylbenzene-d10
VOT-001	91	85	69
VOT-002	77	72	57
VOT-003	102	101	83
VOT-004	71	64	46
VOT-005	130	108	79
VOT-006	107	95	67
VOT-007	105	101	84
VOT-008	88	89	78
VOT-009	99	94	79
VOT-010	85	86	76
VOT-011	109	115	92
VOT-012	93	97	92
VOT-013	87	86	84
VOT-014	86	93	80
VOT-015	81	79	75
VOT-016	112	78	101
VOT-017	85	83	66
VOT-018	101	96	83
VOT-019	99	91	77
VOT-020	80	78	71
VOT-021	82	83	81
VOT-022	87	91	78
VOT-023	87	76	70
VOT-024	85	89	75
VOT-025	77	81	75
VOT-026	89	87	70
VOT-027	70	71	68
VOT-028	89	93	89
VOT-029	88	89	80
VOT-030	96	95	82
VOT-031	96	93	75
VOT-032	64	59	43
VOT-033	87	79	65
VOT-034	84	69	50
VOT-035	98	98	79
VOT-036	85	89	78
VOT-037	119	107	77
VOT-038	101	91	81
VOT-039	113	103	81
VOT-040	114	103	81
VOT-041	91	87	72
VOT-042	102	93	74
VOT-043	86	85	71
VOT-044	89	87	72
VOT-045	97	93	76
VOT-046	94	85	69
VOT-047	88	88	76
VOT-048	99	97	81
VOT-049	89	89	75
VOT-050	81	84	68

Table D-218. (Continued).

Sample ID	Surrogate Recoveries (%)		
	Benzene-d6	Toluene-d8	Ethylbenzene-d10
VOT-051	89	93	79
VOT-052	90	91	78
VOT-053	87	87	77
VOT-054	84	87	72
VOT-055	91	87	75
VOT-056	86	83	76
VOT-057	90	85	75
VOT-058	85	85	73
VOT-059	88	85	72
VOT-060	93	88	72
VOT-061	66	63	51
VOT-062	83	78	61
VOT-063	78	74	55
VOT-064	102	102	85
VOT-065	69	63	50
VOT-066	80	72	52
VOT-067	99	95	79
VOT-068	86	85	76
VOT-069	88	83	75
VOT-070	84	82	74
VOT-071	106	108	94
VOT-072	92	90	79
VOT-073	117	104	82
VOT-074	121	107	76
VOT-075	107	97	78
VOT-076	112	102	78
VOT-077	97	96	78
VOT-078	104	97	81
VOT-079	93	91	75
VOT-080	91	90	80
VOT-081	101	98	81
VOT-082	95	93	79
VOT-083	99	94	81
VOT-084	96	92	74
VOT-085	105	98	81
VOT-086	95	92	74
VOT-087	95	93	82
VOT-088	94	94	82
VOT-089	83	84	74
VOT-090	85	81	73
VOT-091	103	92	62
VOT-092	89	81	66
VOT-093	107	94	71
VOT-094	106	94	69
VOT-095	75	94	71
VOT-096	72	84	61
VOT-097	91	90	76
VOT-098	88	92	75
VOT-099	94	91	73
VOT-100	91	96	84
VOT-101	100	98	83

Table D-218. (Continued).

Sample ID	Surrogate Recoveries (%)		
	Benzene-d6	Toluene-d8	Ethylbenzene-d10
VOT-102	88	86	73
VOT-103	100	83	73
VOT-104	102	102	84
VOT-105	94	88	74
VOT-106	94	88	77
VOT-107	92	91	79
VOT-108	98	100	84
VOT-109	101	99	84
VOT-110	94	90	78
VOT-111	102	97	83
VOT-112	79	81	67
VOT-113	93	91	81
VOT-114	90	92	77
VOT-115	103	102	86
VOT-116	100	100	84
VOT-117	95	94	85
VOT-118	92	91	73
VOT-119	93	94	81
VOT-120	100	97	76
VOT-121	94	86	75
VOT-122	104	94	80
VOT-123	93	89	82
VOT-124	99	96	86
VOT-125	107	98	87
VOT-126	112	104	91
VOT-127	79	89	88
VOT-128	105	98	85
VOT-129	90	100	95
VOT-130	79	87	84
VOT-131	88	83	78
VOT-132	96	92	88
VOT-133	75	76	107
VOT-134	75	78	116
VOT-135	87	79	78
VOT-136	83	83	87
VOT-137	NA	69	119
VOT-138	NA	62	99
VOT-139	NA	64	113
VOT-140	53	62	93
VOT-141	NA	55	102
VOT-142	NA	62	106
VOT-143	79	78	85
VOT-144	44&	65	104
VOT-145	93	87	80
VOT-146	106	95	82
VOT-147	96	91	86
VOT-148	104	89	82
VOT-149	103	94	83
VOT-150	103	96	88
VOT-151	60	63	58
VOT-152	88	90	81

Table D-218. (Continued).

Sample ID	Surrogate Recoveries (%)		
	Benzene-d6	Toluene-d8	Ethylbenzene-d10
VOT-153	77	71	57
VOT-154	90	89	77
VOT-155	86	86	78
VOT-156	84	85	72
VOT-157	83	90	86
VOT-158	81	82	70
VOT-159	79	83	78
VOT-160	90	92	88
VOT-161	89	92	85
VOT-162	86	89	84
VOT-163	101	87	73
VOT-164	104	90	74
VOT-165	101	86	76
VOT-166	101	90	83
VOT-167	99	89	77
VOT-168	110	100	87
VOT-169	107	99	86
VOT-170	103	94	81
VOT-171	96	86	77
VOT-172	106	97	88
VOT-173	105	99	87
VOT-174	103	91	80
VOT-175	112	93	82
VOT-176	103	91	79
VOT-177	101	90	76
VOT-178	115	98	87
VOT-179	109	95	83
VOT-180	109	95	80
VOT-181	97	92	82
VOT-182	86	92	86
VOT-183	87	90	85
VOT-184	83	87	82
VOT-185	80	89	87
VOT-186	83	87	80
VOT-187	80	88	86
VOT-188	78	85	83
VOT-189	82	90	85
VOT-190	97	98	91
VOT-191	93	93	90
VOT-192	55	55	51
VOT-193	64	67	106
VOT-194	76	75	111
VOT-195	NA	64	107
VOT-196	NA	70	116
VOT-197	NA	65	109
VOT-198	86	76	107
VOT-199	NA	69	118
VOT-200	NA	86	116
VOT-201	NA	86	113
VOT-202	NA	94	119
VOT-203	105	94	85

Table D-218. (Continued).

Sample ID	Surrogate Recoveries (%)		
	Benzene-d6	Toluene-d8	Ethylbenzene-d10
VOT-204	105	93	87
VOT-205	105	98	92
VOT-206	95	91	84
VOT-207	102	94	83
VOT-208	106	96	82
VOT-209	106	107	115
VOT-210	80	81	86
VOT-211	88	96	86
VOT-212	94	99	92
VOT-213	85	95	84
VOT-214	80	89	79
VOT-215	80	88	81
VOT-216	85	92	86
VOT-217	87	89	85
VOT-218	88	92	84
VOT-219	87	93	92
VOT-220	82	90	89
VOT-221	83	83	81
VOT-222	88	94	95
VOT-223	103	89	77
VOT-224	102	76	108
VOT-225	108	97	86
VOT-226	66	75	92
VOT-227	80	82	100
VOT-228	110	88	72
VOT-229	98	87	77
VOT-230	103	89	78
VOT-231	69	78	113
VOT-232	94	62	98
VOT-233		61	109
VOT-234		71	117
VOT-235	97	85	78
VOT-236	86	83	79
VOT-237	90	86	79
VOT-238	97	92	88
VOT-239	94	86	81
VOT-240	91	86	80

Table D-219. Results of volatile organic compound analysis of Cruise 3 matrix spike and matrix spike duplicate tissue samples. Percent recovered and relative percent difference (RPD) are reported.

Lab ID	Percent Recoveries		RPD
	TV90MS	TV91MSD	
Benzene	103	108	5
Toluene	66	72	8
Ethylbenzene	104	110	6
m-/p-Xylene	108	116	7
o-Xylene	105	109	3
Surrogate Recovery (%)			
Benzene-d6	96	90	
Toluene-d8	96	93	
Ethylbenzene-d10	86	82	

Lab ID	Percent Recoveries		RPD
	TV94MS	TV95MSD	
Benzene	86	109	23
Toluene	154&	168&	9
Ethylbenzene	90	123&	31*
m-/p-Xylene	92	124&	30
o-Xylene	94	120	24
Surrogate Recovery (%)			
Benzene-d6	79	81	
Toluene-d8	87	90	
Ethylbenzene-d10	85	86	

Lab ID	Percent Recoveries		RPD
	TV98MS	TV99MSD-1	
Benzene	129&	109	17
Toluene	61	41&	41*
Ethylbenzene	115	112	3
m-/p-Xylene	127&	116	9
o-Xylene	101	114	12
Surrogate Recovery (%)			
Benzene-d6	71	102	
Toluene-d8	82	94	
Ethylbenzene-d10	75	81	

Lab ID	Percent Recoveries		RPD
	TW03MS	TW04MSD	
Benzene	51	48&	5
Toluene	80	69	15
Ethylbenzene	54	58	7
m-/p-Xylene	96	72	28
o-Xylene	96	69	33*
Surrogate Recovery (%)			
Benzene-d6	66	75	
Toluene-d8	65	78	
Ethylbenzene-d10	125&	96	

Table D-219. (Continued).

Lab ID	Percent Recoveries		RPD
	TX56MS	TX57MSD	
Benzene	87	96	10
Toluene	152&	158&	4
Ethylbenzene	116	108	7
m-/p-Xylene	166&	191&	14
o-Xylene	184&	220&	18
Surrogate Recovery (%)			
Benzene-d6			
Toluene-d8	59	62	
Ethylbenzene-d10	104	119	

Lab ID	Percent Recoveries		RPD
	TX60MS	TX61MSD-1	
Benzene	106	102	4
Toluene	155&	146&	6
Ethylbenzene	110	107	3
m-/p-Xylene	117	111	5
o-Xylene	109	104	5
Surrogate Recovery (%)			
Benzene-d6	100	99	
Toluene-d8	90	92	
Ethylbenzene-d10	83	91	

Lab ID	Percent Recoveries		RPD
	TX64MS	TX65MSD	
Benzene	91	93	2
Toluene	136&	130&	4
Ethylbenzene	110	107	3
m-/p-Xylene	109	104	4
o-Xylene	111	109	2
Surrogate Recovery (%)			
Benzene-d6	105	100	
Toluene-d8	97	91	
Ethylbenzene-d10	86	83	

Lab ID	Percent Recoveries		RPD
	TZ30MS	TZ31MSD	
Benzene	91	119	26
Toluene	14&	90	145*
Ethylbenzene	99	112	13
m-/p-Xylene	96	108	11
o-Xylene	94	104	10
Surrogate Recovery (%)			
Benzene-d6	106	106	
Toluene-d8	98	95	
Ethylbenzene-d10	90	90	

& = Result outside quality control surrogate recovery data.
* = RPD outside criteria (>30%).

Table D-220. Results of volatile organic compound analysis of Cruise 2 matrix spike and matrix spike duplicate tissue samples. Percent recovered and relative percent difference (RPD) are reported.

Lab ID	Percent Recovery		RPD
	RZ35MS	RZ36MSD	
Analyte			
Benzene	106	110	3
Toluene	94	104	10
Ethylbenzene	109	109	0
M-/P-Xylenes	99	105	6
O-Xylene	99	106	6
Surrogate Recovery (ng)			
Benzene-d6	91	79	
Toluene-d8	89	81	
Ethylbenzene-d10	76	66	

Lab ID	Percent Recovery		RPD
	RZ39MS	RZ40MSD	
Analyte			
Benzene	59	73	20
Toluene	95	101	7
Ethylbenzene	105	104	1
M-/P-Xylenes	103	103	0
O-Xylene	103	105	2
Surrogate Recovery (ng)			
Benzene-d6	91	91	
Toluene-d8	89	81	
Ethylbenzene-d10	72	71	

Lab ID	Percent Recovery		RPD
	RZ47MS	RZ48MSD	
Analyte			
Benzene	106	106	0
Toluene	99	93	7
Ethylbenzene	104	96	8
M-/P-Xylenes	97	91	7
O-Xylene	95	88	8
Surrogate Recovery (ng)			
Benzene-d6	101	82	
Toluene-d8	97	73	
Ethylbenzene-d10	72	57	

Lab ID	Percent Recovery		RPD
	SA93MS	SA94MSD	
Analyte			
Benzene	102	93	9
Toluene	94	86	9
Ethylbenzene	112	102	10
M-/P-Xylenes	104	97	7
O-Xylene	107	102	5
Surrogate Recovery (ng)			
Benzene-d6	88	95	
Toluene-d8	86	92	
Ethylbenzene-d10	74	83	

Table D-220. (Continued).

Lab ID	Percent Recovery		RPD
	SB77MS	SB78MSD	
Analyte			
Benzene	112	112	0
Toluene	98	99	2
Ethylbenzene	114	119	4
M-/P-Xylenes	122&	130&	7
O-Xylene	120	127&	5
Surrogate Recovery (ng)			
Benzene-d6	93	96	
Toluene-d8	92	82	
Ethylbenzene-d10	85	81	

Lab ID	Percent Recovery		RPD
	SB77MS	SB78MSD	
Analyte			
Benzene	124&	108	14
Toluene	114	109	5
Ethylbenzene	106	112	6
M-/P-Xylenes	106	115	9
O-Xylene	104	116	10
Surrogate Recovery (ng)			
Benzene-d6	78	93	
Toluene-d8	84	96	
Ethylbenzene-d10	83	94	

Lab ID	Percent Recovery		RPD
	SG28MS	SG29MSD	
Analyte			
Benzene	103	105	2
Toluene	118	118	1
Ethylbenzene	127&	122&	3
M-/P-Xylenes	165&	163&	1
O-Xylene	121&	105	15
Surrogate Recovery (ng)			
Benzene-d6	83	89	
Toluene-d8	85	85	
Ethylbenzene-d10	76	78	

Lab ID	Percent Recovery		RPD
	SG32MS	SG33MSD	
Analyte			
Benzene	98	95	3
Toluene	94	94	0
Ethylbenzene	111	114	3
M-/P-Xylenes	108	108	0
O-Xylene	109	108	1
Surrogate Recovery (ng)			
Benzene-d6	89	87	
Toluene-d8	88	85	
Ethylbenzene-d10	76	74	

& = Result outside quality control surrogate recovery data.

Table D-221. Results of volatile organic compound analysis of Cruise 2 matrix spike and matrix spike duplicate water samples. Percent recovered and relative percent difference (RPD) are reported.

Lab ID	Percent Recovery		RPD
	RL62MS	RL63MSD	
Analyte			
Benzene	157&	101	44*
Toluene	73	73	1
Ethylbenzene	106	110	3
m-/p-Xylene	100	99	1
o-Xylene	102	102	0
Surrogate Recovery (%)			
Benzene-d6	53	88	
Toluene-d8	88	88	
Ethylbenzene-d10	83	84	

Lab ID	Percent Recovery		RPD
	RR66MS-1	RR67MSD	
Analyte			
Benzene	88	90	3
Toluene	72	70	3
Ethylbenzene	97	98	1
m-/p-Xylene	96	94	1
o-Xylene	96	96	0
Surrogate Recovery (%)			
Benzene-d6	100	102	
Toluene-d8	98	100	
Ethylbenzene-d10	93	95	

* = RPD out of workplan range (>30%).

Table D-222. Sample specific data for semivolatile organic compound analysis of water samples.

Sample ID	Field ID	Lab ID	Associated Blank	Sample Size (L)	Collection Date	Extraction Date	Analysis Date
SVW-01	EB165-PW-SV-A	GM192	AX-S-63pb	2.18	05/31/95	06/05/95	06/10/95
SVW-02	EB165-PW-SV-B	GM193	AX-S-63pb	2.19	05/31/95	06/05/95	06/10/95
SVW-03	EB165-PW-SV-C	GM194	AX-S-63pb	2.21	05/31/95	06/05/95	06/10/95
SVW-04	GC19-PW-SV-A	GM178	AX-S-62pb	2.4	05/27/95	06/01/95	06/09/95
SVW-05	GC19-PW-SV-B	GM179	AX-S-62pb	2.24	05/27/95	06/01/95	06/09/95
SVW-06	GC19-PW-SV-C	GM180	AX-S-62pb	2.2	05/27/95	06/01/95	06/09/95
SVW-07	EB165-AW-SV-A	GM195	AX-S-63pb	2.12	05/31/95	06/05/95	06/10/95
SVW-08	EB165-AW-SV-B	GM196	AX-S-63pb	2.08	05/31/95	06/05/95	06/10/95
SVW-09	EB165-AW-SV-C	GM197	AX-S-63pb	2.1	05/31/95	06/05/95	06/10/95
SVW-10	HI356-AW-SV-A	GM169	AX-S-54pb-re	2.12	05/22/95	05/26/95	06/09/95
SVW-11	HI356-AW-SV-B	GM170	AX-S-54pb-re	2.23	05/22/95	05/26/95	06/09/95
SVW-12	HI356-AW-SV-C	GM171	AX-S-54pb-re	2.09	05/22/95	05/26/95	06/09/95
SVW-13	GC19-AW-SV-A	GM181	AX-S-62pb	2.26	05/27/95	06/01/95	06/09/95
SVW-14	GC19-AW-SV-B	GM182	AX-S-62pb	2.15	05/27/95	06/01/95	06/09/95
SVW-15	GC19-AW-SV-C	GM183	AX-S-62pb	2.18	05/27/95	06/01/95	06/09/95
SVW-16	EI361A-AW-SV-A	GM185	AX-S-62pb	2.26	05/25/95	06/01/95	06/09/95
SVW-17	EI361A-AW-SV-B	GM186	AX-S-62pb	2.22	05/25/95	06/01/95	06/10/95
SVW-18	EI361A-AW-SV-C	GM187	AX-S-62pb	2.24	05/25/95	06/01/95	06/10/95
SVW-19	EB165-PW-SV-A	95A0953	AZ-S-91PB	2.08	11/13/95	11/20/95	12/24/95
SVW-20	EB165-PW-SV-B	95A0954	AZ-S-91PB	2.27	11/13/95	11/20/95	12/24/95
SVW-21	EB165-PW-SV-C	95A0955	AZ-S-91PB	2.05	11/13/95	11/20/95	12/24/95
SVW-22	GC19-PW-SV-A	95A1095	BA-S-15PB	2.215	12/01/95	12/07/95	12/23/95
SVW-23	GC19-PW-SV-B	95A1096	BA-S-15PB	2.105	12/01/95	12/07/95	12/23/95
SVW-24	GC19-PW-SV-C	95A1097	BA-S-15PB	2.27	12/01/95	12/07/95	12/23/95
SVW-25	KM-PW-SV-A	95A1133	BA-S-32PB	2.04	12/13/95	12/08/95	12/24/95
SVW-26	KM-PW-SV-B	95A1134	BA-S-32PB	2.23	12/13/95	12/08/95	12/24/95
SVW-27	KM-PW-SV-C	95A1135	BA-S-32PB	2.25	12/13/95	12/08/95	12/24/95
SVW-28	EB165-AW-SV-A	95A0969	AZ-S-91PB	2.3	11/16/95	11/20/95	12/22/95
SVW-29	EB165-AW-SV-B	95A0970	AZ-S-91PB	2.3	11/16/95	11/20/95	12/22/95
SVW-30	EB165-AW-SV-C	95A0971	AZ-S-91PB	2.34	11/16/95	11/20/95	12/22/95
SVW-31	HI356-AW-SV-A	95A1136	BA-S-32PB	2.21	12/14/95	12/19/95	12/23/95
SVW-32	HI356-AW-SV-B	95A1137	BA-S-32PB	2.22	12/14/95	12/19/95	12/23/95
SVW-33	HI356-AW-SV-C	95A1138	BA-S-32PB	2.2	12/14/95	12/19/95	12/23/95
SVW-34	GC19-AW-SV-A	95A1098	BA-S-15PB	2.22	12/02/95	12/07/95	12/22/95
SVW-35	GC19-AW-SV-B	95A1099	BA-S-15PB	2.19	12/02/95	12/07/95	12/22/95
SVW-36	GC19-AW-SV-C	95A1100	BA-S-15PB	2.19	12/02/95	12/07/95	12/22/95
SVW-37	EI361-AW-SV-A	95A1130	BA-S-32PB	2.22	12/13/95	12/19/95	12/23/95
SVW-38	EI361-AW-SV-B	95A1131	BA-S-32PB	2.31	12/13/95	12/19/95	12/23/95
SVW-39	EI361-AW-SV-C	95A1132	BA-S-32PB	2.3	12/13/95	12/19/95	12/23/95

Table D-223. Surrogate recoveries for semivolatile organic compound analysis of water samples.

Sample ID	Surrogate Recoveries (%)					
	d6-Phenol	d8-Naphthalene	d10-Fluorene	d10-Phenanthrene	d4-Bis(2-ethylhexyl)phthalate	d12-Benzo[a]pyrene
SVW-01	65L	46	85	86	82	58
SVW-02	76L	57	89	94	84	60
SVW-03	76L	53	95	94	83	59
SVW-04	47L	80	92	82	80	56
SVW-05	44L	68	84	91	84	58
SVW-06	35L	55	79	80	75	51
SVW-07	32	61	77	85	108	54
SVW-08	40	74	81	86	104	45
SVW-09	38	75	83	90	109	28&
SVW-10	22	43	55	61	78	52
SVW-11	21	44	55	61	82	54
SVW-12	17	26&	33&	37&	48	38
SVW-13	15	54	63	68	82	0.29&
SVW-14	28	53	64	72	82	61
SVW-15	14&	59	70	77	87	0.26&
SVW-16	27	54	63	71	85	54
SVW-17	27	53	62	69	84	53
SVW-18	25	54	63	69	85	52
SVW-19	48L	83L	115L	94L	120G	95
SVW-20	37L	78L	108L	83L	122G	94
SVW-21	39L	73L	97L	76L	144G	94
SVW-22	40L	72L	137L	84L	143G	85
SVW-23	43L	72L	131L	82L	138G	93
SVW-24	42L	60L	110L	73L	132G	95
SVW-25	49L	97L	114L	104L	145G	101
SVW-26	52L	84L	93L	86L	147G	96
SVW-27	77L	104L	119L	120L	184G	138&
SVW-28	17	35	41&	46	72	47
SVW-29	21	39	43&	47	67	51
SVW-30	19	39	44&	49	66	48
SVW-31	19	39	48	51	70	44
SVW-32	21	42	46	48	70	42
SVW-33	19	42	50	49	80	56
SVW-34	25	45	52	56	91	49

Table D-223. (Continued).

Sample ID	Surrogate Recoveries (%)					
	d6-Phenol	d8-Naphthalene	d10-Fluorene	d10-Phenanthrene	d4-Bis(2-ethylhexyl)phthalate	d12-Benzo[a]pyrene
SVW-35	9&	44	50	53	85	38
SVW-36	12&	52	57	60	90	34&
SVW-37	21	37	41&	43&	65	41
SVW-38	18	37	42&	45	63	28&
SVW-39	20	40	46	47	67	41

G = Surrogate outside limit.
L = Analyte concentration is reported from a dilution.
& = Result outside quality control surrogate recovery data.

Table D-224. Results of semivolatile organic compound analysis of procedural blanks for water samples.

Lab ID	AX-S-54pb-re	AX-S-62pb	AX-S-63pb	BA-S-15PB	BA-S-16PB	BA-S-32PB	AZ-S-91PB
Sample Size	2	2	2	2.03	2	2	2
Extract Date	05/31/95	06/01/95	06/05/95	12/7/95	12/8/95	12/8/95	11/20/95
Analysis Date	06/09/95	06/09/95	06/09/95	12/23/95	12/23/95	12/24/95	12/24/95
Phenol (ng/L)	25 J	260	92	65 J	71 J	96	52 J
Naphthalene (ng/L)	ND	ND	7.8 J	4.7 J	ND	ND	ND
2-Methylnaphthalene (ng/L)	ND	ND	ND	5.1 J	ND	ND	ND
1-Methylnaphthalene (ng/L)	ND	ND	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/L)	ND	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/L)	ND	ND	ND	5.8 J	ND	ND	ND
C_2-Naphthalenes (ng/L)	ND	ND	ND	11 J	ND	ND	ND
C_3-Naphthalenes (ng/L)	ND	ND	ND	13 J	ND	ND	ND
C_4-Naphthalenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene (ng/L)	ND	ND	ND	ND	ND	ND	ND
Acenaphthene (ng/L)	ND	ND	ND	5.3 J	ND	ND	ND
Biphenyl (ng/L)	ND	ND	ND	1.9 J	ND	ND	ND
Fluorene (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_2-Fluorenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
Anthracene (ng/L)	ND	ND	ND	ND	ND	ND	ND
Phenanthrene (ng/L)	ND	ND	ND	19 J	ND	ND	ND
1-Methylphenanthrene (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/L)	ND	ND	ND	4.7 J	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
Dibenzothiophene (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
Fluoranthene (ng/L)	ND	ND	ND	ND	ND	ND	ND

Table D-224. (Continued).

Pyrene (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/L)	ND	ND	ND	ND	ND	ND	ND
Chrysene (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/L)	ND	ND	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/L)	ND	ND	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/L)	ND	ND	ND	ND	ND	ND	ND
Bis(ethylhexyl)phthalate (ng/L)	100 J	110 J	110 J	150 J	130 J	110 J	350 J
Benzo[e]pyrene (ng/L)	ND	ND	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/L)	ND	ND	ND	ND	ND	ND	ND
Perylene (ng/L)	ND	ND	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/L)	ND	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/L)	ND	ND	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/L)	ND	5.6 J	ND	ND	ND	ND	6 J
Surrogate Recovery (%)							
d6-Phenol	20	12 &	25	25	25	22	31
d4-Bis(ethylhexyl)phthalate	50	34 &	76	121	112	118	106
d8-Naphthalene	58	44 &	98	68	70	61	66
d10-Fluorene	64	50	110	79	72	75	68
d10-Phenanthrene	86	69	160 &	91	79	79	79
d12-Benzo[a]pyrene	72	33 &	60	27 &	31 &	56	36

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.
& = Result outside quality control surrogate recovery criteria.

Table D-225. Sample specific data for semivolatile compound analysis of tissue samples.

Sample ID	Field ID	Lab ID	Sample Size (g wet weight)	Percent Dry Wt	Associated Blank	Extract Date	Analysis Date
SVT-001	II-EB165-DEF-CHAMA-SVHC-A	95A0050 ALUM	26.91	12.8	AY-S-57PB ALUM	8/23/95	9/3/95
SVT-002	II-EB165-DEF-CHAMA-SVHC-A	95A0050DUP ALUM	25.33	12.8	AY-S-57PB ALUM	8/23/95	9/3/95
SVT-003	II-EB165-DEF-CHAMA-SVHC-B	95A0059	25.18	12.1	AY-S-60PB	9/5/95	9/16/95
SVT-004	II-EB165-DEF-CHAMA-SVHC-B	95A0059DUP	25.60	12.1	AY-S-60PB	9/5/95	9/16/95
SVT-005	II-EB165-DEF-CHAMA-SVHC-C	95A0060	25.80	15.1	AY-S-60PB	9/5/95	9/17/95
SVT-006	II-EB165-DEF-CHAMA-SVHC-C	95A0060DUP	25.08	15.1	AY-S-60PB	9/5/95	9/17/95
SVT-007	II-EB165-DEF-SPONDYLUS-SVHC-A	95A0069	25.14	17.2	AY-S-63PB	9/7/95	9/17/95
SVT-008	II-EB165-DEF-SPONDYLUS-SVHC-A	95A0069DUP	26.12	17.2	AY-S-63PB	9/7/95	9/17/95
SVT-009	II-EB165-DEF-SPONDYLUS-SVHC-B	95A0067	25.81	16.8	AY-S-60PB	9/6/95	9/16/95
SVT-010	II-EB165-DEF-SPONDYLUS-SVHC-B	95A0067DUP	26.45	16.8	AY-S-60PB	9/6/95	9/16/95
SVT-011	II-EB165-DEF-SPONDYLUS-SVHC-C	95A0068	26.42	17.1	AY-S-60PB	9/6/95	9/16/95
SVT-012	II-EB165-DEF-SPONDYLUS-SVHC-C	95A0068DUP	25.53	17.1	AY-S-60PB	9/6/95	9/16/95
SVT-013	II-EB165-DEF-CHUB-SVHC-A	95A0073	25.29	23.0	AY-S-63PB	9/8/95	9/18/95
SVT-014	II-EB165-DEF-CHUB-SVHC-A	95A0073DUP	26.25	23.0	AY-S-63PB	9/8/95	9/18/95
SVT-015	II-EB165-DEF-CHUB-SVHC-B	95A0074	25.99	22.1	AY-S-63PB	9/8/95	9/18/95
SVT-016	II-EB165-DEF-CHUB-SVHC-B	95A0074DUP	25.78	22.1	AY-S-63PB	9/8/95	9/18/95
SVT-017	II-EB165-DEF-CHUB-SVHC-C	95A0173	25.29	22.0	AY-S-66PB	9/12/95	9/25/95
SVT-018	II-EB165-DEF-CHUB-SVHC-C	95A0173DUP	26.67	22.0	AY-S-66PB	9/12/95	9/25/95
SVT-019	II-EB165-DEF-CREOLEFISH-SVHC-A	95A0174	25.14	19.6	AY-S-66PB	9/12/95	9/25/95
SVT-020	II-EB165-DEF-CREOLEFISH-SVHC-A	95A0174DUP	25.94	19.6	AY-S-66PB	9/12/95	9/25/95
SVT-021	II-EB165-DEF-CREOLEFISH-SVHC-B	95A0172	25.53	19.4	AY-S-66PB	9/12/95	9/25/95
SVT-022	II-EB165-DEF-CREOLEFISH-SVHC-B	95A0172DUP	25.11	19.4	AY-S-66PB	9/12/95	9/25/95
SVT-023	II-EB165-DEF-CREOLEFISH-SVHC-C	95A0171	25.31	20.3	AY-S-66PB	9/12/95	9/25/95
SVT-024	II-EB165-DEF-CREOLEFISH-SVHC-C	95A0171DUP	26.18	20.3	AY-S-66PB	9/12/95	9/25/95
SVT-025	II-EB165-DEF-ROCKHIND-SVHC-A	95A0317	25.25	20.7	AY-S-69PB	8/13/95	9/29/95
SVT-026	II-EB165-DEF-ROCKHIND-SVHC-A	95A0317DUP	25.14	20.7	AY-S-69PB	8/13/95	9/29/95
SVT-027	II-EB165-DEF-ROCKHIND-SVHC-B	95A0313	25.74	19.8	AY-S-66PB	9/13/95	9/26/95
SVT-028	II-EB165-DEF-ROCKHIND-SVHC-B	95A0313DUP	25.22	19.8	AY-S-66PB	9/13/95	9/26/95
SVT-029	II-EB165-DEF-ROCKHIND-SVHC-C	95A0323	26.32	22.2	AY-S-69PB	8/14/95	9/30/95
SVT-030	II-EB165-DEF-ROCKHIND-SVHC-C	95A0323DUP	25.58	22.2	AY-S-69PB	8/14/95	9/30/95
SVT-031	II-HI356-DEF-CHAMA-SVHC-A	95A0049 ALUM	26.78	11.0	AY-S-57PB ALUM	8/23/95	9/3/95
SVT-032	II-HI356-DEF-CHAMA-SVHC-A	95A0049DUP ALUM	25.39	11.0	AY-S-57PB ALUM	8/23/95	9/3/95
SVT-033	II-HI356-DEF-CHAMA-SVHC-B	95A0057 ALUM	26.14	11.8	AY-S-57PB ALUM	8/25/95	9/4/95
SVT-034	II-HI356-DEF-CHAMA-SVHC-B	95A0057DUP ALUM	25.53	11.8	AY-S-57PB ALUM	8/25/95	9/4/95
SVT-035	II-HI356-DEF-CHAMA-SVHC-C	95A0053DUP ALUM	25.68	13.2	AY-S-57PB ALUM	8/24/95	9/3/95

Table D-225. (Continued).

Sample ID	Field ID	Lab ID	Sample Size (g wet weight)	Percent Dry Wt	Associated Blank	Extract Date	Analysis Date
SVT-036	II-HI356-DEF-CHAMA-SVHC-C	95A0053REP	25.14	13.2	AY-S-72PB	9/20/95	10/2/95
SVT-037	II-HI356-DEF-SPONDYLUS-SVHC-A	95A0065	25.41	16.6	AY-S-60PB	9/6/95	9/16/95
SVT-038	II-HI356-DEF-SPONDYLUS-SVHC-A	95A0065DUP	25.56	16.6	AY-S-60PB	9/6/95	9/16/95
SVT-039	II-HI356-DEF-SPONDYLUS-SVHC-B	95A0061	25.62	15.0	AY-S-60PB	9/5/95	9/17/95
SVT-040	II-HI356-DEF-SPONDYLUS-SVHC-B	95A0061DUP	25.19	15.0	AY-S-60PB	9/5/95	9/17/95
SVT-041	II-HI356-DEF-SPONDYLUS-SVHC-C	95A0064	26.71	19.2	AY-S-60PB	9/5/95	9/16/95
SVT-042	II-HI356-DEF-SPONDYLUS-SVHC-C	95A0064DUP	25.25	19.2	AY-S-60PB	9/5/95	9/16/95
SVT-043	II-HI356-DEF-CHUB-SVHC-A	95A0321	25.87	23.4	AY-S-69PB	8/14/95	9/30/95
SVT-044	II-HI356-DEF-CHUB-SVHC-A	95A0321DUP	25.46	23.4	AY-S-69PB	8/14/95	9/30/95
SVT-045	II-HI356-DEF-CHUB-SVHC-B	95A0332	25.45	24.4	AY-S-72PB	9/19/95	10/2/95
SVT-046	II-HI356-DEF-CHUB-SVHC-B	95A0332DUP	25.52	24.4	AY-S-72PB	9/19/95	10/2/95
SVT-047	II-HI356-DEF-CHUB-SVHC-C	95A0312	25.60	21.3	AY-S-66PB	9/12/95	9/26/95
SVT-048	II-HI356-DEF-CHUB-SVHC-C	95A0312DUP	26.46	21.3	AY-S-66PB	9/12/95	9/26/95
SVT-049	II-HI356-DEF-CREOLEFISH-SVHC-A	95A0335	26.17	20.5	AY-S-72PB	9/19/95	10/2/95
SVT-050	II-HI356-DEF-CREOLEFISH-SVHC-A	95A0335DUP	25.92	20.5	AY-S-72PB	9/19/95	10/2/95
SVT-051	II-HI356-DEF-CREOLEFISH-SVHC-B	95A0336	25.11	20.6	AY-S-72PB	9/19/95	10/2/95
SVT-052	II-HI356-DEF-CREOLEFISH-SVHC-B	95A0336DUP	25.23	20.6	AY-S-72PB	9/19/95	10/2/95
SVT-053	II-HI356-DEF-CREOLEFISH-SVHC-C	95A0316	25.04	19.6	AY-S-66PB	9/13/95	9/26/95
SVT-054	II-HI356-DEF-CREOLEFISH-SVHC-C	95A0316DUP	25.65	19.6	AY-S-66PB	9/13/95	9/26/95
SVT-055	II-HI356-DEF-ROCKHIND-SVHC-A	95A0314	26.76	22.8	AY-S-66PB	9/13/95	9/26/95
SVT-056	II-HI356-DEF-ROCKHIND-SVHC-A	95A0314DUP	26.55	22.8	AY-S-66PB	9/13/95	9/26/95
SVT-057	II-HI356-DEF-ROCKHIND-SVHC-B	95A0324	25.85	20.9	AY-S-69PB	8/14/95	9/30/95
SVT-058	II-HI356-DEF-ROCKHIND-SVHC-B	95A0324DUP	25.11	20.9	AY-S-69PB	8/14/95	9/30/95
SVT-059	II-HI356-DEF-ROCKHIND-SVHC-C	95A0315	26.61	20.1	AY-S-66PB	9/13/95	9/26/95
SVT-060	II-HI356-DEF-ROCKHIND-SVHC-C	95A0315DUP	25.80	20.1	AY-S-66PB	9/13/95	9/26/95
SVT-061	II-GC19-DEF-CHAMA-SVHC-A	95A0056 ALUM	25.12	10.4	AY-S-57PB ALUM	8/25/95	9/4/95
SVT-062	II-GC19-DEF-CHAMA-SVHC-A	95A0056DUP ALUM	25.19	10.4	AY-S-57PB ALUM	8/25/95	9/4/95
SVT-063	II-GC19-DEF-CHAMA-SVHC-B	95A0055 ALUM	25.52	10.9	AY-S-57PB ALUM	8/25/95	9/4/95
SVT-064	II-GC19-DEF-CHAMA-SVHC-B	95A0055DUP ALUM	25.23	10.9	AY-S-57PB ALUM	8/25/95	9/4/95
SVT-065	II-GC19-DEF-CHAMA-SVHC-C	95A0052 ALUM	25.58	10.5	AY-S-57PB ALUM	8/24/95	9/3/95
SVT-066	II-GC19-DEF-CHAMA-SVHC-C	95A0052DUP ALUM	25.59	10.5	AY-S-57PB ALUM	8/24/95	9/3/95
SVT-067	II-GC19-DEF-SPONDYLUS-SVHC-A	95A0070	25.60	18.2	AY-S-63PB	9/7/95	9/17/95
SVT-068	II-GC19-DEF-SPONDYLUS-SVHC-A	95A0070DUP	26.56	18.2	AY-S-63PB	9/7/95	9/17/95
SVT-069	II-GC19-DEF-SPONDYLUS-SVHC-B	95A0071	26.45	18.3	AY-S-63PB	9/7/95	9/18/95
SVT-070	II-GC19-DEF-SPONDYLUS-SVHC-B	95A0071DUP	26.12	18.3	AY-S-63PB	9/7/95	9/18/95
SVT-071	II-GC19-DEF-SPONDYLUS-SVHC-C	95A0072	26.31	17.6	AY-S-63PB	9/8/95	9/18/95
SVT-072	II-GC19-DEF-SPONDYLUS-SVHC-C	95A0072DUP	26.04	17.6	AY-S-63PB	9/8/95	9/18/95

Table D-225. (Continued).

Sample ID	Field ID	Lab ID	Sample Size (g wet weight)	Percent Dry Wt	Associated Blank	Extract Date	Analysis Date
SVT-073	II-GC19-DEF-CHUB-SVHC-A	95A0330	25.39	21.7	AY-S-72PB	9/19/95	10/1/95
SVT-074	II-GC19-DEF-CHUB-SVHC-A	95A0330DUP	25.27	21.7	AY-S-72PB	9/19/95	10/1/95
SVT-075	II-GC19-DEF-CHUB-SVHC-B	95A0334	25.12	22.7	AY-S-72PB	9/19/95	10/2/95
SVT-076	II-GC19-DEF-CHUB-SVHC-B	95A0334DUP	25.33	22.7	AY-S-72PB	9/19/95	10/2/95
SVT-077	II-GC19-DEF-CHUB-SVHC-C	95A0333	25.68	21.7	AY-S-72PB	9/19/95	10/2/95
SVT-078	II-GC19-DEF-CHUB-SVHC-C	95A0333DUP	25.22	21.7	AY-S-72PB	9/19/95	10/2/95
SVT-079	II-GC19-DEF-CREOLEFISH-SVHC-A	95A0328	25.32	19.7	AY-S-72PB	9/18/95	10/1/95
SVT-080	II-GC19-DEF-CREOLEFISH-SVHC-A	95A0328DUP	25.24	19.7	AY-S-72PB	9/18/95	10/1/95
SVT-081	II-GC19-DEF-CREOLEFISH-SVHC-B	95A0327	25.96	19.6	AY-S-72PB	9/18/95	10/1/95
SVT-082	II-GC19-DEF-CREOLEFISH-SVHC-B	95A0327DUP	25.26	19.6	AY-S-72PB	9/18/95	10/1/95
SVT-083	II-GC19-DEF-CREOLEFISH-SVHC-C	95A0329	25.28	19.2	AY-S-72PB	9/18/95	10/1/95
SVT-084	II-GC19-DEF-CREOLEFISH-SVHC-C	95A0329DUP	26.17	19.2	AY-S-72PB	9/18/95	10/1/95
SVT-085	II-GC19-DEF-TRIGGERFISH-SVHC-A	95A0326	25.41	20.6	AY-S-69PB	8/15/95	10/1/95
SVT-086	II-GC19-DEF-TRIGGERFISH-SVHC-A	95A0326DUP	26.30	20.6	AY-S-69PB	8/15/95	10/1/95
SVT-087	II-GC19-DEF-TRIGGERFISH-SVHC-B	95A0325	25.95	20.9	AY-S-69PB	8/14/95	9/30/95
SVT-088	II-GC19-DEF-TRIGGERFISH-SVHC-B	95A0325DUP	25.26	20.9	AY-S-69PB	8/14/95	10/1/95
SVT-089	II-GC19-DEF-TRIGGERFISH-SVHC-C	95A0320	26.03	20.4	AY-S-69PB	8/14/95	9/29/95
SVT-090	II-GC19-DEF-TRIGGERFISH-SVHC-C	95A0320DUP	25.15	20.4	AY-S-69PB	8/14/95	9/30/95
SVT-091	II-EI361-DEF-CHAMA-SVHC-A	95A0051 ALUM	25.65	11.0	AY-S-57PB ALUM	8/23/95	9/3/95
SVT-092	II-EI361-DEF-CHAMA-SVHC-A	95A0051DUP ALUM	25.69	11.0	AY-S-57PB ALUM	8/23/95	9/3/95
SVT-093	II-EI361-DEF-CHAMA-SVHC-B	95A0058 ALUM	26.07	13.9	AY-S-57PB ALUM	8/25/95	9/4/95
SVT-094	II-EI361-DEF-CHAMA-SVHC-B	95A0058DUP ALUM	25.24	13.9	AY-S-57PB ALUM	8/25/95	9/4/95
SVT-095	II-EI361-DEF-CHAMA-SVHC-C	95A0054 ALUM	26.11	14.0	AY-S-57PB ALUM	8/24/95	9/4/95
SVT-096	II-EI361-DEF-CHAMA-SVHC-C	95A0054DUP ALUM	26.33	14.0	AY-S-57PB ALUM	8/24/95	9/4/95
SVT-097	II-EI361-DEF-SPONDYLUS-SVHC-A	95A0063	26.22	17.6	AY-S-60PB	9/5/95	9/17/95
SVT-098	II-EI361-DEF-SPONDYLUS-SVHC-A	95A0063DUP	25.03	17.6	AY-S-60PB	9/5/95	9/17/95
SVT-099	II-EI361-DEF-SPONDYLUS-SVHC-B	95A0066	25.35	17.1	AY-S-60PB	9/6/95	9/16/95
SVT-100	II-EI361-DEF-SPONDYLUS-SVHC-B	95A0066DUP	25.57	17.1	AY-S-60PB	9/6/95	9/16/95
SVT-101	II-EI361-DEF-SPONDYLUS-SVHC-C	95A0062	25.76	16.0	AY-S-60PB	9/5/95	9/17/95
SVT-102	II-EI361-DEF-SPONDYLUS-SVHC-C	95A0062DUP	26.65	16.0	AY-S-60PB	9/5/95	9/17/95
SVT-103	II-EI361-DEF-CHUB-SVHC-A	95A0170	25.42	23.9	AY-S-66PB	9/12/95	9/25/95
SVT-104	II-EI361-DEF-CHUB-SVHC-A	95A0170DUP	26.06	23.9	AY-S-66PB	9/12/95	9/25/95
SVT-105	II-EI361-DEF-CHUB-SVHC-B	95A0168	25.83	26.1	AY-S-63PB	9/8/95	9/18/95
SVT-106	II-EI361-DEF-CHUB-SVHC-B	95A0168DUP	25.19	26.1	AY-S-63PB	9/8/95	9/18/95
SVT-107	II-EI361-DEF-CHUB-SVHC-C	95A0166	25.83	24.1	AY-S-63PB	9/8/95	9/18/95
SVT-108	II-EI361-DEF-CHUB-SVHC-C	95A0166DUP	25.78	24.1	AY-S-63PB	9/8/95	9/18/95
SVT-109	II-EI361-DEF-CREOLEFISH-SVHC-A	95A0169	26.59	19.0	AY-S-63PB	9/11/95	9/18/95

Table D-225. (Continued).

Sample ID	Field ID	Lab ID	Sample Size (g wet weight)	Percent Dry Wt	Associated Blank	Extract Date	Analysis Date
SVT-110	II-EI361-DEF-CREOLEFISH-SVHC-A	95A0169DUP	25.90	19.0	AY-S-63PB	9/11/95	9/18/95
SVT-111	II-EI361-DEF-CREOLEFISH-SVHC-B	95A0167	26.26	20.3	AY-S-63PB	9/8/95	9/18/95
SVT-112	II-EI361-DEF-CREOLEFISH-SVHC-B	95A0167DUP	25.19	20.3	AY-S-63PB	9/8/95	9/18/95
SVT-113	II-EI361-DEF-CREOLEFISH-SVHC-C	95A0318	26.18	19.6	AY-S-69PB	8/13/95	9/29/95
SVT-114	II-EI361-DEF-CREOLEFISH-SVHC-C	95A0318DUP	25.26	19.6	AY-S-69PB	8/13/95	9/29/95
SVT-115	II-EI361-DEF-TRIGGERFISH-SVHC-A	95A0322	26.19	20.5	AY-S-69PB	8/14/95	9/30/95
SVT-116	II-EI361-DEF-TRIGGERFISH-SVHC-A	95A0322DUP	26.72	20.5	AY-S-69PB	8/14/95	9/30/95
SVT-117	II-EI361-DEF-TRIGGERFISH-SVHC-B	95A0319	25.00	20.6	AY-S-69PB	8/13/95	9/29/95
SVT-118	II-EI361-DEF-TRIGGERFISH-SVHC-B	95A0319DUP	25.20	20.6	AY-S-69PB	8/13/95	9/29/95
SVT-119	II-EI361-DEF-TRIGGERFISH-SVHC-C	95A0331	25.43	19.8	AY-S-72PB	9/19/95	10/1/95
SVT-120	II-EI361-DEF-TRIGGERFISH-SVHC-C	95A0331DUP	25.30	19.8	AY-S-72PB	9/19/95	10/2/95
SVT-121	III-EB165-DEF-CHAMA-SVHC-A	96B1153	23.84	11.7	BB-S-17PB	3/27/96	4/7/96
SVT-122	III-EB165-DEF-CHAMA-SVHC-A	96B1153DUP REF	24.49	11.7	BB-S-17PB	3/27/96	4/24/96
SVT-123	III-EB165-DEF-CHAMA-SVHC-B	96B1148	23.39	11.3	BB-S-17PB	3/27/96	4/6/96
SVT-124	III-EB165-DEF-CHAMA-SVHC-B	96B1148DUP	24.30	11.3	BB-S-17PB	3/27/96	4/6/96
SVT-125	III-EB165-DEF-CHAMA-SVHC-C	96B1146	23.36	12.2	BB-S-17PB	3/26/96	4/6/96
SVT-126	III-EB165-DEF-CHAMA-SVHC-C	96B1146DUP	24.26	12.2	BB-S-17PB	3/26/96	4/6/96
SVT-127	III-EB165-DEF-SPONDYLUS-SVHC-A	96B1138	25.50	16.3	BB-S-16PB	3/25/96	3/29/96
SVT-128	III-EB165-DEF-SPONDYLUS-SVHC-A	96B1138DUP	24.90	16.3	BB-S-16PB	3/25/96	3/29/96
SVT-129	III-EB165-DEF-SPONDYLUS-SVHC-B	96B1149	23.74	12.0	BB-S-17PB	3/27/96	4/6/96
SVT-130	III-EB165-DEF-SPONDYLUS-SVHC-B	96B1149DUP	24.27	12.0	BB-S-17PB	3/27/96	4/6/96
SVT-131	III-EB165-DEF-SPONDYLUS-SVHC-C	96B1133	24.80	14.0	BB-S-16PB	3/25/96	3/29/96
SVT-132	III-EB165-DEF-SPONDYLUS-SVHC-C	96B1133DUP RE	25.25	14.0	BB-S-17PB	3/27/96	4/7/96
SVT-133	III-EB165-DEF-CHUB-SVHC-A	96B0997	25.44	23.2	BB-S-21PB	4/5/96	4/16/96
SVT-134	III-EB165-DEF-CHUB-SVHC-A	96B0997DUP	24.61	23.2	BB-S-21PB	4/5/96	4/16/96
SVT-135	III-EB165-DEF-CHUB-SVHC-B	96B1012	25.14	23.4	BB-S-52PB	4/9/96	4/20/96
SVT-136	III-EB165-DEF-CHUB-SVHC-B	96B1012DUP	25.06	23.4	BB-S-52PB	4/9/96	4/20/96
SVT-137	III-EB165-DEF-CHUB-SVHC-C	96B0991	25.29	23.1	BB-S-21PB	4/5/96	4/16/96
SVT-138	III-EB165-DEF-CHUB-SVHC-C	96B0991DUP	25.24	23.1	BB-S-21PB	4/5/96	4/16/96
SVT-139	III-EB165-DEF-CREOLEFISH-SVHC-A	96B1005	24.80	20.3	BB-S-52PB	4/8/96	4/19/96
SVT-140	III-EB165-DEF-CREOLEFISH-SVHC-A	96B1005DUP	23.25	20.3	BB-S-52PB	4/8/96	4/19/96
SVT-141	III-EB165-DEF-CREOLEFISH-SVHC-B	96B1001	27.62	20.2	BB-S-21PB	4/8/96	4/17/96
SVT-142	III-EB165-DEF-CREOLEFISH-SVHC-B	96B1001DUPRE	5.18	20.2	BB-S-63PB	4/15/96	4/24/96
SVT-143	III-EB165-DEF-CREOLEFISH-SVHC-C	96B0778	26.98	20.1	BB-S-63PB	4/10/96	4/23/96
SVT-144	III-EB165-DEF-CREOLEFISH-SVHC-C	96B0778DUP	25.87	20.1	BB-S-63PB	4/10/96	4/23/96
SVT-145	III-EB165-DEF-SERGMAJOR-SVHC-A	96B1011	24.63	20.2	BB-S-52PB	4/9/96	4/19/96
SVT-146	III-EB165-DEF-SERGMAJOR-SVHC-A	96B1011DUP	24.90	20.2	BB-S-52PB	4/9/96	4/19/96

Table D-225. (Continued).

Sample ID	Field ID	Lab ID	Sample Size (g wet weight)	Percent Dry Wt	Associated Blank	Extract Date	Analysis Date
SVT-147	III-EB165-DEF-SERGMAJOR-SVHC-B	96B1010	24.89	21.2	BB-S-52PB	4/9/96	4/19/96
SVT-148	III-EB165-DEF-SERGMAJOR-SVHC-B	96B1010DUP	24.92	21.2	BB-S-52PB	4/9/96	4/19/96
SVT-149	III-EB165-DEF-SERGMAJOR-SVHC-C	96B1006DUPRE	22.70	20.2	BB-S-52PB	4/10/96	4/19/96
SVT-150	III-EB165-DEF-SERGMAJOR-SVHC-C	96B1006RE	25.11	20.2	BB-S-52PB	4/10/96	4/19/96
SVT-151	III-HI356-DEF-CHAMA-SVHC-A	96B1156	24.38	9.7	BB-S-63PB	4/11/96	4/23/96
SVT-152	III-HI356-DEF-CHAMA-SVHC-A	96B1156DUP	24.92	9.7	BB-S-63PB	4/11/96	4/23/96
SVT-153	III-HI356-DEF-CHAMA-SVHC-B	96B1137	24.60	12.0	BB-S-16PB	3/25/96	3/29/96
SVT-154	III-HI356-DEF-CHAMA-SVHC-B	96B1137DUP	25.00	12.0	BB-S-16PB	3/25/96	3/29/96
SVT-155	III-HI356-DEF-CHAMA-SVHC-C	96B1142	25.70	16.4	BB-S-16PB	3/25/96	3/29/96
SVT-156	III-HI356-DEF-CHAMA-SVHC-C	96B1142DUP	25.40	16.4	BB-S-16PB	3/25/96	3/30/96
SVT-157	III-HI356-DEF-SPONDYLUS-SVHC-A	96B1152	22.93	11.8	BB-S-17PB	3/27/96	4/7/96
SVT-158	III-HI356-DEF-SPONDYLUS-SVHC-A	96B1152DUP	24.41	11.8	BB-S-17PB	3/27/96	4/7/96
SVT-159	III-HI356-DEF-SPONDYLUS-SVHC-B	96B1151	23.42	14.7	BB-S-17PB	3/27/96	4/6/96
SVT-160	III-HI356-DEF-SPONDYLUS-SVHC-B	96B1151DUP	23.06	14.7	BB-S-17PB	3/27/96	4/6/96
SVT-161	III-HI356-DEF-SPONDYLUS-SVHC-C	96B1136	25.00	16.0	BB-S-16PB	3/25/96	3/29/96
SVT-162	III-HI356-DEF-SPONDYLUS-SVHC-C	96B1136DUP	24.40	16.0	BB-S-16PB	3/25/96	3/29/96
SVT-163	III-HI356-DEF-CHUB-SVHC-A	96B0998	24.53	22.2	BB-S-21PB	4/5/96	4/17/96
SVT-164	III-HI356-DEF-CHUB-SVHC-A	96B0998DUP	24.62	22.2	BB-S-21PB	4/5/96	4/17/96
SVT-165	III-HI356-DEF-CHUB-SVHC-B	96B0983	25.91	22.9	BB-S-20PB	3/28/96	4/12/96
SVT-166	III-HI356-DEF-CHUB-SVHC-B	96B0983DUP	24.94	22.9	BB-S-20PB	3/28/96	4/12/96
SVT-167	III-HI356-DEF-CHUB-SVHC-C	96B0980	25.50	22.2	BB-S-20PB	3/28/96	4/12/96
SVT-168	III-HI356-DEF-CHUB-SVHC-C	96B0980DUP	25.21	22.2	BB-S-20PB	3/28/96	4/12/96
SVT-169	III-HI356-DEF-CREOLEFISH-SVHC-A	96B0979	24.88	20.2	BB-S-20PB	3/28/96	4/12/96
SVT-170	III-HI356-DEF-CREOLEFISH-SVHC-A	96B0979DUP	25.91	20.2	BB-S-20PB	3/28/96	4/12/96
SVT-171	III-HI356-DEF-CREOLEFISH-SVHC-B	96B0978	26.49	20.4	BB-S-20PB	3/28/96	4/12/96
SVT-172	III-HI356-DEF-CREOLEFISH-SVHC-B	96B0978DUP	26.33	20.4	BB-S-20PB	3/28/96	4/12/96
SVT-173	III-HI356-DEF-CREOLEFISH-SVHC-C	96B1000	22.82	20.6	BB-S-21PB	4/8/96	4/17/96
SVT-174	III-HI356-DEF-CREOLEFISH-SVHC-C	96B1000DUP	22.30	20.6	BB-S-21PB	4/8/96	4/17/96
SVT-175	III-HI356-DEF-SERGMAJOR-SVHC-A	96B1007	25.88	21.4	BB-S-52PB	4/9/96	4/19/96
SVT-176	III-HI356-DEF-SERGMAJOR-SVHC-A	96B1007DUP	24.57	21.4	BB-S-52PB	4/9/96	4/19/96
SVT-177	III-HI356-DEF-SERGMAJOR-SVHC-B	96B1008	24.77	21.4	BB-S-52PB	4/9/96	4/19/96
SVT-178	III-HI356-DEF-SERGMAJOR-SVHC-B	96B1008DUP	24.62	21.4	BB-S-52PB	4/9/96	4/19/96
SVT-179	III-HI356-DEF-SERGMAJOR-SVHC-C	96B0779	25.30	22.9	BB-S-63PB	4/10/96	4/23/96
SVT-180	III-HI356-DEF-SERGMAJOR-SVHC-C	96B0779DUP	24.54	22.9	BB-S-63PB	4/10/96	4/23/96
SVT-181	III-GC19-DEF-CHAMA-SVHC-A	96B1154	23.42	16.1	BB-S-63PB	4/11/96	4/23/96
SVT-182	III-GC19-DEF-CHAMA-SVHC-A	96B1154DUP	23.93	16.1	BB-S-63PB	4/11/96	4/23/96
SVT-183	III-GC19-DEF-CHAMA-SVHC-B	96B1141	25.50	13.9	BB-S-16PB	3/25/96	3/29/96

Table D-225. (Continued).

Sample ID	Field ID	Lab ID	Sample Size (g wet weight)	Percent Dry Wt	Associated Blank	Extract Date	Analysis Date
SVT-184	III-GC19-DEF-CHAMA-SVHC-B	96B1141DUP	25.40	13.9	BB-S-16PB	3/25/96	3/29/96
SVT-185	III-GC19-DEF-CHAMA-SVHC-C	96B1145	23.28	15.7	BB-S-17PB	3/26/96	4/6/96
SVT-186	III-GC19-DEF-CHAMA-SVHC-C	96B1145DUP	24.00	15.7	BB-S-17PB	3/26/96	4/6/96
SVT-187	III-GC19-DEF-SPONDYLUS-SVHC-A	96B1147	24.89	15.7	BB-S-17PB	3/26/96	4/6/96
SVT-188	III-GC19-DEF-SPONDYLUS-SVHC-A	96B1147DUP	24.64	15.7	BB-S-17PB	3/26/96	4/6/96
SVT-189	III-GC19-DEF-SPONDYLUS-SVHC-B	96B1139	25.80	16.9	BB-S-16PB	3/25/96	3/29/96
SVT-190	III-GC19-DEF-SPONDYLUS-SVHC-B	96B1139DUP	25.70	16.9	BB-S-16PB	3/25/96	3/29/96
SVT-191	III-GC19-DEF-SPONDYLUS-SVHC-C	96B1140	25.40	16.6	BB-S-16PB	3/25/96	3/29/96
SVT-192	III-GC19-DEF-SPONDYLUS-SVHC-C	96B1140DUP	26.20	16.6	BB-S-16PB	3/25/96	3/29/96
SVT-193	III-GC19-DEF-CHUB-SVHC-A	96B0987	24.66	25.9	BB-S-20PB	3/28/96	4/13/96
SVT-194	III-GC19-DEF-CHUB-SVHC-A	96B0987DUP	24.47	25.9	BB-S-20PB	3/28/96	4/13/96
SVT-195	III-GC19-DEF-CHUB-SVHC-B	96B1242	26.92	24.3	BB-S-63PB	4/10/96	4/23/96
SVT-196	III-GC19-DEF-CHUB-SVHC-B	96B1242DUP	26.41	24.3	BB-S-63PB	4/10/96	4/23/96
SVT-197	III-GC19-DEF-CHUB-SVHC-C	96B0994	25.60	23.2	BB-S-21PB	4/5/96	4/16/96
SVT-198	III-GC19-DEF-CHUB-SVHC-C	96B0994DUP	25.35	23.2	BB-S-21PB	4/5/96	4/16/96
SVT-199	III-GC19-DEF-CREOLEFISH-SVHC-A	96B0992	25.46	19.5	BB-S-21PB	4/5/96	4/16/96
SVT-200	III-GC19-DEF-CREOLEFISH-SVHC-A	96B0992DUP	26.55	19.5	BB-S-21PB	4/5/96	4/16/96
SVT-201	III-GC19-DEF-CREOLEFISH-SVHC-B	96B0996	26.82	19.7	BB-S-21PB	4/5/96	4/16/96
SVT-202	III-GC19-DEF-CREOLEFISH-SVHC-B	96B0996DUP	25.21	19.7	BB-S-21PB	4/5/96	4/16/96
SVT-203	III-GC19-DEF-CREOLEFISH-SVHC-C	96B0989	24.39	19.6	BB-S-20PB	4/2/96	4/13/96
SVT-204	III-GC19-DEF-CREOLEFISH-SVHC-C	96B0989DUPRE	25.20	19.6	BB-S-20PB	4/2/96	4/13/96
SVT-205	III-GC19-DEF-TRIGGERFISH-SVHC-A	96B0985	25.59	20.1	BB-S-20PB	3/28/96	4/12/96
SVT-206	III-GC19-DEF-TRIGGERFISH-SVHC-A	96B0985DUP	25.27	20.1	BB-S-20PB	3/28/96	4/12/96
SVT-207	III-GC19-DEF-TRIGGERFISH-SVHC-B	96B0990	5.25	20.6	BB-S-63PB	4/11/96	4/24/96
SVT-208	III-GC19-DEF-TRIGGERFISH-SVHC-B	96B0990DUP	24.74	20.6	BB-S-63PB	4/11/96	4/24/96
SVT-209	III-GC19-DEF-TRIGGERFISH-SVHC-C	96B0993	24.64	20.0	BB-S-21PB	4/5/96	4/16/96
SVT-210	III-GC19-DEF-TRIGGERFISH-SVHC-C	96B0993DUP	25.23	20.0	BB-S-21PB	4/5/96	4/16/96
SVT-211	III-EI361-DEF-CHAMA-SVHC-A	96B1135	25.10	12.7	BB-S-16PB	3/25/96	3/29/96
SVT-212	III-EI361-DEF-CHAMA-SVHC-A	96B1135DUP	25.00	12.7	BB-S-16PB	3/25/96	3/29/96
SVT-213	III-EI361-DEF-CHAMA-SVHC-B	96B1134	25.00	11.7	BB-S-16PB	3/25/96	3/29/96
SVT-214	III-EI361-DEF-CHAMA-SVHC-B	96B1134DUP RE	25.15	11.7	BB-S-17PB	3/27/96	4/7/96
SVT-215	III-EI361-DEF-CHAMA-SVHC-C	96B1155	26.14	9.8	BB-S-63PB	4/11/96	4/23/96
SVT-216	III-EI361-DEF-CHAMA-SVHC-C	96B1155DUP	25.92	9.8	BB-S-63PB	4/11/96	4/23/96
SVT-217	III-EI361-DEF-SPONDYLUS-SVHC-A	96B1143	25.00	15.5	BB-S-16PB	3/26/96	3/30/96
SVT-218	III-EI361-DEF-SPONDYLUS-SVHC-A	96B1143DUP	25.90	15.5	BB-S-16PB	3/26/96	3/30/96
SVT-219	III-EI361-DEF-SPONDYLUS-SVHC-B	96B1150	23.50	16.0	BB-S-17PB	3/27/96	4/6/96
SVT-220	III-EI361-DEF-SPONDYLUS-SVHC-B	96B1150DUP	23.93	16.0	BB-S-17PB	3/27/96	4/6/96

Table D-225. (Continued).

Sample ID	Field ID	Lab ID	Sample Size (g wet weight)	Percent Dry Wt	Associated Blank	Extract Date	Analysis Date
SVT-221	III-EI361-DEF-SPONDYLUS-SVHC-C	96B1144	19.60	15.7	BB-S-17PB	3/26/96	4/6/96
SVT-222	III-EI361-DEF-SPONDYLUS-SVHC-C	96B1144DUP	17.80	15.7	BB-S-17PB	3/26/96	4/6/96
SVT-223	III-EI361-DEF-CHUB-SVHC-A	96B1003	27.19	23.9	BB-S-52PB	4/8/96	4/19/96
SVT-224	III-EI361-DEF-CHUB-SVHC-A	96B1003DUP	24.76	23.9	BB-S-52PB	4/8/96	4/19/96
SVT-225	III-EI361-DEF-CHUB-SVHC-B	96B0984	25.93	25.0	BB-S-20PB	3/28/96	4/12/96
SVT-226	III-EI361-DEF-CHUB-SVHC-B	96B0984DUP	26.14	25.0	BB-S-20PB	3/28/96	4/12/96
SVT-227	III-EI361-DEF-CHUB-SVHC-C	96B0995	26.17	24.8	BB-S-21PB	4/5/96	4/16/96
SVT-228	III-EI361-DEF-CHUB-SVHC-C	96B0995DUP	24.66	24.8	BB-S-21PB	4/5/96	4/16/96
SVT-229	III-EI361-DEF-CREOLEFISH-SVHC-A	96B0988	24.86	20.6	BB-S-20PB	4/2/96	4/13/96
SVT-230	III-EI361-DEF-CREOLEFISH-SVHC-A	96B0988DUP	25.02	20.6	BB-S-20PB	4/2/96	4/13/96
SVT-231	III-EI361-DEF-CREOLEFISH-SVHC-B	96B1009	24.77	20.5	BB-S-52PB	4/9/96	4/19/96
SVT-232	III-EI361-DEF-CREOLEFISH-SVHC-B	96B1009DUP	24.83	20.5	BB-S-52PB	4/9/96	4/19/96
SVT-233	III-EI361-DEF-CREOLEFISH-SVHC-C	96B1241	25.27	20.4	BB-S-63PB	4/10/96	4/23/96
SVT-234	III-EI361-DEF-CREOLEFISH-SVHC-C	96B1241DUP	25.31	20.4	BB-S-63PB	4/10/96	4/23/96
SVT-235	III-EI361-DEF-TRIGGERFISH-SVHC-A	96B0986	24.65	20.7	BB-S-20PB	3/28/96	4/12/96
SVT-236	III-EI361-DEF-TRIGGERFISH-SVHC-A	96B0986DUP	24.66	20.7	BB-S-20PB	3/28/96	4/13/96
SVT-237	III-EI361-DEF-TRIGGERFISH-SVHC-B	96B1004	21.98	20.9	BB-S-52PB	4/8/96	4/19/96
SVT-238	III-EI361-DEF-TRIGGERFISH-SVHC-B	96B1004DUP	22.37	20.9	BB-S-52PB	4/8/96	4/19/96
SVT-239	III-EI361-DEF-TRIGGERFISH-SVHC-C	96B1002	25.45	21.1	BB-S-63PB	4/15/96	4/24/96
SVT-240	III-EI361-DEF-TRIGGERFISH-SVHC-C	96B1002DUP	24.55	21.1	BB-S-63PB	4/15/96	4/24/96

Table D-226. Surrogate recoveries for semivolatile organic compound analysis of tissue samples.

Sample ID	Surrogate Recoveries (%)					
	d6-Phenol	d8-Naphthalene	d10-Fluorene	d10-Phenanthrene	d4-Bis(2-ethylhexyl)phthalate	d12-Benzo[a]pyrene
SVT-001	66	79	80	76	86	94
SVT-002	61	64	78	75	84	89
SVT-003	179	68	84	85	121	73
SVT-004	182	77	90	92	115	73
SVT-005	203	87	99	103	123	81
SVT-006	130	80	85	88	97	67
SVT-007	83	85	95	97	119	81
SVT-008	88	87	96	97	122	82
SVT-009	128	106	108	100	131	95
SVT-010	106	97	100	95	135	91
SVT-011	107	102	106	101	149	98
SVT-012	84	91	100	96	138	87
SVT-013	56	85	80	78	103	58
SVT-014	63	93	85	80	114	63
SVT-015	64	82	82	80	116	77
SVT-016	58	86	84	82	112	69
SVT-017	82	104	106	104	135	89
SVT-018	78	101	96	96	122	79
SVT-019	40	82	86	90	108	73
SVT-020	52	102	94	93	119	85
SVT-021	68	105	104	99	124	91
SVT-022	58	94	95	98	119	85
SVT-023	49	91	85	80	104	79
SVT-024	64	131	124	120	153	111
SVT-025	73	76	80	78	64	76
SVT-026	77	66	71	68	111	59
SVT-027	37	89	83	88	104	69
SVT-028	58	109	96	99	127	84
SVT-029	48	56	60	57	102	62
SVT-030	20	22	26	24	43	28
SVT-031	70	76	79	77	82	95
SVT-032	67	74	79	80	81	81
SVT-033	115	105	109	101	112	120
SVT-034	82	79	86	86	83	87

Table D-226. (Continued).

Sample ID	Surrogate Recoveries (%)					
	d6-Phenol	d8-Naphthalene	d10-Fluorene	d10-Phenanthrene	d4-Bis(2-ethylhexyl)phthalate	d12-Benzo[a]pyrene
SVT-035	37	71	82	84	83	89
SVT-036	56	75	77	74	60	66
SVT-037	87	89	96	96	118	89
SVT-038	89	101	103	99	129	92
SVT-039	67	79	85	88	103	74
SVT-040	67	80	87	86	112	87
SVT-041	68	74	85	87	89	76
SVT-042	106	97	102	100	111	87
SVT-043	97	76	86	79	63	65
SVT-044	53	70	76	70	55	55
SVT-045	59	80	75	68	54	45
SVT-046	53	67	66	60	42	42
SVT-047	91	95	91	89	119	68
SVT-048	79	91	89	87	113	65
SVT-049	98	116	133	129	95	95
SVT-050	72	88	97	92	74	73
SVT-051	29	90	88	79	58	64
SVT-052	74	75	72	65	54	54
SVT-053	107	120	100	102	143	96
SVT-054	107	119	100	100	149	99
SVT-055	53	113	103	104	143	97
SVT-056	62	105	93	93	124	85
SVT-057	70	73	85	80	62	75
SVT-058	33	19	32	32	50	34
SVT-059	32	116	98	99	137	89
SVT-060	42	115	96	98	138	93
SVT-061	48	75	89	87	89	99
SVT-062	69	82	88	88	92	96
SVT-063	40	28	38	38	35	40
SVT-064	60	75	91	92	88	99
SVT-065	47	61	80	79	77	83
SVT-066	44	66	79	76	76	87
SVT-067	88	82	95	95	116	83
SVT-068	85	73	82	81	109	72
SVT-069	83	78	95	89	123	76
SVT-070	38	31	36	36	50	32

Table D-226. (Continued).

Sample ID	Surrogate Recoveries (%)					
	d6-Phenol	d8-Naphthalene	d10-Fluorene	d10-Phenanthrene	d4-Bis(2-ethylhexyl)phthalate	d12-Benzo[a]pyrene
SVT-071	32	27	30	31	37	25
SVT-072	74	74	80	82	103	66
SVT-073	59	95	96	88	69	71
SVT-074	8.1	84	80	74	54	59
SVT-075	111	99	95	88	65	70
SVT-076	57	84	82	77	56	60
SVT-077	67	74	78	73	52	59
SVT-078	48	91	88	79	64	65
SVT-079	22	102	108	99	74	92
SVT-080		99	99	94	78	86
SVT-081	30	82	83	76	57	76
SVT-082	40	110	106	100	82	105
SVT-083	11	96	95	90	84	84
SVT-084	53	102	104	98	71	94
SVT-085	87	69	86	87	86	88
SVT-086	73	73	81	80	122	78
SVT-087	74	64	83	88	129	83
SVT-088	90	67	78	77	123	81
SVT-089	47	61	74	74	120	81
SVT-090	106	74	93	88	134	89
SVT-091	51	74	82	80	81	88
SVT-092	56	62	77	75	78	90
SVT-093	73	74	82	82	80	79
SVT-094	72	71	76	76	76	72
SVT-095	42	64	78	76	73	92
SVT-096	44	66	76	76	70	81
SVT-097	90	77	83	80	117	72
SVT-098	94	88	98	99	138	82
SVT-099	101	92	105	100	131	82
SVT-100	104	113	98	94	117	93
SVT-101	70	74	80	81	107	78
SVT-102	77	89	93	91	131	91
SVT-103	39	78	91	85	101	68
SVT-104	32	61	71	69	84	53
SVT-105	90	63	61	59	68	36
SVT-106	61	50	49	45	61	35

Table D-226. (Continued).

Sample ID	Surrogate Recoveries (%)					
	d6-Phenol	d8-Naphthalene	d10-Fluorene	d10-Phenanthrene	d4-Bis(2-ethylhexyl)phthalate	d12-Benzo[a]pyrene
SVT-107	86	58	58	53	82	41
SVT-108	100	76	73	71	95	48
SVT-109	66	74	79	82	92	66
SVT-110	64	65	74	76	78	56
SVT-111	102	91	96	97	121	84
SVT-112	93	89	96	95	110	89
SVT-113	64	70	76	74	119	71
SVT-114	62	65	77	74	130	80
SVT-115	71	58	78	80	75	78
SVT-116	84	62	81	82	78	91
SVT-117	86	62	87	86	146	87
SVT-118	92	70	90	92	132	85
SVT-119	26	97	99	98	108	93
SVT-120	57	93	95	89	75	86
SVT-121	56	67	73	72	128	70
SVT-122	44	56	70	69	90	63
SVT-123	53	77	87	85	139	75
SVT-124	40	64	73	72	116	64
SVT-125	43	61	76	73	107	72
SVT-126	49	66	75	74	113	72
SVT-127	64	57	78	77	96	80
SVT-128	58	72	85	83	106	79
SVT-129	53	68	80	83	132	81
SVT-130	58	47	63	65	108	64
SVT-131	60	60	73	74	92	76
SVT-132	47	60	65	64	113	61
SVT-133	42	70	68	65	98	51
SVT-134	35	71	68	64	95	48
SVT-135	53	86	88	82	120	63
SVT-136	44	72	69	62	96	46
SVT-137	34	56	64	61	70	52
SVT-138	41	67	73	70	81	60
SVT-139	44	67	71	71	95	68
SVT-140	52	76	76	75	96	71
SVT-141	24	77	74	71	97	65
SVT-142	73	93	103	102	120	87

Table D-226. (Continued).

Sample ID	Surrogate Recoveries (%)					
	d6-Phenol	d8-Naphthalene	d10-Fluorene	d10-Phenanthrene	d4-Bis(2-ethylhexyl)phthalate	d12-Benzo[a]pyrene
SVT-143	70	71	79	79	93	71
SVT-144	73	80	88	87	101	76
SVT-145	46	78	78	75	106	65
SVT-146	40	62	68	65	95	56
SVT-147	43	97	89	80	110	60
SVT-148	40	76	74	69	106	60
SVT-149	39	77	80	76	99	69
SVT-150	46	79	81	77	101	70
SVT-151	58	66	75	71	100	67
SVT-152	74	71	76	76	107	72
SVT-153	67	71	85	83	95	81
SVT-154	63	67	80	78	90	73
SVT-155	88	62	71	72	80	73
SVT-156	73	72	80	79	92	82
SVT-157	47	70	77	78	128	76
SVT-158	51	69	72	71	122	71
SVT-159	59	63	74	75	125	72
SVT-160	58	64	67	72	101	70
SVT-161	52	63	84	85	107	85
SVT-162	71	60	84	84	100	82
SVT-163	46	70	70	66	97	58
SVT-164	45	86	86	83	118	74
SVT-165	89	58	63	59	88	52
SVT-166	84	64	69	66	96	54
SVT-167	86	64	74	71	103	62
SVT-168	101	62	73	70	100	61
SVT-169	61	64	73	70	97	72
SVT-170	44	61	76	71	103	71
SVT-171	80	68	77	72	102	71
SVT-172	60	65	74	69	101	70
SVT-173	34	79	77	75	104	67
SVT-174	31	74	74	72	91	66
SVT-175	28	87	79	75	104	63
SVT-176	39	83	82	76	111	65
SVT-177	32	68	71	67	95	60
SVT-178	37	76	80	74	107	66

Table D-226. (Continued).

Sample ID	Surrogate Recoveries (%)					
	d6-Phenol	d8-Naphthalene	d10-Fluorene	d10-Phenanthrene	d4-Bis(2-ethylhexyl)phthalate	d12-Benzo[a]pyrene
SVT-179	65	79	75	69	97	60
SVT-180	58	77	74	70	95	61
SVT-181	106	68	77	72	103	70
SVT-182	118	63	72	71	93	64
SVT-183	48	68	78	76	86	78
SVT-184	66	85	98	96	112	97
SVT-185	45	64	79	77	114	77
SVT-186	47	52	73	73	109	73
SVT-187	50	67	74	74	122	72
SVT-188	48	62	70	69	113	69
SVT-189	67	89	102	98	124	92
SVT-190	47	69	80	79	103	80
SVT-191	74	97	111	108	125	106
SVT-192	50	72	84	82	91	87
SVT-193	92	58	62	58	82	42
SVT-194	71	72	75	65	100	46
SVT-195	62	63	59	54	82	40
SVT-196	43	55	55	50	74	40
SVT-197	45	53	57	53	68	45
SVT-198	36	65	69	65	87	56
SVT-199	79	58	63	64	69	59
SVT-200	85	58	63	62	75	60
SVT-201	42	75	72	71	99	63
SVT-202	34	68	67	65	94	58
SVT-203	99	61	66	77	74	70
SVT-204	104	58	76	80	87	74
SVT-205	87	69	83	83	108	74
SVT-206	56	60	73	75	96	69
SVT-207	81	76	85	82	III	73
SVT-208	76	69	84	84	101	75
SVT-209	82	72	80	78	89	68
SVT-210	83	81	85	83	95	77
SVT-211	82	65	83	82	98	77
SVT-212	83	70	89	86	104	82
SVT-213	58	66	84	82	91	75
SVT-214	58	77	79	78	118	70

Table D-226. (Continued).

Sample ID	Surrogate Recoveries (%)					
	d6-Phenol	d8-Naphthalene	d10-Fluorene	d10-Phenanthrene	d4-Bis(2-ethylhexyl)phthalate	d12-Benzo[a]pyrene
SVT-215	89	61	69	68	98	64
SVT-216	70	76	89	89	120	79
SVT-217	78	67	80	81	97	83
SVT-218	75	97	110	108	124	116
SVT-219	55	74	73	72	126	72
SVT-220	59	68	71	71	121	69
SVT-221	53	67	78	81	104	82
SVT-222	45	62	77	79	108	82
SVT-223	35	64	63	61	80	49
SVT-224	51	74	71	67	93	52
SVT-225	125	70	72	66	103	49
SVT-226	77	55	65	58	89	47
SVT-227	103	45	58	55	81	46
SVT-228	103	97	95	87	125	58
SVT-229	44	65	74	69	94	61
SVT-230	56	84	105	100	123	91
SVT-231	46	66	65	62	90	53
SVT-232	34	67	68	63	88	49
SVT-233	61	68	74	71	97	65
SVT-234	60	66	71	68	90	63
SVT-235	87	56	77	77	92	68
SVT-236	67	58	75	76	90	68
SVT-237	46	77	78	77	97	69
SVT-238	50	75	75	76	96	68
SVT-239	101	83	96	95	118	75
SVT-240	91	71	82	80	99	71

Table D-227. Results of semivolatile organic compound analysis of procedural blanks for tissue samples.

Lab ID	AY-S-57PB ALUM	AY-S-60PB	AY-S-63PB	AY-S-66PB	AY-S-69PB
Extract Date	08/25/95	09/06/95	09/11/95	09/13/95	08/15/95
Analysis Date	09/03/95	09/16/95	09/17/95	09/25/95	09/29/95
Phenol (ng/g)	9.8	ND	ND	ND	ND
Naphthalene (ng/g)	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g)	ND	ND	ND	ND	ND
1-Methylnaphthalene (ng/g)	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g)	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g)	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g)	ND	ND	ND	ND	ND
C_2-Naphthalenes (ng/g)	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g)	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g)	ND	ND	ND	ND	ND
Acenaphthylene (ng/g)	ND	ND	ND	ND	ND
Acenaphthene (ng/g)	ND	ND	ND	ND	ND
Biphenyl (ng/g)	ND	ND	ND	ND	ND
Fluorene (ng/g)	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g)	1.6	ND	ND	ND	ND
C_2-Fluorenes (ng/g)	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g)	ND	ND	ND	ND	ND
Anthracene (ng/g)	ND	ND	ND	ND	ND
Phenanthrene (ng/g)	ND	ND	ND	ND	ND
1-Methylphenanthrene (ng/g)	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g)	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g)	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g)	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g)	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g)	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g)	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g)	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g)	ND	ND	ND	ND	ND
Fluoranthene (ng/g)	ND	ND	ND	ND	ND
Pyrene (ng/g)	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g)	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g)	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g)	ND	ND	ND	ND	ND
Chrysene (ng/g)	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g)	ND	ND	ND	ND	ND

Table D-227. (Continued).

C_2-Chrysenes (ng/g)	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g)	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g)	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g)	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g)	ND	ND	ND	ND	ND
Bis(ethylhexyl)phthalate (ng/g)	ND	ND	67 J	ND	ND
Benzo[e]pyrene (ng/g)	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g)	ND	ND	ND	ND	ND
Perylene (ng/g)	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g)	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g)	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g)	ND	ND	ND	ND	ND
Surrogate Recovery (%)					
d6-Phenol	23	64		59	65
d8-Naphthalene	24 &	60	93	81	51
d10-Fluorene	43	73	99	88	81
d10-Phenanthrene	54	83	104	93	89
d4-Bis(2-ethylhexyl)phthalate	72	104	172 &	110	105
d12-Benzo[a]pyrene	71	84	100	99	102

Lab ID	AY-S-72PB	BB-S-16PB	BB-S-17PB	BB-S-20PB	BB-S-21PB
Extract Date	09/19/95	03/25/96	03/27/96	04/02/96	4/5/96
Analysis Date	10/01/95	03/29/96	04/07/96	04/20/96	4/16/96
Phenol (ng/g)	ND	ND	9.4 J	ND	ND
Naphthalene (ng/g)	ND	ND	ND	ND	ND
2-Methylnaphthalene (ng/g)	ND	ND	ND	ND	ND
1-Methylnaphthalene (ng/g)	ND	ND	ND	ND	ND
2,6-Dimethylnaphthalene (ng/g)	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene (ng/g)	ND	ND	ND	ND	ND
C_1-Naphthalenes (ng/g)	ND	ND	ND	ND	ND
C_2-Naphthalenes (ng/g)	ND	ND	ND	ND	ND
C_3-Naphthalenes (ng/g)	ND	ND	ND	ND	ND
C_4-Naphthalenes (ng/g)	ND	ND	ND	ND	ND
Acenaphthylene (ng/g)	ND	ND	ND	ND	ND
Acenaphthene (ng/g)	ND	ND	ND	ND	ND
Biphenyl (ng/g)	ND	ND	0.87 J	ND	ND
Fluorene (ng/g)	ND	ND	ND	ND	ND
C_1-Fluorenes (ng/g)	ND	ND	ND	ND	ND

Table D-227. (Continued).

C_2-Fluorenes (ng/g)	ND	ND	ND	ND	ND
C_3-Fluorenes (ng/g)	ND	ND	ND	ND	ND
Anthracene (ng/g)	ND	ND	ND	ND	ND
Phenanthrene (ng/g)	ND	1 J	ND	ND	ND
1-Methylphenanthrene (ng/g)	ND	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g)	ND	ND	ND	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g)	ND	ND	ND	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g)	ND	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g)	ND	ND	ND	ND	ND
Dibenzothiophene (ng/g)	ND	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/g)	ND	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g)	ND	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g)	ND	ND	ND	ND	ND
Fluoranthene (ng/g)	ND	ND	ND	ND	ND
Pyrene (ng/g)	ND	ND	ND	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g)	ND	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g)	ND	ND	ND	ND	ND
Benzo[a]anthracene (ng/g)	ND	ND	ND	ND	ND
Chrysene (ng/g)	ND	ND	ND	ND	ND
C_1-Chrysenes (ng/g)	ND	ND	ND	ND	ND
C_2-Chrysenes (ng/g)	ND	ND	ND	ND	ND
C_3-Chrysenes (ng/g)	ND	ND	ND	ND	ND
C_4-Chrysenes (ng/g)	ND	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g)	ND	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/g)	ND	ND	ND	ND	ND
Bis(ethylhexyl)phthalate (ng/g)	ND	ND	54 J	ND	ND
Benzo[e]pyrene (ng/g)	ND	ND	ND	ND	ND
Benzo[a]pyrene (ng/g)	ND	ND	ND	ND	ND
Perylene (ng/g)	ND	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g)	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/g)	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/g)	ND	ND	ND	ND	ND
Surrogate Recovery (%)					
d6-Phenol	65	54	32	54	41
d8-Naphthalene	85	53	46	37	39
d10-Fluorene	95	67	55	46	49
d10-Phenanthrene	98	68	61	48	53
d4-Bis(2-ethylhexyl)phthalate	89	90	118	61	72
d12-Benzo[a]pyrene	110	65	62	30 &	56

Table D-227. (Continued).

Lab ID	BB-S-52PB	BB-S-63PB
Extract Date	04/10/96	04/15/96
Analysis Date	04/18/96	04/23/96
Phenol (ng/g)	ND	ND
Naphthalene (ng/g)	ND	ND
2-Methylnaphthalene (ng/g)	ND	ND
1-Methylnaphthalene (ng/g)	ND	ND
2,6-Dimethylnaphthalene (ng/g)	ND	ND
2,3,5-Trimethylnaphthalene (ng/g)	ND	ND
C_1-Naphthalenes (ng/g)	ND	ND
C_2-Naphthalenes (ng/g)	ND	ND
C_3-Naphthalenes (ng/g)	ND	ND
C_4-Naphthalenes (ng/g)	ND	ND
Acenaphthylene (ng/g)	ND	ND
Acenaphthene (ng/g)	ND	ND
Biphenyl (ng/g)	1.9 J	ND
Fluorene (ng/g)	ND	ND
C_1-Fluorenes (ng/g)	ND	ND
C_2-Fluorenes (ng/g)	ND	ND
C_3-Fluorenes (ng/g)	ND	ND
Anthracene (ng/g)	ND	ND
Phenanthrene (ng/g)	ND	ND
1-Methylphenanthrene (ng/g)	ND	ND
C_1-Phenanthrenes/anthracenes (ng/g)	ND	ND
C_2-Phenanthrenes/anthracenes (ng/g)	ND	ND
C_3-Phenanthrenes/anthracenes (ng/g)	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g)	ND	ND
Dibenzothiophene (ng/g)	ND	ND
C_1-Dibenzothiophenes (ng/g)	ND	ND
C_2-Dibenzothiophenes (ng/g)	ND	ND
C_3-Dibenzothiophenes (ng/g)	ND	ND
Fluoranthene (ng/g)	ND	ND
Pyrene (ng/g)	ND	ND
C_1-Fluoranthenes/pyrenes (ng/g)	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g)	ND	ND
Benzo[a]anthracene (ng/g)	ND	ND
Chrysene (ng/g)	ND	ND
C_1-Chrysenes (ng/g)	ND	ND
C_2-Chrysenes (ng/g)	ND	ND

Table D-227. (Continued).

C_3-Chrysenes (ng/g)	ND	ND
C_4-Chrysenes (ng/g)	ND	ND
Benzo[b]fluoranthene (ng/g)	ND	ND
Benzo[k]fluoranthene (ng/g)	ND	ND
Bis(ethylhexyl)phthalate (ng/g)	ND	ND
Benzo[e]pyrene (ng/g)	ND	ND
Benzo[a]pyrene (ng/g)	ND	ND
Perylene (ng/g)	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/g)	ND	ND
Dibenzo[a,h]anthracene (ng/g)	ND	ND
Benzo[g,h,i]perylene (ng/g)	ND	ND
Surrogate Recovery (%)		
d6-Phenol	37	49
d8-Naphthalene	49	54
d10-Fluorene	55	58
d10-Phenanthrene	59	63
d4-Bis(2-ethylhexyl)phthalate	86	93
d12-Benzo[a]pyrene	60	65

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.
& = Result outside quality control surrogate recovery criteria.

Table D-228. Results of semivolatile organic compound analysis of matrix spike and matrix spike duplicate samples.

Lab ID	AX-S-29ms	AV-S-64 MS	AV-S-67MS RE	AV-S-70 MS
Associated Blank	AX-S-28pb	AV-S-63PB	AV-S-66PB RE	AV-S-69PB
Phenol (ng/g)	118	119	187	37
Naphthalene (ng/g)	80	45	54	17 &
2-Methylnaphthalene (ng/g)	91	53	57	37 &
1-Methylnaphthalene (ng/g)	94	50	58	37 &
2,6-Dimethylnaphthalene (ng/g)	96	63	58	50
2,3,5-Trimethylnaphthalene (ng/g)	96	66	65	58
C_1-Naphthalenes (ng/g)		ND		ND
C_2-Naphthalenes (ng/g)		ND		ND
C_3-Naphthalenes (ng/g)		ND	ND	ND
C_4-Naphthalenes (ng/g)	ND	ND	ND	ND
Acenaphthylene (ng/g)	99	66	60	53
Acenaphthene (ng/g)	96	64	61	52
Biphenyl (ng/g)	95	61	60	45
Fluorene (ng/g)	97	71	64	63
C_1-Fluorenes (ng/g)				
C_2-Fluorenes (ng/g)	ND	ND	ND	ND
C_3-Fluorenes (ng/g)	ND	ND	ND	ND
Anthracene (ng/g)	76	71	60	62
Phenanthrene (ng/g)	96	72	67	64
1-Methylphenanthrene (ng/g)	92	80	67	68
C_1-Phenanthrenes/anthracenes (ng/g)				
C_2-Phenanthrenes/anthracenes (ng/g)			ND	
C_3-Phenanthrenes/anthracenes (ng/g)	ND	ND	ND	ND
C_4-Phenanthrenes/anthracenes (ng/g)	ND	ND	ND	ND
Dibenzothiophene (ng/g)	94	76	63	63
C_1-Dibenzothiophenes (ng/g)	ND	ND	ND	ND
C_2-Dibenzothiophenes (ng/g)	ND	ND	ND	ND
C_3-Dibenzothiophenes (ng/g)	ND	ND	ND	ND
Fluoranthene (ng/g)	90	81	69	64
Pyrene (ng/g)	89	81	68	67
C_1-Fluoranthenes/pyrenes (ng/g)	ND	ND	ND	ND
C_2-Fluoranthenes/pyrenes (ng/g)	ND	ND	ND	ND
Benzo[a]anthracene (ng/g)	89	85	64	76
Chrysene (ng/g)	93	78	63	67
C_1-Chrysenes (ng/g)	ND	ND	ND	ND
C_2-Chrysenes (ng/g)	ND	ND	ND	ND

Table D-228. (Continued).

C_3-Chrysenes (ng/g)	ND	ND	ND	ND
C_4-Chrysenes (ng/g)	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/g)	83	80	65	72
Benzo[k]fluoranthene (ng/g)	84	82	67	68
Bis(ethylhexyl)phthalate (ng/g)				
Benzo[e]pyrene (ng/g)	109	102	71	82
Benzo[a]pyrene (ng/g)	103	82	67	67
Perylene (ng/g)	90	85	58	67
Indeno[1,2,3,-c,d]pyrene (ng/g)	107	98	74	78
Dibenzo[a,h]anthracene (ng/g)	111	92	77	75
Benzo[g,h,i]perylene (ng/g)	97	95	71	71
Surrogate Recovery (%)				
d6-Phenol	43	83	20	43
d8-Naphthalene	53	49	60	25 &
d10-Fluorene	65	81	79	93
d10-Phenanthrene	65	87	80	108
d4-Bis(ethylhexyl)phthalate	66	121	81	110
d12-Benzo[a]pyrene	58	74	71	92

Lab ID	AV-S-73MS	AV-S-78 MS	AV-S-81 MS
Associated Blank	AV-S-72PB	AV-S-77pb	AV-S-80pb
Phenol (ng/g)	47	63	121
Naphthalene (ng/g)	51	78	75
2-Methylnaphthalene (ng/g)	56	88	83
1-Methylnaphthalene (ng/g)	55	87	82
2,6-Dimethylnaphthalene (ng/g)	58	93	89
2,3,5-Trimethylnaphthalene (ng/g)	59	93	
C_1-Naphthalenes (ng/g)			
C_2-Naphthalenes (ng/g)			
C_3-Naphthalenes (ng/g)	ND		ND
C_4-Naphthalenes (ng/g)	ND	ND	ND
Acenaphthylene (ng/g)	56	91	85
Acenaphthene (ng/g)	58	91	88
Biphenyl (ng/g)	56	88	84
Fluorene (ng/g)	60	94	88
C_1-Fluorenes (ng/g)			
C_2-Fluorenes (ng/g)	ND	ND	ND
C_3-Fluorenes (ng/g)	ND	ND	ND

Table D-228. (Continued).

Anthracene (ng/g)	49	80	73	
Phenanthrene (ng/g)	57	95	91	
1-Methylphenanthrene (ng/g)	58	94	90	
C_1-Phenanthrenes/anthracenes (ng/g)				
C_2-Phenanthrenes/anthracenes (ng/g)	ND	ND	ND	
C_3-Phenanthrenes/anthracenes (ng/g)		ND	ND	
C_4-Phenanthrenes/anthracenes (ng/g)	ND	ND	ND	
Dibenzothiophene (ng/g)	56	95	91	
C_1-Dibenzothiophenes (ng/g)				
C_2-Dibenzothiophenes (ng/g)	ND	ND	ND	
C_3-Dibenzothiophenes (ng/g)	ND	ND	ND	
Fluoranthene (ng/g)	56	87	83	
Pyrene (ng/g)	56	87	83	
C_1-Fluoranthenes/pyrenes (ng/g)	ND	ND	ND	
C_2-Fluoranthenes/pyrenes (ng/g)	ND	ND	ND	
Benzo[a]anthracene (ng/g)	54	84	77	
Chrysene (ng/g)	55	87	78	
C_1-Chrysenes (ng/g)	ND	ND	ND	
C_2-Chrysenes (ng/g)	ND	ND	ND	
C_3-Chrysenes (ng/g)	ND	ND	ND	
C_4-Chrysenes (ng/g)	ND	ND	ND	
Benzo[b]fluoranthene (ng/g)	56	82	74	
Benzo[k]fluoranthene (ng/g)	53	84	74	
Bis(ethylhexyl)phthalate (ng/g)				
Benzo[e]pyrene (ng/g)	72	115	103	
Benzo[a]pyrene (ng/g)	63	100	90	
Perylene (ng/g)	49	93	75	
Indeno[1,2,3,-c,d]pyrene (ng/g)	76	118	98	
Dibenzo[a,h]anthracene (ng/g)	80	123	98	
Benzo[g,h,i]perylene (ng/g)	68	107	85	
Surrogate Recovery (%)				
d6-Phenol	21	28	86	
d8-Naphthalene	95	56	57	
d10-Fluorene	113	68	67	
d10-Phenanthrene	123	65	63	
d4-Bis(ethylhexyl)phthalate	115	66	66	
d12-Benzo[a]pyrene	89	49	50	

ND = Concentration below the method detection limit.
& = Result outside quality control surrogate recovery criteria.

Table D-229. Results of semivolatile organic compound analysis of field quality control samples.

Sample Type	Field Blank	Equipment Blank	Trip Blank	Equipment Blank
Field ID	HI356-AW-SV-FB	HI356-TIS-SV-EB	DB-AW-SV-TB	EI361A-TIS-SV-EB
Lab ID	GM172	GM173	GM184tb	GM190eb
Associated Blank	AX-S-54pb-re	AX-S-54pb-re	AX-S-62pb	AX-S-62pb
Sample Size	1.67	2.06	1.9	2.26
Collection Date	05/22/95	05/22/95	03/28/95	05/25/95
Extraction Date	05/26/95	05/26/95	06/01/95	06/01/95
Analysis Date	06/09/95	06/09/95	06/09/95	06/10/95
Phenol (ng/L)	69 J	120 B	53 J	190 B
Naphthalene (ng/L)	8.5 J	8.1 J	4.4 J	ND
2-Methylnaphthalene (ng/L)	7.2 J	12 J	ND	ND
1-Methylnaphthalene (ng/L)	4.1 J	8.5 J	ND	ND
2,6-Dimethylnaphthalene (ng/L)	ND	3.5 J	ND	ND
2,3,5-Trimethylnaphthalene (ng/L)	ND	1.5 J	ND	7.6
C_1-Naphthalenes (ng/L)	6.3 J	13 J	ND	ND
C_2-Naphthalenes (ng/L)	6.7 J	17 J	ND	ND
C_3-Naphthalenes (ng/L)	ND	11 J	ND	4.4 J
C_4-Naphthalenes (ng/L)	ND	7 J	ND	ND
Acenaphthylene (ng/L)	ND	ND	ND	ND
Acenaphthene (ng/L)	ND	ND	ND	ND
Biphenyl (ng/L)	ND	1.9 J	ND	ND
Fluorene (ng/L)	ND	ND	ND	ND
C_1-Fluorenes (ng/L)	ND	4.3 J	ND	ND
C_2-Fluorenes (ng/L)	ND	21	ND	ND
C_3-Fluorenes (ng/L)	ND	ND	ND	ND
Anthracene (ng/L)	ND	ND	ND	ND
Phenanthrene (ng/L)	ND	ND	ND	ND
1-Methylphenanthrene (ng/L)	ND	ND	ND	ND
C_1-Phenanthrenes/anthracenes (ng/L)	ND	9.7 J	ND	4.5 J
C_2-Phenanthrenes/anthracenes (ng/L)	ND	7.9 J	ND	6.3 J
C_3-Phenanthrenes/anthracenes (ng/L)	ND	ND	ND	3 J
C_4-Phenanthrenes/anthracenes (ng/L)	ND	ND	ND	ND
Dibenzothiophene (ng/L)	ND	ND	ND	ND
C_1-Dibenzothiophenes (ng/L)	ND	2.9 J	ND	ND
C_2-Dibenzothiophenes (ng/L)	ND	3.4 J	ND	3.7 J
C_3-Dibenzothiophenes (ng/L)	ND	2.1 J	ND	3.2 J
Flouranthene (ng/L)	ND	ND	ND	ND
Pyrene (ng/L)	ND	ND	ND	ND

Table D-229. (Continued).

C_1-Flouranthenes/pyrenes (ng/L)	ND	ND	ND	ND
C_2-Flouranthenes/pyrenes (ng/L)	ND	ND	ND	ND
Benzo[a]anthracene (ng/L)	ND	ND	ND	ND
Chrysene (ng/L)	ND	ND	ND	ND
C_1-Chrysenes (ng/L)	ND	ND	ND	ND
C_2-Chrysenes (ng/L)	ND	ND	ND	ND
C_3-Chrysenes (ng/L)	ND	ND	ND	ND
C_4-Chrysenes (ng/L)	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/L)	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/L)	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/L)	230 J	160 J	130 J	470 B
Benzo[e]pyrene (ng/L)	ND	ND	ND	ND
Benzo[a]pyrene (ng/L)	ND	ND	ND	ND
Perylene (ng/L)	ND	ND	ND	ND
Indeno[1,2,3,-c,d]pyrene (ng/L)	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/L)	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/L)	ND	ND	ND	ND
Surrogate Recovery (%)				
d6-Phenol	26	21	19	27
d4-Bis(2-ethylhexyl)phthalate	56	54	59	51
d8-Naphthalene	59	64	66	67
d10-Fluorene	59	66	71	71
d10-Phenanthrene	80	86	74	90
d12-Benzo[a]pyrene	56	59	31 &	54

Sample Type	Equipment Blank	Equipment Blank	Trip Blank	Field Blank
Field ID	EB165-TIS-SV-EB (SORTING TRAY)	EB165-TIS-SV-EB (FISH BOX)	RA-SV-TB	GC19-AW-SV-FB
Lab ID	95A0974	95A0975	95A0976	95A1103
Associated Blank	AZ-S-91PB	AZ-S-91PB	AZ-S-91PB	BA-S-15PB
Sample Size	2.36	1.8	2.05	2.33
Collection Date	11/16/95	11/16/95	09/12/95	12/02/95
Extraction Date	11/20/95	11/20/95	11/20/95	12/07/95
Analysis Date	12/22/95	12/22/95	12/22/95	12/22/95
Phenol (ng/L)	61 J	96 B	70 J	58 J
Naphthalene (ng/L)	9.8 J	13 J	5.5 J	6.7 J
2-Methylnaphthalene (ng/L)	16 J	20	3.3 J	5.9 J
1-Methylnaphthalene (ng/L)	9.8 J	12	ND	2.6 J
2,6-Dimethylnaphthalene (ng/L)	2.9 J	4.7 J	ND	ND

Table D-229. (Continued).

2,3,5-Trimethylnaphthalene (ng/L)	1.8 J	1.9 J	ND	ND
C_1-Naphthalenes (ng/L)	19 J	20 J	ND	5.9 J
C_2-Naphthalenes (ng/L)	24	29	ND	8.2 J
C_3-Naphthalenes (ng/L)	18	20	ND	6.8 J
C_4-Naphthalenes (ng/L)	9.9 J	12 J	ND	ND
Acenaphthylene (ng/L)	ND	ND	ND	ND
Acenaphthene (ng/L)	ND	ND	ND	3.8 J
Biphenyl (ng/L)	ND	1.9 J	ND	ND
Fluorene (ng/L)	ND	ND	ND	3.5 J
C_1-Fluorenes (ng/L)	3.9 J	4 J	ND	ND
C_2-Fluorenes (ng/L)	ND	ND	ND	ND
C_3-Fluorenes (ng/L)	ND	ND	ND	ND
Anthracene (ng/L)	ND	ND	ND	ND
Phenanthrene (ng/L)	ND	ND	ND	14 J
1-Methylphenanthrene (ng/L)	2.5 J	4 J	ND	ND
C_1-Phenanthrenes/anthracenes (ng/L)	9.5 J	14 J	7.1 J	3.3 J
C_2-Phenanthrenes/anthracenes (ng/L)	8.5 J	13 J	17	ND
C_3-Phenanthrenes/anthracenes (ng/L)	3.2 J	7 J	20	ND
C_4-Phenanthrenes/anthracenes (ng/L)	ND	ND	ND	ND
Dibenzothiophene (ng/L)	ND	2.1 J	ND	ND
C_1-Dibenzothiophenes (ng/L)	2.5 J	3.2 J	3.2 J	ND
C_2-Dibenzothiophenes (ng/L)	3.8 J	5.9 J	11	ND
C_3-Dibenzothiophenes (ng/L)	ND	3.7 J	17	ND
Flouranthene (ng/L)	4 J	2.9 J	ND	ND
Pyrene (ng/L)	2.5 J	2.8 J	3.2 J	ND
C_1-Flouranthenes/pyrenes (ng/L)	ND	2.2 J	6.8 J	ND
C_2-Flouranthenes/pyrenes (ng/L)	ND	ND	15	ND
Benzo[a]anthracene (ng/L)	ND	ND	ND	ND
Chrysene (ng/L)	ND	ND	ND	ND
C_1-Chrysenes (ng/L)	ND	ND	ND	ND
C_2-Chrysenes (ng/L)	ND	ND	3.9 J	ND
C_3-Chrysenes (ng/L)	ND	ND	ND	ND
C_4-Chrysenes (ng/L)	ND	ND	ND	ND
Benzo[b]fluoranthene (ng/L)	ND	ND	ND	ND
Benzo[k]fluoranthene (ng/L)	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate (ng/L)	300 J	370 J	250 J	ND
Benzo[e]pyrene (ng/L)	ND	ND	ND	ND
Benzo[a]pyrene (ng/L)	ND	ND	ND	ND
Perylene (ng/L)	ND	ND	ND	ND

Table D-229. (Continued).

Indeno[1,2,3,-c,d]pyrene (ng/L)	ND	ND	ND	ND
Dibenzo[a,h]anthracene (ng/L)	ND	ND	ND	ND
Benzo[g,h,i]perylene (ng/L)	ND	ND	ND	ND
Surrogate Recovery (%)				
d6-Phenol	15	16	16	16
d4-Bis(2-ethylhexyl)phthalate	59	61	56	97
d8-Naphthalene	35	35	34 &	49
d10-Fluorene	39 &	42 &	38 &	55
d10-Phenanthrene	41 &	43 &	42 &	56
d12-Benzo[a]pyrene	23 &	44	44	61

B = Analyte contained in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the method detection limit.
& = QC result outside criteria (MS/MSD recovery: 50% - 120%).

Table D-230 Results of metal analysis of procedural blank and spike samples for Cruise 2 produced water samples.

Procedural Blanks	As (µg/L)	Ba (µg/L)	Cd (µg/L)	Hg (µg/L)
Procedural Blank #1	ND	ND	ND	ND
Procedural Blank #2	ND	ND	ND	---
Percent Spike Recovery	As (%)	Ba (%)	Cd (%)	Hg (%)
EB165-PW-TM-A	108	MOA	MOA	116
EB165-PW-TM-C2	104	MOA	MOA	---
GC19-PW-TM-A	98	MOA	MOA	---
GC19-PW-TM-C	100	MOA	MOA	---

MOA = Method of Standard Additions.
ND = Concentration below the method detection limit.

Table D-231. Results of metal analysis of procedural blank and spike samples for Cruise 2 ambient seawater samples.

Procedural Blanks	As (µg/L)	Ba (µg/L)	Cd (µg/L)	Hg (µg/L)
Procedural Blank #1	ND	ND	ND	ND
Procedural Blank #2	ND	ND	ND	---
Procedural Blank #3	ND	ND	ND	---
Procedural Blank #4	ND	ND	ND	---
Percent Spike Recovery	As (%)	Ba (%)	Cd (%)	Hg (%)
EB165-AW-TM-A	104	MOA	89	98
EI361-AW-TM-A	98	MOA	113	---
GC19-AW-TM-A	94	MOA	95	---
HI356-AW-TM-A	110	MOA	109	---

MOA = Method of Standard Additions.
ND = Concentration below the method detection limit.

Table D-232. Results of metal analysis of procedural blank and spike samples for Cruise 3 produced water samples.

Procedural Blanks	As (µg/L)	Ba (µg/L)	Cd (µg/L)	Hg (µg/L)
Procedural Blank #1	ND	ND	ND	ND
Procedural Blank #2	ND	ND	ND	ND
Percent Spike Recovery	As (%)	Ba (%)	Cd (%)	Hg (%)
EB165-PW-TM-A	107	MOA	MOA	105
EB165-PW-TM-C	101	MOA	MOA	---
GC19-PW-TM-A	100	MOA	MOA	---
GC19-PW-TM-C2	94	MOA	MOA	---
KM-PW-TM-A	97	MOA	MOA	103
KM-PW-TM-C	99	MOA	MOA	---

MOA = Method of Standard Additions.
ND = Concentration below the method detection limit.

Table D-233. Results of metal analysis of procedural blank and spike samples for Cruise 3 ambient seawater samples.

Procedural Blanks	As (µg/L)	Ba (µg/L)	Cd (µg/L)	Hg (µg/L)
Procedural Blank #1	ND	ND	ND	ND
Procedural Blank #2	ND	ND	ND	ND
Procedural Blank #3	ND	ND	ND	---
Procedural Blank #4	ND	ND	ND	---
Percent Spike Recovery	As (%)	Ba (%)	Cd (%)	Hg (%)
EB165-AW-TM-A	100	MOA	114	97
GC19-AW-TM-A	95	MOA	97	---
HI356-AW-TM-A	---	MOA	---	99

MOA = Method of Standard Additions.
ND = Concentration below the method detection limit.

Table D-234. Sample specific data for Cruise 2 tissue samples that were analyzed for arsenic, barium, and cadmium with results for procedural blanks and matrix spike samples.

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-001	II-EB165-DEF-CHAMA-TM-A #1	3.5358	0.4990	86
MT-002	II-EB165-DEF-CHAMA-TM-A #2	3.1976	0.4512	
MT-003	II-EB165-DEF-CHAMA-TM-B #1	3.2168	0.4260	87
MT-004	II-EB165-DEF-CHAMA-TM-B #2	3.3079	0.4381	
MT-005	II-EB165-DEF-CHAMA-TM-C #1	3.3402	0.5386	84
MT-006	II-EB165-DEF-CHAMA-TM-C #2	3.3571	0.5413	
MT-091	II-EI361-DEF-CHAMA-TM-A #1	3.4929	0.3868	89
MT-092	II-EI361-DEF-CHAMA-TM-A #2	3.4726	0.3846	
MT-093	II-EI361-DEF-CHAMA-TM-B #1	3.5900	0.5125	86
MT-094	II-EI361-DEF-CHAMA-TM-B #2	3.6379	0.5193	
MT-095	II-EI361-DEF-CHAMA-TM-C #1	3.6133	0.5335	85
MT-096	II-EI361-DEF-CHAMA-TM-C #2	4.2304	0.6246	
MT-061	II-GC19-DEF-CHAMA-TM-A #1	4.5300	0.4701	90
MT-062	II-GC19-DEF-CHAMA-TM-A #2	4.3276	0.4491	
MT-063	II-GC19-DEF-CHAMA-TM-B #1	4.4281	0.4729	89
MT-064	II-GC19-DEF-CHAMA-TM-B #2	4.7259	0.5047	
MT-065	II-GC19-DEF-CHAMA-TM-C #1	4.4829	0.4702	90
MT-066	II-GC19-DEF-CHAMA-TM-C #2	5.1903	0.5444	
MT-031	II-HI356-DEF-CHAMA-TM-A #1	5.2777	0.6641	87
MT-032	II-HI356-DEF-CHAMA-TM-A #2	5.3868	0.6779	
MT-033	II-HI356-DEF-CHAMA-TM-B #1	6.5786	0.7066	89
MT-034	II-HI356-DEF-CHAMA-TM-B #2	6.4758	0.6956	
MT-035	II-HI356-DEF-CHAMA-TM-C #1	4.6463	0.6026	87
MT-036	II-HI356-DEF-CHAMA-TM-C #2	4.9832	0.6463	
MT-007	II-EB165-DEF-SPONDYLUS-TM-A #1	4.2575	0.8394	80
MT-008	II-EB165-DEF-SPONDYLUS-TM-A #2	4.2418	0.8363	
MT-009	II-EB165-DEF-SPONDYLUS-TM-B #1	3.5260	0.6737	81
MT-010	II-EB165-DEF-SPONDYLUS-TM-B #2	3.5181	0.6722	
MT-011	II-EB165-DEF-SPONDYLUS-TM-C #1	4.2706	0.8335	80
MT-012	II-EB165-DEF-SPONDYLUS-TM-C #2	4.5019	0.8787	
MT-097	II-EI361-DEF-SPONDYLUS-TM-A #1	4.8335	0.9460	80
MT-098	II-EI361-DEF-SPONDYLUS-TM-A #2	4.8291	0.9451	
MT-099	II-EI361-DEF-SPONDYLUS-TM-B #1	4.4686	0.8618	81
MT-100	II-EI361-DEF-SPONDYLUS-TM-B #2	5.0237	0.9688	
MT-101	II-EI361-DEF-SPONDYLUS-TM-C #1	4.3745	0.8267	81
MT-102	II-EI361-DEF-SPONDYLUS-TM-C #2	4.0644	0.7681	
MT-067	II-GC19-DEF-SPONDYLUS-TM-A #1	4.3378	0.8262	81
MT-068	II-GC19-DEF-SPONDYLUS-TM-A #2	4.0401	0.7695	
MT-069	II-GC19-DEF-SPONDYLUS-TM-B #1	4.3580	0.8613	80
MT-070	II-GC19-DEF-SPONDYLUS-TM-B #2	4.3890	0.8674	
MT-071	II-GC19-DEF-SPONDYLUS-TM-C #1	4.2446	0.8078	81
MT-072	II-GC19-DEF-SPONDYLUS-TM-C #2	4.1430	0.7885	

Procedural Blanks	As (µg/g)	Ba (µg/g)	Cd (µg/g)
Procedural Blank #1	0.08	0.25	ND
Procedural Blank #2	0.06	0.37	ND

Percent Spike Recovery	As (%)	Ba (%)	Cd (%)
II-EB165-DEF-CHAMA-TM-A #1	90	105	103
II-EB165-DEF-CHAMA-TM-B #1	105	99	95

Table D-234. (Continued).

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-037	II-HI356-DEF-SPONDYLUS-TM-A #1	3.0912	0.5276	83
MT-038	II-HI356-DEF-SPONDYLUS-TM-A #2	3.1196	0.5324	
MT-039	II-HI356-DEF-SPONDYLUS-TM-B #1	3.5072	0.6091	83
MT-040	II-HI356-DEF-SPONDYLUS-TM-B #2	3.5302	0.6130	
MT-041	II-HI356-DEF-SPONDYLUS-TM-C #1	3.5038	0.7051	80
MT-042	II-HI356-DEF-SPONDYLUS-TM-C #2	3.4539	0.6950	
MT-013	II-EB165-DEF-CHUB-TM-A #1	4.1446	0.9541	77
MT-014	II-EB165-DEF-CHUB-TM-A #2	4.1646	0.9587	
MT-015	II-EB165-DEF-CHUB-TM-B #1	3.7785	0.8703	77
MT-016	II-EB165-DEF-CHUB-TM-B #2	3.5490	0.8174	
MT-017	II-EB165-DEF-CHUB-TM-C #1	3.3327	0.7684	77
MT-018	II-EB165-DEF-CHUB-TM-C #2	3.3570	0.7740	
MT-103	II-EI361-DEF-CHUB-TM-A #1	3.4050	0.8311	76
MT-104	II-EI361-DEF-CHUB-TM-A #2	3.2461	0.7923	
MT-105	II-EI361-DEF-CHUB-TM-B #1	3.5365	0.9052	74
MT-106	II-EI361-DEF-CHUB-TM-B #2	3.4421	0.8810	
MT-107	II-EI361-DEF-CHUB-TM-C #1	3.2315	0.7759	76
MT-108	II-EI361-DEF-CHUB-TM-C #2	3.3488	0.8040	
MT-019	II-EB165-DEF-CREOLEFISH-TM-A #1	3.2653	0.6544	80
MT-020	II-EB165-DEF-CREOLEFISH-TM-A #2	3.3500	0.6714	
MT-021	II-EB165-DEF-CREOLEFISH-TM-B #1	3.3150	0.6815	79
MT-022	II-EB165-DEF-CREOLEFISH-TM-B #2	3.2987	0.6781	
MT-023	II-EB165-DEF-CREOLEFISH-TM-C #1	3.2871	0.7080	78
MT-024	II-EB165-DEF-CREOLEFISH-TM-C #2	3.4577	0.7448	

Procedural Blanks	As (µg/g)	Ba (µg/g)	Cd (µg/g)
Procedural Blank #1	0.07	0.23	ND
Procedural Blank #2	ND	0.26	ND

Percent Spike Recovery	As	Ba	Cd
II-EB165-DEF-CHUB-TM-A #1	101	99	101
II-EI361-DEF-CHUB-TM-A #1	100	102	102

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-109	II-EI361-DEF-CREOLEFISH-TM-A #1	3.5273	0.7025	80
MT-110	II-EI361-DEF-CREOLEFISH-TM-A #2	4.0041	0.7975	
MT-111	II-EI361-DEF-CREOLEFISH-TM-B #1	3.4995	0.6905	80
MT-112	II-EI361-DEF-CREOLEFISH-TM-B #2	4.0115	0.7915	
MT-113	II-EI361-DEF-CREOLEFISH-TM-C #1	3.4256	0.7055	79
MT-114	II-EI361-DEF-CREOLEFISH-TM-C #2	3.3982	0.6999	
MT-079	II-GC19-DEF-CREOLEFISH-TM-A #1	4.0218	0.8425	79
MT-080	II-GC19-DEF-CREOLEFISH-TM-A #2	4.3709	0.9156	
MT-081	II-GC19-DEF-CREOLEFISH-TM-B #1	3.4971	0.7219	79
MT-082	II-GC19-DEF-CREOLEFISH-TM-B #2	3.4679	0.7159	
MT-083	II-GC19-DEF-CREOLEFISH-TM-C #1	3.7535	0.7610	80
MT-084	II-GC19-DEF-CREOLEFISH-TM-C #2	3.6479	0.7396	
MT-049	II-HI356-DEF-CREOLEFISH-TM-A #1	3.7255	0.7854	79
MT-050	II-HI356-DEF-CREOLEFISH-TM-A #2	3.6403	0.7674	
MT-051	II-HI356-DEF-CREOLEFISH-TM-B #1	3.5219	0.7416	79
MT-052	II-HI356-DEF-CREOLEFISH-TM-B #2	3.7965	0.7994	
MT-053	II-HI356-DEF-CREOLEFISH-TM-C #1	3.5805	0.7502	79
MT-054	II-HI356-DEF-CREOLEFISH-TM-C #2	3.6756	0.7701	
MT-073	II-GC19-DEF-CHUB-TM-A #1	3.6455	0.8665	76
MT-074	II-GC19-DEF-CHUB-TM-A #2	3.6058	0.8570	

Table D-234. (Continued).

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-075	II-GC19-DEF-CHUB-TM-B #1	3.7305	0.9078	76
MT-076	II-GC19-DEF-CHUB-TM-B #2	3.8897	0.9465	
MT-077	II-GC19-DEF-CHUB-TM-C #1	3.5597	0.8154	77
MT-078	II-GC19-DEF-CHUB-TM-C #2	3.7000	0.8476	
MT-043	II-HI356-DEF-CHUB-TM-A #1	3.7149	0.8729	77
MT-044	II-HI356-DEF-CHUB-TM-A #2	4.0162	0.9437	
MT-045	II-HI356-DEF-CHUB-TM-B #1	3.8175	0.9179	76
MT-046	II-HI356-DEF-CHUB-TM-B #2	3.8664	0.9297	
MT-047	II-HI356-DEF-CHUB-TM-C #1	4.0668	1.0806	73
MT-048	II-HI356-DEF-CHUB-TM-C #2	3.9144	1.0401	
Procedural Blanks		As (µg/g)	Ba (µg/g)	Cd (µg/g)
Procedural Blank #1		ND	0.19	ND
Procedural Blank #2		ND	0.21	ND
Percent Spike Recovery		As (%)	Ba (%)	Cd (%)
II-EI361-DEF-CREOLEFISH-TM-A #1		104	99	92
II-GC19-DEF-CREOLEFISH-TM-A #1		100	102	93

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-025	II-EB165-DEF-ROCKHIND-TM-A #1	3.4402	0.7302	79
MT-026	II-EB165-DEF-ROCKHIND-TM-A #2	3.3846	0.7184	
MT-027	II-EB165-DEF-ROCKHIND-TM-B #1	3.5235	0.7648	78
MT-028	II-EB165-DEF-ROCKHIND-TM-B #2	3.4099	0.7402	
MT-029	II-EB165-DEF-ROCKHIND-TM-C #1	3.7472	0.8191	78
MT-030	II-EB165-DEF-ROCKHIND-TM-C #2	3.6434	0.7964	
MT-055	II-HI356-DEF-ROCKHIND-TM-A #1	3.7393	0.9097	76
MT-056	II-HI356-DEF-ROCKHIND-TM-A #2	3.8289	0.9314	
MT-057	II-HI356-DEF-ROCKHIND-TM-B #1	3.6945	1.0654	71
MT-058	II-HI356-DEF-ROCKHIND-TM-B #2	3.6123	1.0417	
MT-059	II-HI356-DEF-ROCKHIND-TM-C #1	3.6436	0.7759	79
MT-060	II-HI356-DEF-ROCKHIND-TM-C #2	3.5659	0.7594	
MT-115	II-EI361-DEF-TRIGGERFISH-TM-A #1	3.4341	0.7373	79
MT-116	II-EI361-DEF-TRIGGERFISH-TM-A #2	3.5571	0.7637	
MT-117	II-EI361-DEF-TRIGGERFISH-TM-B #1	3.7698	0.7876	79
MT-118	II-EI361-DEF-TRIGGERFISH-TM-B #2	3.9755	0.8306	
MT-119	II-EI361-DEF-TRIGGERFISH-TM-C #1	3.2450	0.6620	80
MT-120	II-EI361-DEF-TRIGGERFISH-TM-C #2	3.7417	0.7633	
MT-085	II-GC19-DEF-TRIGGERFISH-TM-A #1	3.6942	0.7677	79
MT-086	II-GC19-DEF-TRIGGERFISH-TM-A #2	3.6785	0.7645	
MT-087	II-GC19-DEF-TRIGGERFISH-TM-B #1	3.4956	0.7443	79
MT-088	II-GC19-DEF-TRIGGERFISH-TM-B #2	3.4488	0.7344	
MT-089	II-GC19-DEF-TRIGGERFISH-TM-C #1	3.4280	0.7257	79
MT-090	II-GC19-DEF-TRIGGERFISH-TM-C #2	3.3769	0.7149	
Procedural Blanks		As (µg/g)	Ba (µg/g)	Cd (µg/g)
Procedural Blank #1		ND	0.10	ND
Procedural Blank #2		ND	0.09	ND
Percent Spike Recovery		As (%)	Ba (%)	Cd (%)
II-EB165-DEF-ROCKHIND-TM-A #1		96	98	93
II-EI361-DEF-TRIGGERFISH-TM-A #1		93	105	98

Table D-235. Sample specific data for Cruise 2 tissue samples that were analyzed for mercury with results for procedural blanks and matrix spike samples.

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-001	II-EB165-DEF-CHAMA-TM-A #1	1.6701	0.2357	86
MT-002	II-EB165-DEF-CHAMA-TM-A #2	1.8796	0.2652	
MT-003	II-EB165-DEF-CHAMA-TM-B #1	1.5066	0.1995	87
MT-004	II-EB165-DEF-CHAMA-TM-B #2	1.4912	0.1975	
MT-005	II-EB165-DEF-CHAMA-TM-C #1	1.7123	0.2761	84
MT-006	II-EB165-DEF-CHAMA-TM-C #2	2.4741	0.3989	
MT-091	II-EI361-DEF-CHAMA-TM-A #1	1.6553	0.1833	89
MT-092	II-EI361-DEF-CHAMA-TM-A #2	1.4262	0.1580	
MT-093	II-EI361-DEF-CHAMA-TM-B #1	1.4633	0.2089	86
MT-094	II-EI361-DEF-CHAMA-TM-B #2	1.6575	0.2366	
MT-095	II-EI361-DEF-CHAMA-TM-C #1	1.5727	0.2322	85
MT-096	II-EI361-DEF-CHAMA-TM-C #2	1.4784	0.2183	
MT-061	II-GC19-DEF-CHAMA-TM-A #1	1.3299	0.1380	90
MT-062	II-GC19-DEF-CHAMA-TM-A #2	1.3989	0.1452	
MT-063	II-GC19-DEF-CHAMA-TM-B #1	1.7478	0.1867	89
MT-064	II-GC19-DEF-CHAMA-TM-B #2	1.4902	0.1592	
MT-065	II-GC19-DEF-CHAMA-TM-C #1	1.5694	0.1646	90
MT-066	II-GC19-DEF-CHAMA-TM-C #2	1.5470	0.1623	
MT-031	II-HI356-DEF-CHAMA-TM-A #1	1.5776	0.1985	87
MT-032	II-HI356-DEF-CHAMA-TM-A #2	1.5343	0.1931	
MT-033	II-HI356-DEF-CHAMA-TM-B #1	2.0472	0.2199	89
MT-034	II-HI356-DEF-CHAMA-TM-B #2	2.2105	0.2374	
MT-035	II-HI356-DEF-CHAMA-TM-C #1	1.5712	0.2038	87
MT-036	II-HI356-DEF-CHAMA-TM-C #2	1.4559	0.1888	

Procedural Blanks	Hg (µg/g)
Procedural Blank #1	ND
Procedural Blank #2	ND

Percent Spike Recovery	Hg (%)
II-EB165-DEF-CHAMA-TM-A #1	67
II-EB165-DEF-CHAMA-TM-B #1	70
II-EB165-DEF-CHAMA-TM-C #1	70
II-EI361-DEF-CHAMA-TM-A #1	60
II-EI361-DEF-CHAMA-TM-C #1	72
II-GC19-DEF-CHAMA-TM-A #1	74
II-HI356-DEF-CHAMA-TM-A #1	71
II-HI356-DEF-CHAMA-TM-C #1	42
II-HI356-DEF-CHAMA-TM-C #2	72

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-007	II-EB165-DEF-SPONDYLUS-TM-A #1	2.3997	0.4731	80
MT-008	II-EB165-DEF-SPONDYLUS-TM-A #2	2.2241	0.4385	
MT-009	II-EB165-DEF-SPONDYLUS-TM-B #1	2.4860	0.4750	81
MT-010	II-EB165-DEF-SPONDYLUS-TM-B #2	2.7017	0.5162	
MT-011	II-EB165-DEF-SPONDYLUS-TM-C #1	2.6028	0.5080	80
MT-012	II-EB165-DEF-SPONDYLUS-TM-C #2	2.4089	0.4702	
MT-097	II-EI361-DEF-SPONDYLUS-TM-A #1	2.1190	0.4147	80
MT-098	II-EI361-DEF-SPONDYLUS-TM-A #2	3.5154	0.6880	
MT-099	II-EI361-DEF-SPONDYLUS-TM-B #1	2.7512	0.5306	81
MT-100	II-EI361-DEF-SPONDYLUS-TM-B #2	2.4833	0.4789	
MT-101	II-EI361-DEF-SPONDYLUS-TM-C #1	2.0983	0.3965	81

Table D-235. (Continued).

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-102	II-EI361-DEF-SPONDYLUS-TM-C #2	2.3340	0.4411	
MT-067	II-GC19-DEF-SPONDYLUS-TM-A #1	1.8182	0.3463	81
MT-068	II-GC19-DEF-SPONDYLUS-TM-A #2	2.3862	0.4545	
MT-069	II-GC19-DEF-SPONDYLUS-TM-B #1	2.3517	0.4648	80
MT-070	II-GC19-DEF-SPONDYLUS-TM-B #2	2.2419	0.4431	
MT-071	II-GC19-DEF-SPONDYLUS-TM-C #1	2.3178	0.4411	81
MT-072	II-GC19-DEF-SPONDYLUS-TM-C #2	2.5903	0.4930	
MT-037	II-HI356-DEF-SPONDYLUS-TM-A #1	2.4594	0.4197	83
MT-038	II-HI356-DEF-SPONDYLUS-TM-A #2	2.2212	0.3791	
MT-039	II-HI356-DEF-SPONDYLUS-TM-B #1	2.2414	0.3892	83
MT-040	II-HI356-DEF-SPONDYLUS-TM-B #2	2.4896	0.4323	
MT-041	II-HI356-DEF-SPONDYLUS-TM-C #1	2.1117	0.4249	80
MT-042	II-HI356-DEF-SPONDYLUS-TM-C #2	1.9894	0.4003	
MT-013	II-EB165-DEF-CHUB-TM-A #1	1.8617	0.4286	77
MT-014	II-EB165-DEF-CHUB-TM-A #2	2.2035	0.5073	
MT-015	II-EB165-DEF-CHUB-TM-B #1	1.6790	0.3867	77
MT-016	II-EB165-DEF-CHUB-TM-B #2	2.0609	0.4747	

Procedural Blanks	Hg (µg/g)
Procedural Blank #1	ND
Procedural Blank #2	ND

Percent Spike Recovery	Hg (%)
II-EB165-DEF-SPONDYLUS-TM-A #1	71
II-EB165-DEF-SPONDYLUS-TM-C #1	61
II-EI361-DEF-SPONDYLUS-TM-A #1	69
II-EI361-DEF-SPONDYLUS-TM-C #1	72
II-GC19-DEF-SPONDYLUS-TM-A #1	71
II-GC19-DEF-SPONDYLUS-TM-C #2	74
II-HI356-DEF-SPONDYLUS-TM-A #1	61
II-HI356-DEF-SPONDYLUS-TM-C #1	66
II-EB165-DEF-CHUB-TM-A #1	65
II-EB165-DEF-CHUB-TM-B #1	64

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-017	II-EB165-DEF-CHUB-TM-C #1	1.9924	0.4594	77
MT-018	II-EB165-DEF-CHUB-TM-C #2	2.2457	0.5178	
MT-103	II-EI361-DEF-CHUB-TM-A #1	2.0899	0.5101	76
MT-104	II-EI361-DEF-CHUB-TM-A #2	2.0064	0.4897	
MT-105	II-EI361-DEF-CHUB-TM-B #1	2.3253	0.5952	74
MT-106	II-EI361-DEF-CHUB-TM-B #2	2.2150	0.5669	
MT-107	II-EI361-DEF-CHUB-TM-C #1	2.4048	0.5774	76
MT-108	II-EI361-DEF-CHUB-TM-C #2	2.3279	0.5589	
MT-019	II-EB165-DEF-CREOLEFISH-TM-A #1	2.0961	0.4201	80
MT-020	II-EB165-DEF-CREOLEFISH-TM-A #2	2.5158	0.5042	
MT-021	II-EB165-DEF-CREOLEFISH-TM-B #1	2.1480	0.4416	79
MT-022	II-EB165-DEF-CREOLEFISH-TM-B #2	2.3238	0.4777	
MT-023	II-EB165-DEF-CREOLEFISH-TM-C #1	2.1257	0.4579	78
MT-024	II-EB165-DEF-CREOLEFISH-TM-C #2	2.1247	0.4576	

Procedural Blanks	Hg (µg/g)
Procedural Blank #1	ND
Procedural Blank #2	ND

Table D-235. (Continued).

Percent Spike Recovery	Hg (%)
II-EB165-DEF-CHUB-TM-C #1	72
II-EI361-DEF-CHUB-TM-A #1	68
II-EB165-DEF-CREOLEFISH-TM-A #1	69
II-EB165-DEF-CREOLEFISH-TM-C #1	70

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-109	II-EI361-DEF-CREOLEFISH-TM-A #1	2.5983	0.5175	80
MT-110	II-EI361-DEF-CREOLEFISH-TM-A #2	2.5695	0.5117	
MT-111	II-EI361-DEF-CREOLEFISH-TM-B #1	2.7057	0.5339	80
MT-112	II-EI361-DEF-CREOLEFISH-TM-B #2	2.4857	0.4904	
MT-113	II-EI361-DEF-CREOLEFISH-TM-C #1	2.6323	0.5421	79
MT-114	II-EI361-DEF-CREOLEFISH-TM-C #2	2.5762	0.5306	
MT-079	II-GC19-DEF-CREOLEFISH-TM-A #1	2.5044	0.5246	79
MT-080	II-GC19-DEF-CREOLEFISH-TM-A #2	2.7728	0.5809	
MT-081	II-GC19-DEF-CREOLEFISH-TM-B #1	2.5812	0.5328	79
MT-082	II-GC19-DEF-CREOLEFISH-TM-B #2	2.6549	0.5481	
MT-083	II-GC19-DEF-CREOLEFISH-TM-C #1	2.6608	0.5395	80
MT-084	II-GC19-DEF-CREOLEFISH-TM-C #2	2.7507	0.5577	
MT-049	II-HI356-DEF-CREOLEFISH-TM-A #1	2.6083	0.5498	79
MT-050	II-HI356-DEF-CREOLEFISH-TM-A #2	2.6058	0.5493	
MT-051	II-HI356-DEF-CREOLEFISH-TM-B #1	2.5468	0.5363	79
MT-052	II-HI356-DEF-CREOLEFISH-TM-B #2	2.7227	0.5733	
MT-053	II-HI356-DEF-CREOLEFISH-TM-C #1	2.5739	0.5393	79
MT-054	II-HI356-DEF-CREOLEFISH-TM-C #2	2.6661	0.5586	
MT-073	II-GC19-DEF-CHUB-TM-A #1	2.6604	0.6323	76
MT-074	II-GC19-DEF-CHUB-TM-A #2	2.6075	0.6198	
MT-075	II-GC19-DEF-CHUB-TM-B #1	2.7166	0.6611	76
MT-076	II-GC19-DEF-CHUB-TM-B #2	2.6148	0.6363	
MT-077	II-GC19-DEF-CHUB-TM-C #1	2.7808	0.6370	77
MT-078	II-GC19-DEF-CHUB-TM-C #2	2.9052	0.6655	
MT-043	II-HI356-DEF-CHUB-TM-A #1	2.7096	0.6367	77
MT-044	II-HI356-DEF-CHUB-TM-A #2	2.7590	0.6483	
MT-045	II-HI356-DEF-CHUB-TM-B #1	2.6591	0.6394	76
MT-046	II-HI356-DEF-CHUB-TM-B #2	2.9421	0.7074	
MT-047	II-HI356-DEF-CHUB-TM-C #1	2.4270	0.6449	73
MT-048	II-HI356-DEF-CHUB-TM-C #2	2.5036	0.6652	

Procedural Blanks	Hg (µg/g)
Procedural Blank #1	ND
Procedural Blank #2	ND

Percent Spike Recovery	Hg (%)
II-EI361-DEF-CREOLEFISH-TM-A #1	77
II-GC19-DEF-CREOLEFISH-TM-A #1	73
II-HI356-DEF-CREOLEFISH-TM-A #1	71
II-GC19-DEF-CHUB-TM-A #1	61
II-HI356-DEF-CHUB-TM-A #1	66

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-025	II-EB165-DEF-ROCKHIND-TM-A #1	2.7257	0.5786	79
MT-026	II-EB165-DEF-ROCKHIND-TM-A #2	2.7837	0.5909	
MT-027	II-EB165-DEF-ROCKHIND-TM-B #1	2.7084	0.5879	78
MT-028	II-EB165-DEF-ROCKHIND-TM-B #2	2.7315	0.5929	
MT-029	II-EB165-DEF-ROCKHIND-TM-C #1	2.9024	0.6344	78

Table D-235. (Continued).

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-030	II-EB165-DEF-ROCKHIND-TM-C #2	2.8358	0.6198	
MT-055	II-HI356-DEF-ROCKHIND-TM-A #1	2.7102	0.6593	76
MT-056	II-HI356-DEF-ROCKHIND-TM-A #2	2.9388	0.7149	
MT-057	II-HI356-DEF-ROCKHIND-TM-B #1	2.5528	0.7361	71
MT-058	II-HI356-DEF-ROCKHIND-TM-B #2	2.6767	0.7719	
MT-059	II-HI356-DEF-ROCKHIND-TM-C #1	2.5427	0.5415	79
MT-060	II-HI356-DEF-ROCKHIND-TM-C #2	3.1532	0.6715	
MT-115	II-EI361-DEF-TRIGGERFISH-TM-A #1	2.8857	0.6196	79
MT-116	II-EI361-DEF-TRIGGERFISH-TM-A #2	3.0409	0.6529	
MT-117	II-EI361-DEF-TRIGGERFISH-TM-B #1	2.9320	0.6126	79
MT-118	II-EI361-DEF-TRIGGERFISH-TM-B #2	2.9490	0.6161	
MT-119	II-EI361-DEF-TRIGGERFISH-TM-C #1	2.7899	0.5691	80
MT-120	II-EI361-DEF-TRIGGERFISH-TM-C #2	2.7740	0.5659	
MT-085	II-GC19-DEF-TRIGGERFISH-TM-A #1	2.6524	0.5512	79
MT-086	II-GC19-DEF-TRIGGERFISH-TM-A #2	2.9161	0.6060	
MT-087	II-GC19-DEF-TRIGGERFISH-TM-B #1	2.7957	0.5953	79
MT-088	II-GC19-DEF-TRIGGERFISH-TM-B #2	2.7882	0.5937	
MT-089	II-GC19-DEF-TRIGGERFISH-TM-C #1	3.0598	0.6478	79
MT-090	II-GC19-DEF-TRIGGERFISH-TM-C #2	3.0349	0.6425	

Procedural Blanks	Hg (µg/g)
Procedural Blank #1	ND
Procedural Blank #2	ND

Percent Spike Recovery	Hg (%)
II-EB165-DEF-ROCKHIND-TM-A #1	60
II-HI356-DEF-ROCKHIND-TM-A #1	79
II-EI361-DEF-TRIGGERFISH-TM-A #1	68
II-GC19-DEF-TRIGGERFISH-TM-A #1	74

ND = Concentration below the method detection limit.

Table D-236. Sample specific data for Cruise 3 tissue samples that were analyzed for arsenic, barium, and cadmium with results for procedural blanks and matrix spike samples.

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-121	III-EB165-DEF-CHAMA-TM-A #1	2.8901	0.3224	89
MT-122	III-EB165-DEF-CHAMA-TM-A #2	3.2950	0.3700	89
MT-123	III-EB165-DEF-CHAMA-TM-B #1	3.9143	0.4683	88
MT-124	III-EB165-DEF-CHAMA-TM-B #2	4.2547	0.5131	88
MT-125	III-EB165-DEF-CHAMA-TM-C #1	3.3305	0.4691	86
MT-126	III-EB165-DEF-CHAMA-TM-C #2	3.3822	0.4827	86
MT-211	III-EI361-DEF-CHAMA-TM-A #1	3.4696	0.3768	89
MT-212	III-EI361-DEF-CHAMA-TM-A #2	3.7798	0.4105	89
MT-213	III-EI361-DEF-CHAMA-TM-B #1	2.9296	0.3037	90
MT-214	III-EI361-DEF-CHAMA-TM-B #2	3.1652	0.3463	89
MT-215	III-EI361-DEF-CHAMA-TM-C #1	2.3377	0.3719	84
MT-216	III-EI361-DEF-CHAMA-TM-C #2	3.3948	0.3788	89
MT-181	III-GC19-DEF-CHAMA-TM-A #1	2.9716	0.3961	87
MT-182	III-GC19-DEF-CHAMA-TM-A #2	3.1867	0.4166	87
MT-183	III-GC19-DEF-CHAMA-TM-B #1	3.0784	0.4393	86
MT-184	III-GC19-DEF-CHAMA-TM-B #2	2.9758	0.4402	85
MT-185	III-GC19-DEF-CHAMA-TM-C #1	4.3766	0.7367	83
MT-186	III-GC19-DEF-CHAMA-TM-C #2	3.6576	0.6014	84
MT-151	III-HI356-DEF-CHAMA-TM-A #1	3.7696	0.3601	90
MT-152	III-HI356-DEF-CHAMA-TM-A #2	3.6815	0.3527	90
MT-153	III-HI356-DEF-CHAMA-TM-B #1	3.1053	0.3152	90
MT-154	III-HI356-DEF-CHAMA-TM-B #2	4.0458	0.4382	89
MT-155	III-HI356-DEF-CHAMA-TM-C #1	3.2679	0.3167	90
MT-156	III-HI356-DEF-CHAMA-TM-C #2	3.8878	0.3673	91
MT-127	III-EB165-DEF-SPONDYLUS-TM-A #1	3.3256	0.5574	83
MT-128	III-EB165-DEF-SPONDYLUS-TM-A #2	3.2698	0.5599	83
MT-129	III-EB165-DEF-SPONDYLUS-TM-B #1	3.2244	0.4751	85
MT-130	III-EB165-DEF-SPONDYLUS-TM-B #2	3.1223	0.4225	86
MT-131	III-EB165-DEF-SPONDYLUS-TM-C #1	3.2967	0.5063	85
MT-132	III-EB165-DEF-SPONDYLUS-TM-C #2	2.9914	0.4837	84
MT-217	III-EI361-DEF-SPONDYLUS-TM-A #1	3.0952	0.5287	83
MT-218	III-EI361-DEF-SPONDYLUS-TM-A #2	3.3363	0.5723	83
MT-219	III-EI361-DEF-SPONDYLUS-TM-B #1	3.2395	0.5356	83
MT-220	III-EI361-DEF-SPONDYLUS-TM-B #2	3.7079	0.6256	83
MT-221	III-EI361-DEF-SPONDYLUS-TM-C #1	3.5302	0.6108	83
MT-222	III-EI361-DEF-SPONDYLUS-TM-C #2	3.4184	0.5944	83
MT-187	III-GC19-DEF-SPONDYLUS-TM-A #1	3.4345	0.5779	83
MT-188	III-GC19-DEF-SPONDYLUS-TM-A #2	3.4539	0.5726	83
MT-189	III-GC19-DEF-SPONDYLUS-TM-B #1	3.1864	0.5456	83
MT-190	III-GC19-DEF-SPONDYLUS-TM-B #2	3.2879	0.5601	83
MT-191	III-GC19-DEF-SPONDYLUS-TM-C #1	3.0853	0.5157	83
MT-192	III-GC19-DEF-SPONDYLUS-TM-C #2	3.6310	0.6271	83

Procedural Blanks	As (µg/g)	Ba (µg/g)	Cd (µg/g)
Procedural Blank #1	ND	0.16	ND
Procedural Blank #2	ND	0.24	ND

Percent Spike Recovery	As (%)	Ba (%)	Cd (%)
III-EB165-DEF-CHAMA-TM-A #1	92	100	96
III-EB165-DEF-SPONDYLUS-TM-A #1	100	99	97

Table D-236. (Continued).

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-157	III-HI356-DEF-SPONDYLUS-TM-A #1	3.4627	0.4869	86
MT-158	III-HI356-DEF-SPONDYLUS-TM-A #2	3.6428	0.4976	86
MT-159	III-HI356-DEF-SPONDYLUS-TM-B #1	3.4447	0.5194	85
MT-160	III-HI356-DEF-SPONDYLUS-TM-B #2	3.5372	0.5185	85
MT-161	III-HI356-DEF-SPONDYLUS-TM-C #1	3.4300	0.6021	82
MT-162	III-HI356-DEF-SPONDYLUS-TM-C #2	3.2290	0.5659	82
MT-139	III-EB165-DEF-CREOLEFISH-TM-A #1	3.7928	0.8075	79
MT-140	III-EB165-DEF-CREOLEFISH-TM-A #2	3.5341	0.7338	79
MT-141	III-EB165-DEF-CREOLEFISH-TM-B #1	3.7093	0.7649	79
MT-142	III-EB165-DEF-CREOLEFISH-TM-B #2	3.3221	0.6909	79
MT-143	III-EB165-DEF-CREOLEFISH-TM-C #1	3.3181	0.6850	79
MT-144	III-EB165-DEF-CREOLEFISH-TM-C #2	3.6855	0.7455	80
MT-229	III-EI361-DEF-CREOLEFISH-TM-A #1	3.4733	0.7313	79
MT-230	III-EI361-DEF-CREOLEFISH-TM-A #2	3.1405	0.6544	79
MT-231	III-EI361-DEF-CREOLEFISH-TM-B #1	3.4606	0.7338	79
MT-232	III-EI361-DEF-CREOLEFISH-TM-B #2	3.5667	0.7590	79
MT-233	III-EI361-DEF-CREOLEFISH-TM-C #1	3.5723	0.7300	80
MT-234	III-EI361-DEF-CREOLEFISH-TM-C #2	3.7268	0.7571	80
MT-199	III-GC19-DEF-CREOLEFISH-TM-A #1	3.7579	0.7570	80
MT-200	III-GC19-DEF-CREOLEFISH-TM-A #2	3.8486	0.7578	80
MT-201	III-GC19-DEF-CREOLEFISH-TM-B #1	4.0230	0.8259	79
MT-202	III-GC19-DEF-CREOLEFISH-TM-B #2	3.3937	0.6915	80
MT-203	III-GC19-DEF-CREOLEFISH-TM-C #1	3.5372	0.7101	80
MT-204	III-GC19-DEF-CREOLEFISH-TM-C #2	3.5950	0.7198	80
MT-169	III-HI356-DEF-CREOLEFISH-TM-A #1	3.3595	0.7207	79
MT-170	III-HI356-DEF-CREOLEFISH-TM-A #2	3.8354	0.7929	79
MT-171	III-HI356-DEF-CREOLEFISH-TM-B #1	3.5184	0.7352	79
MT-172	III-HI356-DEF-CREOLEFISH-TM-B #2	3.5815	0.7469	79
MT-173	III-HI356-DEF-CREOLEFISH-TM-C #1	3.5605	0.7520	79
MT-174	III-HI356-DEF-CREOLEFISH-TM-C #2	3.7994	0.8026	79
MT-145	III-EB165-DEF-SERGMAJOR-TM-A #1	3.8285	0.8037	79
MT-146	III-EB165-DEF-SERGMAJOR-TM-A #2	3.5622	0.7473	79
MT-147	III-EB165-DEF-SERGMAJOR-TM-B #1	3.4603	0.7408	79
MT-148	III-EB165-DEF-SERGMAJOR-TM-B #2	3.6016	0.7790	78
MT-149	III-EB165-DEF-SERGMAJOR-TM-C #1	3.5318	0.7437	79
MT-150	III-EB165-DEF-SERGMAJOR-TM-C #2	3.8754	0.8064	79
MT-175	III-HI356-DEF-SERGMAJOR-TM-A #1	3.5302	0.7876	78
MT-176	III-HI356-DEF-SERGMAJOR-TM-A #2	3.4263	0.7580	78
MT-177	III-HI356-DEF-SERGMAJOR-TM-B #1	3.8043	0.8565	77
MT-178	III-HI356-DEF-SERGMAJOR-TM-B #2	3.4582	0.7653	78
MT-179	III-HI356-DEF-SERGMAJOR-TM-C #1	3.5780	0.8121	77
MT-180	III-HI356-DEF-SERGMAJOR-TM-C #2	4.0770	0.8938	78

Procedural Blanks	As (µg/g)	Ba (µg/g)	Cd (µg/g)
Procedural Blank #1	ND	ND	ND
Procedural Blank #2	0.11	0.03	ND

Percent Spike Recovery	As (%)	Ba (%)	Cd (%)
III-EB165-DEF-CREOLEFISH-TM-A #1	97	99	85
III-EB165-DEF-SERGMAJOR-TM-A #1	97	115	94

Table D-236. (Continued).

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-133	III-EB165-DEF-CHUB-TM-A #1	4.0609	0.9983	75
MT-134	III-EB165-DEF-CHUB-TM-A #2	3.5794	0.9065	75
MT-135	III-EB165-DEF-CHUB-TM-B #1	3.4981	0.8863	75
MT-136	III-EB165-DEF-CHUB-TM-B #2	3.4725	0.8779	75
MT-137	III-EB165-DEF-CHUB-TM-C #1	3.6296	0.8576	76
MT-138	III-EB165-DEF-CHUB-TM-C #2	3.4843	0.8478	76
MT-223	III-EI361-DEF-CHUB-TM-A #1	3.5482	0.9015	75
MT-224	III-EI361-DEF-CHUB-TM-A #2	3.3986	0.8280	76
MT-225	III-EI361-DEF-CHUB-TM-B #1	3.6107	0.9047	75
MT-226	III-EI361-DEF-CHUB-TM-B #2	3.4661	0.8523	75
MT-227	III-EI361-DEF-CHUB-TM-C #1	3.5044	0.9002	74
MT-228	III-EI361-DEF-CHUB-TM-C #2	3.6677	0.9292	75
MT-193	III-GC19-DEF-CHUB-TM-A #1	3.5186	0.9169	74
MT-194	III-GC19-DEF-CHUB-TM-A #2	3.4749	0.8900	74
MT-195	III-GC19-DEF-CHUB-TM-B #1	3.5652	0.9088	75
MT-196	III-GC19-DEF-CHUB-TM-B #2	3.6071	0.9084	75
MT-197	III-GC19-DEF-CHUB-TM-C #1	3.6441	0.8953	75
MT-198	III-GC19-DEF-CHUB-TM-C #2	3.7742	0.9187	76
MT-163	III-HI356-DEF-CHUB-TM-A #1	3.4768	0.8150	77
MT-164	III-HI356-DEF-CHUB-TM-A #2	3.5025	0.8170	77
MT-165	III-HI356-DEF-CHUB-TM-B #1	3.6889	0.8769	76
MT-166	III-HI356-DEF-CHUB-TM-B #2	3.5714	0.8542	76
MT-167	III-HI356-DEF-CHUB-TM-C #1	3.5614	0.8457	76
MT-168	III-HI356-DEF-CHUB-TM-C #2	3.5286	0.8222	77
MT-235	III-EI361-DEF-TRIGGERFISH-TM-A #1	3.5058	0.7272	79
MT-236	III-EI361-DEF-TRIGGERFISH-TM-A #2	3.5742	0.7562	79
MT-237	III-EI361-DEF-TRIGGERFISH-TM-B #1	3.5869	0.7986	78
MT-238	III-EI361-DEF-TRIGGERFISH-TM-B #2	3.4907	0.7535	78
MT-239	III-EI361-DEF-TRIGGERFISH-TM-C #1	3.3948	0.7604	78
MT-240	III-EI361-DEF-TRIGGERFISH-TM-C #2	3.6330	0.8069	78
MT-205	III-GC19-DEF-TRIGGERFISH-TM-A #1	3.5183	0.7813	78
MT-206	III-GC19-DEF-TRIGGERFISH-TM-A #2	3.5801	0.7781	78
MT-207	III-GC19-DEF-TRIGGERFISH-TM-B #1	3.9095	0.8304	79
MT-208	III-GC19-DEF-TRIGGERFISH-TM-B #2	3.5772	0.7624	79
MT-209	III-GC19-DEF-TRIGGERFISH-TM-C #1	3.9520	0.8464	79
MT-210	III-GC19-DEF-TRIGGERFISH-TM-C #2	3.6412	0.7961	78

Procedural Blanks	As (µg/g)	Ba (µg/g)	Cd (µg/g)
Procedural Blank #1	0.12	ND	ND
Procedural Blank #2	0.06	ND	ND

Percent Spike Recovery	As (%)	Ba (%)	Cd (%)
III-EB165-DEF-CHUB-TM-A #1	109	101	99
III-EI361-DEF-TRIGGERFISH-TM-A #1	107	109	101

ND = Concentration below the method detection limit.

Table D-237. Sample specific data for Cruise 3 tissue samples that analyzed for mercury with results for procedural blanks and matrix spike samples.

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-121	III-EB165-DEF-CHAMA-TM-A #1	2.5532	0.2858	89
MT-122	III-EB165-DEF-CHAMA-TM-A #2	3.0121	0.3371	
MT-123	III-EB165-DEF-CHAMA-TM-B #1	2.6767	0.3215	88
MT-124	III-EB165-DEF-CHAMA-TM-B #2	3.1175	0.3745	
MT-125	III-EB165-DEF-CHAMA-TM-C #1	2.6850	0.3807	86
MT-126	III-EB165-DEF-CHAMA-TM-C #2	2.5138	0.3564	
MT-211	III-EI361-DEF-CHAMA-TM-A #1	2.8656	0.3112	89
MT-212	III-EI361-DEF-CHAMA-TM-A #2	2.7290	0.2964	
MT-213	III-EI361-DEF-CHAMA-TM-B #1	3.0707	0.3271	89
MT-214	III-EI361-DEF-CHAMA-TM-B #2	3.1133	0.3317	
MT-215	III-EI361-DEF-CHAMA-TM-C #1	2.8484	0.3855	86
MT-216	III-EI361-DEF-CHAMA-TM-C #2	2.6611	0.3601	
MT-181	III-GC19-DEF-CHAMA-TM-A #1	2.4770	0.3270	87
MT-182	III-GC19-DEF-CHAMA-TM-A #2	4.1561	0.5487	
MT-183	III-GC19-DEF-CHAMA-TM-B #1	2.3137	0.3362	85
MT-184	III-GC19-DEF-CHAMA-TM-B #2	1.9935	0.2897	
MT-185	III-GC19-DEF-CHAMA-TM-C #1	2.1942	0.3651	83
MT-186	III-GC19-DEF-CHAMA-TM-C #2	3.6028	0.5994	
MT-151	III-HI356-DEF-CHAMA-TM-A #1	2.8939	0.2768	90
MT-152	III-HI356-DEF-CHAMA-TM-A #2	2.5044	0.2396	
MT-153	III-HI356-DEF-CHAMA-TM-B #1	2.8545	0.2995	90
MT-154	III-HI356-DEF-CHAMA-TM-B #2	2.6087	0.2737	
MT-155	III-HI356-DEF-CHAMA-TM-C #1	2.7517	0.2633	90
MT-156	III-HI356-DEF-CHAMA-TM-C #2	2.6550	0.2541	
MT-127	III-EB165-DEF-SPONDYLUS-TM-A #1	2.7942	0.4734	83
MT-128	III-EB165-DEF-SPONDYLUS-TM-A #2	2.4454	0.4143	
MT-129	III-EB165-DEF-SPONDYLUS-TM-B #1	2.5618	0.3621	86
MT-130	III-EB165-DEF-SPONDYLUS-TM-B #2	2.5063	0.3542	
MT-131	III-EB165-DEF-SPONDYLUS-TM-C #1	2.3377	0.3685	84
MT-132	III-EB165-DEF-SPONDYLUS-TM-C #2	3.1662	0.4991	
MT-217	III-EI361-DEF-SPONDYLUS-TM-A #1	2.5215	0.4316	83
MT-218	III-EI361-DEF-SPONDYLUS-TM-A #2	2.4877	0.4258	
MT-219	III-EI361-DEF-SPONDYLUS-TM-B #1	2.4062	0.4019	83
MT-220	III-EI361-DEF-SPONDYLUS-TM-B #2	2.5407	0.4244	
MT-221	III-EI361-DEF-SPONDYLUS-TM-C #1	2.3819	0.4131	83
MT-222	III-EI361-DEF-SPONDYLUS-TM-C #2	2.6655	0.4623	
MT-187	III-GC19-DEF-SPONDYLUS-TM-A #1	2.4918	0.4162	83
MT-188	III-GC19-DEF-SPONDYLUS-TM-A #2	2.4497	0.4092	
MT-189	III-GC19-DEF-SPONDYLUS-TM-B #1	2.7348	0.4671	83
MT-190	III-GC19-DEF-SPONDYLUS-TM-B #2	2.2585	0.3857	
MT-191	III-GC19-DEF-SPONDYLUS-TM-C #1	2.6560	0.4513	83
MT-192	III-GC19-DEF-SPONDYLUS-TM-C #2	2.8978	0.4924	

Procedural Blanks	Hg (µg/g)
Procedural Blank #1	ND
Procedural Blank #2	ND

Percent Spike Recovery	Hg (%)
III-EB165-DEF-CHAMA-TM-A #1	67
III-EI361-DEF-CHAMA-TM-A #1	66
III-GC19-DEF-CHAMA-TM-A #1	68
III-HI356-DEF-CHAMA-TM-A #1	74
III-EB165-DEF-SPONDYLUS-TM-A #1	68
III-EI361-DEF-SPONDYLUS-TM-A #1	68
III-GC19-DEF-SPONDYLUS-TM-A #1	67

Table D-237. (Continued).

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-157	III-HI356-DEF-SPONDYLUS-TM-A #1	2.4936	0.3306	87
MT-158	III-HI356-DEF-SPONDYLUS-TM-A #2	2.6670	0.3536	
MT-159	III-HI356-DEF-SPONDYLUS-TM-B #1	2.8679	0.3684	87
MT-160	III-HI356-DEF-SPONDYLUS-TM-B #2	2.8273	0.3632	
MT-161	III-HI356-DEF-SPONDYLUS-TM-C #1	2.4165	0.4168	83
MT-162	III-HI356-DEF-SPONDYLUS-TM-C #2	2.6671	0.4600	
MT-139	III-EB165-DEF-CREOLEFISH-TM-A #1	2.8349	0.5884	79
MT-140	III-EB165-DEF-CREOLEFISH-TM-A #2	2.8674	0.5952	
MT-141	III-EB165-DEF-CREOLEFISH-TM-B #1	3.0079	0.6119	80
MT-142	III-EB165-DEF-CREOLEFISH-TM-B #2	2.7413	0.5577	
MT-143	III-EB165-DEF-CREOLEFISH-TM-C #1	3.1093	0.6355	80
MT-144	III-EB165-DEF-CREOLEFISH-TM-C #2	2.8265	0.5777	
MT-229	III-EI361-DEF-CREOLEFISH-TM-A #1	3.1379	0.6612	79
MT-230	III-EI361-DEF-CREOLEFISH-TM-A #2	2.9041	0.6119	
MT-231	III-EI361-DEF-CREOLEFISH-TM-B #1	2.9263	0.5958	80
MT-232	III-EI361-DEF-CREOLEFISH-TM-B #2	3.0298	0.6169	
MT-233	III-EI361-DEF-CREOLEFISH-TM-C #1	3.0152	0.6264	79
MT-234	III-EI361-DEF-CREOLEFISH-TM-C #2	2.8880	0.6000	
MT-199	III-GC19-DEF-CREOLEFISH-TM-A #1	2.9545	0.5948	80
MT-200	III-GC19-DEF-CREOLEFISH-TM-A #2	2.9550	0.5949	
MT-201	III-GC19-DEF-CREOLEFISH-TM-B #1	3.0914	0.6199	80
MT-202	III-GC19-DEF-CREOLEFISH-TM-B #2	3.1145	0.6245	
MT-203	III-GC19-DEF-CREOLEFISH-TM-C #1	3.1849	0.6436	80
MT-204	III-GC19-DEF-CREOLEFISH-TM-C #2	3.1083	0.6281	
MT-169	III-HI356-DEF-CREOLEFISH-TM-A #1	2.9753	0.6161	79
MT-170	III-HI356-DEF-CREOLEFISH-TM-A #2	3.1270	0.6475	
MT-171	III-HI356-DEF-CREOLEFISH-TM-B #1	3.0641	0.6626	78
MT-172	III-HI356-DEF-CREOLEFISH-TM-B #2	2.9374	0.6352	
MT-173	III-HI356-DEF-CREOLEFISH-TM-C #1	3.3453	0.6797	80
MT-174	III-HI356-DEF-CREOLEFISH-TM-C #2	2.9975	0.6091	
MT-145	III-EB165-DEF-SERGMAJOR-TM-A #1	3.1112	0.8037	79
MT-146	III-EB165-DEF-SERGMAJOR-TM-A #2	2.9569	0.7473	
MT-147	III-EB165-DEF-SERGMAJOR-TM-B #1	3.0827	0.7408	79
MT-148	III-EB165-DEF-SERGMAJOR-TM-B #2	2.9162	0.7790	
MT-149	III-EB165-DEF-SERGMAJOR-TM-C #1	2.9892	0.7437	79
MT-150	III-EB165-DEF-SERGMAJOR-TM-C #2	3.2003	0.8064	
MT-175	III-HI356-DEF-SERGMAJOR-TM-A #1	3.0125	0.7876	78
MT-176	III-HI356-DEF-SERGMAJOR-TM-A #2	3.0171	0.7580	
MT-177	III-HI356-DEF-SERGMAJOR-TM-B #1	3.0216	0.8565	77
MT-178	III-HI356-DEF-SERGMAJOR-TM-B #2	3.0299	0.7653	
MT-179	III-HI356-DEF-SERGMAJOR-TM-C #1	2.9476	0.8121	78
MT-180	III-HI356-DEF-SERGMAJOR-TM-C #2	3.1076	0.8938	

Procedural Blanks	Hg (µg/g)
Procedural Blank #1	ND
Procedural Blank #2	ND

Percent Spike Recovery	Hg (%)
III-HI356-DEF-SPONDYLUS-TM-A #1	64
III-EB165-DEF-CREOLEFISH-TM-A #1	64
III-EI361-DEF-CREOLEFISH-TM-A #1	69
III-GC19-DEF-CREOLEFISH-TM-A #1	71
III-HI356-DEF-CREOLEFISH-TM-A #1	69
III-EB165-DEF-SERGMAJOR-TM-A #1	68
III-HI356-DEF-SERGMAJOR-TM-A #1	60

Table D-237. (Continued).

Sample ID	Laboratory ID	Tissue wet weight (g)	Tissue dry weight (g)	Percent Water Content
MT-133	III-EB165-DEF-CHUB-TM-A #1	2.8143	0.7023	75
MT-134	III-EB165-DEF-CHUB-TM-A #2	2.4390	0.6086	
MT-135	III-EB165-DEF-CHUB-TM-B #1	2.3018	0.5826	75
MT-136	III-EB165-DEF-CHUB-TM-B #2	2.5022	0.6333	
MT-137	III-EB165-DEF-CHUB-TM-C #1	2.4850	0.8037	76
MT-138	III-EB165-DEF-CHUB-TM-C #2	2.4046	0.7473	
MT-223	III-EI361-DEF-CHUB-TM-A #1	2.4753	0.7408	75
MT-224	III-EI361-DEF-CHUB-TM-A #2	2.5328	0.7790	
MT-225	III-EI361-DEF-CHUB-TM-B #1	2.3370	0.7437	75
MT-226	III-EI361-DEF-CHUB-TM-B #2	2.5995	0.8064	
MT-227	III-EI361-DEF-CHUB-TM-C #1	2.5665	0.7876	74
MT-228	III-EI361-DEF-CHUB-TM-C #2	2.7504	0.7580	
MT-193	III-GC19-DEF-CHUB-TM-A #1	2.3664	0.8565	74
MT-194	III-GC19-DEF-CHUB-TM-A #2	2.6002	0.7653	
MT-195	III-GC19-DEF-CHUB-TM-B #1	2.5994	0.8121	75
MT-196	III-GC19-DEF-CHUB-TM-B #2	2.4894	0.8938	
MT-197	III-GC19-DEF-CHUB-TM-C #1	2.5386	0.6208	76
MT-198	III-GC19-DEF-CHUB-TM-C #2	2.6519	0.6485	
MT-163	III-HI356-DEF-CHUB-TM-A #1	2.4937	0.5831	77
MT-164	III-HI356-DEF-CHUB-TM-A #2	2.4964	0.5837	
MT-165	III-HI356-DEF-CHUB-TM-B #1	2.5666	0.6120	76
MT-166	III-HI356-DEF-CHUB-TM-B #2	2.5947	0.6187	
MT-167	III-HI356-DEF-CHUB-TM-C #1	2.3494	0.5527	76
MT-168	III-HI356-DEF-CHUB-TM-C #2	2.3752	0.5587	
MT-235	III-EI361-DEF-TRIGGERFISH-TM-A #1	3.3306	0.6978	79
MT-236	III-EI361-DEF-TRIGGERFISH-TM-A #2	2.9797	0.6242	
MT-237	III-EI361-DEF-TRIGGERFISH-TM-B #1	2.4490	0.5369	78
MT-238	III-EI361-DEF-TRIGGERFISH-TM-B #2	2.5085	0.5500	
MT-239	III-EI361-DEF-TRIGGERFISH-TM-C #1	2.4580	0.5482	78
MT-240	III-EI361-DEF-TRIGGERFISH-TM-C #2	2.3721	0.5291	
MT-205	III-GC19-DEF-TRIGGERFISH-TM-A #1	2.5865	0.5683	78
MT-206	III-GC19-DEF-TRIGGERFISH-TM-A #2	2.8768	0.6320	
MT-207	III-GC19-DEF-TRIGGERFISH-TM-B #1	2.3691	0.5041	79
MT-208	III-GC19-DEF-TRIGGERFISH-TM-B #2	2.7898	0.5936	
MT-209	III-GC19-DEF-TRIGGERFISH-TM-C #1	2.4028	0.5200	78
MT-210	III-GC19-DEF-TRIGGERFISH-TM-C #2	2.3260	0.5034	

Procedural Blanks	Hg (µg/g)
Procedural Blank #1	ND
Procedural Blank #2	ND

Percent Spike Recovery	Hg (%)
III-EB165-DEF-CHUB-TM-A #1	63
III-EI361-DEF-CHUB-TM-A #1	65
III-GC19-DEF-CHUB-TM-A #1	65
III-HI356-DEF-CHUB-TM-A #1	58
III-EI361-DEF-TRIGGERFISH-TM-A #1	60
III-GC19-DEF-TRIGGERFISH-TM-A #1	54

ND = Concentration below the method detection limit.

Table D-238. Listing of field and laboratory IDs for water samples analyzed for ^{226}Ra and ^{228}Ra with method blank, reference standard, and spiked sample IDs.

Sample ID	Cruise	Field ID	Lab ID	^{226}Ra			^{228}Ra		
				Blank ID	Standard ID	Spike ID	Blank ID	Standard ID	Spike ID
RW-01	2	EB165-PW-NORM-A	951125001	MB4R60531	LC2R60531	951125-4	MB4R80531	LC2R80531	951125-8
RW-02	2	EB165-PW-NORM-B	951125002	MB4R60531	LC2R60531	951125-4	MB4R80531	LC2R80531	951125-8
RW-03	2	EB165-PW-NORM-C	951125003	MB4R60531	LC2R60531	951125-4	MB4R80531	LC2R80531	951125-8
RW-04	2	GC19-PW-NORM-A	951192001	MB2R680625	LC1R60625	951192-4	MB2R680625	LC1R80625	951192-8
RW-05	2	GC19-PW-NORM-B	951192002	MB2R680625	LC1R60625	951192-4	MB2R680625	LC1R80625	951192-8
RW-06	2	GC19-PW-NORM-C	951192003	MB2R680625	LC1R60625	951192-4	MB2R680625	LC1R80625	951192-8
RW-07	2	EB165-AW-NORM-A	951125004	MB4R60531	LC2R60531	951125-4	MB4R80531	LC2R80531	951125-8
RW-08	2	EB165-AW-NORM-B	951125005	MB4R60531	LC2R60531	951125-4	MB4R80531	LC2R80531	951125-8
RW-09	2	EB165-AW-NORM-C	951125006	MB4R60531	LC2R60531	951125-4	MB4R80531	LC2R80531	951125-8
RW-10	2	HI356-AW-NORM-A	951125007	MB4R60531	LC2R60531	951125-4	MB4R80531	LC2R80531	951125-8
RW-11	2	HI356-AW-NORM-B	951125008	MB4R60531	LC2R60531	951125-4	MB4R80531	LC2R80531	951125-8
RW-12	2	HI356-AW-NORM-C	951125009	MB4R60531	LC2R60531	951125-4	MB4R80531	LC2R80531	951125-8
RW-13	2	GC19-AW-NORM-A	951192004	MB2R680625	LC1R60625	951192-4	MB2R680625	LC1R80625	951192-8
RW-14	2	GC19-AW-NORM-B	951192005	MB2R680625	LC1R60625	951192-4	MB2R680625	LC1R80625	951192-8
RW-15	2	GC19-AW-NORM-C1	951192006	MB2R680625	LC1R60625	951192-4	MB2R680625	LC1R80625	951192-8
RW-16	2	EI361A-AW-NORM-A	951192007	MB2R680625	LC1R60625	951192-4	MB2R680625	LC1R80625	951192-8
RW-17	2	EI361A-AW-NORM-B	951192008	MB2R680625	LC1R60625	951192-4	MB2R680625	LC1R80625	951192-8
RW-18	2	EI361A-AW-NORM-C	951192009	MB2R680625	LC1R60625	951192-4	MB2R680625	LC1R80625	951192-8
RW-19	3	EB165-PW-NORMA	952639001	MB4R61120	LC2R61120	952634-1	MB4R81120	LC2R81120	952634-6
RW-20	3	EB165-PW-NORMB	952639002	MB4R61120	LC2R61120	952634-1	MB4R81120	LC2R81120	952634-6
RW-21	3	EB165-PW-NORMC	952639003	MB4R61120	LC2R61120	952634-1	MB4R81120	LC2R81120	952634-6
RW-22	3	GC19-PW-NORM-A	952811005	MB2R61208	LC1R61208	952811-8	MB2R81208	LC1R81208	952811-12
RW-23	3	GC19-PW-NORM-B	952811006	MB2R61208	LC1R61208	952811-8	MB2R81208	LC1R81208	952811-12
RW-24	3	GC19-PW-NORM-C	952811007	MB2R61208	LC1R61208	952811-8	MB2R81208	LC1R81208	952811-12
RW-25	3	KM-PW-NORMA	952929004	MB2R61202	LC1R61202	952976-001	MB2R81222	LC1R81222	952901-1
RW-26	3	KM-PW-NORMB	952929005	MB2R61202	LC1R61202	952976-001	MB2R81222	LC1R81222	952901-1
RW-27	3	KM-PW-NORMC	952929006	MB2R61202	LC1R61202	952976-001	MB2R81222	LC1R81222	952901-1
RW-28	3	EB165-AW-NORM-A	952811001	MB2R61208	LC1R61208	952811-8	MB2R81208	LC1R81208	952811-12
RW-29	3	EB165-AW-NORM-B	952811002	MB2R61208	LC1R61208	952811-8	MB2R81208	LC1R81208	952811-12
RW-30	3	EB165-AW-NORM-C	952811003	MB2R61208	LC1R61208	952811-8	MB2R81208	LC1R81208	952811-12
RW-31	3	HI356-AW-NORMA	952929001	MB2R61202	LC1R61202	952976-001	MB2R81222	LC1R81222	952901-1
RW-32	3	HI356-AW-NORMB	952929002	MB2R61202	LC1R61202	952976-001	MB2R81222	LC1R81222	952901-1

Table D-238. (Continued).

Sample ID	Cruise	Field ID	Lab ID	^{226}Ra			^{228}Ra		
				Blank ID	Standard ID	Spike ID	Blank ID	Standard ID	Spike ID
RW-33	3	HI356-AW-NORMC	952929003	MB2R61202	LC1R61202	952976-001	MB2R81222	LC1R81222	952901-1
RW-34	3	GC19-AW-NORM-A	952811008	MB2R61208	LC1R61208	952811-8	MB2R81208	LC1R81208	952811-12
RW-35	3	GC19-AW-NORM-B	952811009	MB2R61208	LC1R61208	952811-8	MB2R81208	LC1R81208	952811-12
RW-36	3	GC19-AW-NORM-C	952811010	MB2R61208	LC1R61208	952811-8	MB2R81208	LC1R81208	952811-12
RW-37	3	EI361-AW-NORM-A	952811011	MB2R61208	LC1R61208	952811-8	MB2R81208	LC1R81208	952811-12
RW-38	3	EI361-AW-NORM-B	952811012	MB2R61208	LC1R61208	952811-8	MB2R81208	LC1R81208	952811-12
RW-39	3	EI361-AW-NORM-C	952811013	MB2R61208	LC1R61208	952811-8	MB2R81208	LC1R81208	952811-12

Table D-239. ^{226}Ra activity in method blanks for water sample analyses.

Blank ID	Activity (pCi/L)	
MB4R60531	0.03	0.04
MB2R680625	0.11	
MB4R61120	ND	
MB2R61208	0.089	
MB2R61202	0.23	

ND = Concentration below the method detection limit.

Table D-240. Percent recovery of ^{226}Ra in reference standard samples for water sample analyses.

Standard ID	Percent Recovery	
LC2R60531	100	99
LC1R60625	99	
LC2R61120	98	
LC1R61208	109	
LC1R61202	105	

Table D-241. Percent recovery of ^{226}Ra in reference spiked samples for water sample analyses.

Spike ID	Percent Recovery	
951125-4	98	100
951192-4	91	
952634-1	97	
952811-8	68	
952976-001	101	

Table D-242. ^{228}Ra activity in method blanks for water sample analyses.

Blank ID	Activity (pCi/L)	
MB4R80531	0.361	-0.15
MB2R680625	-0.25	
MB4R81120	1.3	
MB2R81208	-0.715	
MB2R81222	1.5	

Table D-243. Percent recovery of ^{228}Ra in reference standard samples for water sample analyses.

Standard ID	Percent Recovery	
LC2R80531	104	82
LC1R80625	93	
LC2R81120	180	
LC1R81208	122	
LC1R81222	82	

Table D-244. Percent recovery of ^{228}Ra in reference spiked samples for water sample analyses.

Spike ID	Percent Recovery	
951125-8	97	61
951192-8	101	
952634-6	73	
952811-12	87	
952901-1	74	

Table D-245. Listing of field and laboratory IDs for tissues samples and analyzed for ^{226}Ra and ^{228}Ra with method blank, reference standard, and spiked sample IDs.

Sample ID	Field ID	Lab ID	^{226}Ra			^{228}Ra		
			Blank ID	Standard ID	Spike ID	Blank ID	Standard ID	Spike ID
RT-001	II-EB165-DEF-CHAMA-NORM-A	951623009	MB2R60727	LC1R60727	951623-1	MB2R80727	LC1R80727	951623-10
RT-002	II-EB165-DEF-CHAMA-NORM-A	951623010	MB2R60727	LC1R60727	951623-1	MB2R80727	LC1R80727	951623-10
RT-003	II-EB165-DEF-CHAMA-NORM-B	951624005	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2
RT-004	II-EB165-DEF-CHAMA-NORM-B	951624006	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2
RT-005	II-EB165-DEF-CHAMA-NORM-C	951624007	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2
RT-006	II-EB165-DEF-CHAMA-NORM-C	951624008	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2
RT-007	II-EB165-DEF-SPONDYLUS-NORM-A	951625009	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-008	II-EB165-DEF-SPONDYLUS-NORM-A	951625010	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-009	II-EB165-DEF-SPONDYLUS-NORM-B	951625013	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-010	II-EB165-DEF-SPONDYLUS-NORM-B	951625014	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-011	II-EB165-DEF-SPONDYLUS-NORM-C	951625011	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-012	II-EB165-DEF-SPONDYLUS-NORM-C	951625012	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-013	II-EF165-DEF-CHUB-NORM-A	951626001	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2
RT-014	II-EF165-DEF-CHUB-NORM-A	951626002	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2
RT-015	II-EF165-DEF-CHUB-NORM-B	951626003	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2
RT-016	II-EF165-DEF-CHUB-NORM-B	951626004	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2
RT-017	II-EB165-DEF-CHUB-NORM-C	951694007	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-018	II-EB165-DEF-CHUB-NORM-C	951694008	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-019	II-EB165-DEF-CREOLE FISH-NORM-A	951694013	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-020	II-EB165-DEF-CREOLE FISH-NORM-A	951694014	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-021	II-EB165-DEF-CREOLE FISH-NORM-B	951694017	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-022	II-EB165-DEF-CREOLE FISH-NORM-B	951694018	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-023	II-EB165-DEF-CREOLE FISH-NORM-C	951694009	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-024	II-EB165-DEF-CREOLE FISH-NORM-C	951694010	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-025	II-EB165-DEF-ROCKHIND-NORM-A	951794003	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-026	II-EB165-DEF-ROCKHIND-NORM-A	951794004	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-027	II-EB165-DEF-ROCKHIND-NORM-B	951794017	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-028	II-EB165-DEF-ROCKHIND-NORM-B	951794018	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-029	II-EB165-DEF-ROCKHIND-NORM-C	951795015	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-030	II-EB165-DEF-ROCKHIND-NORM-C	951795016	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-031	II-HI356-DEF-CHAMA-NORM-A	951622011	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-032	II-HI356-DEF-CHAMA-NORM-A	951622012	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12

Table D-245. (Continued).

Sample ID	Field ID	Lab ID	^{226}Ra			^{228}Ra		
			Blank ID	Standard ID	Spike ID	Blank ID	Standard ID	Spike ID
RT-033	II-HI356-DEF-CHAMA-NORM-B	951624001	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2
RT-034	II-HI356-DEF-CHAMA-NORM-B	951624002	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2
RT-035	II-HI356-DEF-CHAMA-NORM-C	951622013	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-036	II-HI356-DEF-CHAMA-NORM-C	951622014	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-037	II-HI356-DEF-SPONDYLUS-NORM-A	951625007	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-038	II-HI356-DEF-SPONDYLUS-NORM-A	951625008	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-039	II-HI356-DEF-SPONDYLUS-NORM-B	951625003	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-040	II-HI356-DEF-SPONDYLUS-NORM-B	951625004	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-041	II-HI356-DEF-SPONDYLUS-NORM-C	951625001	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-042	II-HI356-DEF-SPONDYLUS-NORM-C	951625002	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-043	II-HI356-DEF-CHUB-NORM-A	951795001	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-044	II-HI356-DEF-CHUB-NORM-A	951795002	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-045	II-HI356-DEF-CHUB-NORM-B	951796005	MB4R680817	LC2R60817	951796-1	MB4R680817	LC2R80817	951769-10
RT-046	II-HI356-DEF-CHUB-NORM-B	951796006	MB4R680817	LC2R60817	951796-1	MB4R680817	LC2R80817	951769-10
RT-047	II-HI356-DEF-CHUB-NORM-C	951795007	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-048	II-HI356-DEF-CHUB-NORM-C	951795008	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-049	II-HI356-DEF-CREOLEFISH-NORM-A	951796007	MB4R680817	LC2R60817	951796-1	MB4R680817	LC2R80817	951769-10
RT-050	II-HI356-DEF-CREOLEFISH-NORM-A	951796008	MB4R680817	LC2R60817	951796-1	MB4R680817	LC2R80817	951769-10
RT-051	II-HI356-DEF-CREOLEFISH-NORM-B	951796009	MB4R680817	LC2R60817	951796-1	MB4R680817	LC2R80817	951769-10
RT-052	II-HI356-DEF-CREOLEFISH-NORM-B	951796010	MB4R680817	LC2R60817	951796-1	MB4R680817	LC2R80817	951769-10
RT-053	II-HI356-DEF-CREDLEFISH-NORM-C	951795003	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-054	II-HI356-DEF-CREDLEFISH-NORM-C	951795004	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-055	II-HI356-DEF-ROCKHIND-NORM-A	951794011	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-056	II-HI356-DEF-ROCKHIND-NORM-A	951794012	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-057	II-HI356-DEF-ROCKHIND-NORM-B	951796001	MB4R680817	LC2R60817	951796-1	MB4R680817	LC2R80817	951769-10
RT-058	II-HI356-DEF-ROCKHIND-NORM-B	951796002	MB4R680817	LC2R60817	951796-1	MB4R680817	LC2R80817	951769-10
RT-059	II-HI356-DEF-ROCKHIND-NORM-C	951794007	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-060	II-HI356-DEF-ROCKHIND-NORM-C	951794008	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-061	II-GC19-DEF-CHAMA-NORM-A	951622009	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-062	II-GC19-DEF-CHAMA-NORM-A	951622010	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-063	II-GC19-DEF-CHAMA-NORM-B	951622001	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-064	II-GC19-DEF-CHAMA-NORM-B	951622002	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-065	II-GC19-DEF-CHAMA-NORM-C	951622003	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-066	II-GC19-DEF-CHAMA-NORM-C	951622004	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12

Table D-245. (Continued).

Sample ID	Field ID	Lab ID	^{226}Ra			^{228}Ra		
			Blank ID	Standard ID	Spike ID	Blank ID	Standard ID	Spike ID
RT-067	II-GC19- DEF-SPONDYLUS-NORM-A	951625019	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-068	II-GC19- DEF-SPONDYLUS-NORM-A	951625020	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-069	II-GC19- DEF-SPONDYLUS-NORM-B	951625015	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-070	II-GC19- DEF-SPONDYLUS-NORM-B	951625016	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-071	II-GC19- DEF-SPONDYLUS-NORM-C	951625017	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-072	II-GC19- DEF-SPONDYLUS-NORM-C	951625018	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-073	II-GC19-DEF-CHUB-NORM-A	951795009	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-074	II-GC19-DEF-CHUB-NORM-A	951795010	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-075	II-GC19-DEF-CHUB-NORM-B	951796003	MB4R680817	LC2R60817	951796-1	MB4R680817	LC2R80817	951769-10
RT-076	II-GC19-DEF-CHUB-NORM-B	951796004	MB4R680817	LC2R60817	951796-1	MB4R680817	LC2R80817	951769-10
RT-077	II-GC19-DEF-CHUB-NORM-C	951795013	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-078	II-GC19-DEF-CHUB-NORM-C	951795014	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-079	II-GC19-DEF-CREOLEFISH-NORM-A	951795019	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-080	II-GC19-DEF-CREOLEFISH-NORM-A	951795020	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-081	II-GC19-DEF-CREDLEFISH-NORM-B	951794015	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-082	II-GC19-DEF-CREDLEFISH-NORM-B	951794016	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-083	II-GC19-DEF-CREDLEFISH-NORM-C	951794005	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-084	II-GC19-DEF-CREDLEFISH-NORM-C	951794006	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-085	II-GC19-DEF-TRIGGERFISH-NORM-A	951795005	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-086	II-GC19-DEF-TRIGGERFISH-NORM-A	951795006	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-087	II-GC19-DEF-TRIGGERFISH-NORM-B	951795017	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-088	II-GC19-DEF-TRIGGERFISH-NORM-B	951795018	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-089	II-GC19-DEF-TRIGGERFISH-NORM-C	951794013	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-090	II-GC19-DEF-TRIGGERFISH-NORM-C	951794014	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-091	II-EI361-DEF-CHAMA-NORM-A	951622005	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-092	II-EI361-DEF-CHAMA-NORM-A	951622006	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-093	II-EI361-DEF-CHAMA-NORM-B	951622007	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-094	II-EI361-DEF-CHAMA-NORM-B	951622008	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-095	II-EI361-DEF-CHAMA-NORM-C	951622017	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-096	II-EI361-DEF-CHAMA-NORM-C	951622018	MB2R60726	LC1R60726	951622-2	MB2R80726	LC1R80726	951622-12
RT-097	II-EI361-DEF-SPONDYLUS-NORM-A	951625005	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-098	II-EI361-DEF-SPONDYLUS-NORM-A	951625006	MB2R60728	LC1R60728	951625-5	MB2R80728	LC1R80728	951625-12
RT-099	II-EI361-DEF-SPONDYLUS-NORM-B	951624009	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2
RT-100	II-EI361-DEF-SPONDYLUS-NORM-B	951624010	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2

Table D-245. (Continued).

Sample ID	Field ID	Lab ID	^{226}Ra			^{228}Ra		
			Blank ID	Standard ID	Spike ID	Blank ID	Standard ID	Spike ID
RT-101	II-EI361-DEF-SPONDYLUS-NORM-C	951624011	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2
RT-102	II-EI361-DEF-SPONDYLUS-NORM-C	951624012	MB4R60727	LC2R60727	951624-9	MB4R80727	LC2R80727	951626-2
RT-103	II-EI361-DEF-CHUB-NORM-A	951694001	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-104	II-EI361-DEF-CHUB-NORM-A	951694002	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-105	II-EI361-DEF-CHUB-NORM-B	951694003	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-106	II-EI361-DEF-CHUB-NORM-B	951694004	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-107	II-EI361-DEF-CHUB-NORM-C	951694011	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-108	II-EI361-DEF-CHUB-NORM-C	951694012	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-109	II-EI361-DEF-CREOLE FISH-NORM-A	951694005	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-110	II-EI361-DEF-CREOLE FISH-NORM-A	951694006	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-111	II-EI361-DEF-CREOLE FISH-NORM-B	951694015	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-112	II-EI361-DEF-CREOLE FISH-NORM-B	951694016	MB2R60803	LC1R60803	951649-1	MB2R80803	LC1R80803	951694-16
RT-113	II-EI361-DEF-CREDLEFISH-NORM-C	951794019	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-114	II-EI361-DEF-CREDLEFISH-NORM-C	951794020	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-115	II-EI361-DEF-TRIGGERFISH-NORM-A	951794001	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-116	II-EI361-DEF-TRIGGERFISH-NORM-A	951794002	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-117	II-EI361-DEF-TRIGGERFISH-NORM-B	951795011	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-118	II-EI361-DEF-TRIGGERFISH-NORM-B	951795012	MB2R680817	LC1R60817	951795-3	MB2R680817	LC1R80817	951795-18
RT-119	II-EI361-DEF-TRIGGERFISH-NORM-C	951794009	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-120	II-EI361-DEF-TRIGGERFISH-NORM-C	951794010	MB4R680815	LC2R60815	951794-10	MB4R680815	LC2R80815	951794-16
RT-121	III-EB165-DEF-CHAMA-NORM-A	960169019	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-122	III-EB165-DEF-CHAMA-NORM-A	960256019	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-123	III-EB165-DEF-CHAMA-NORM-B	960170001	MB4R60201	LC2R60201	960170-3	MB4R80201	LC2R80201	960170-3
RT-124	III-EB165-DEF-CHAMA-NORM-B	960257001	MB4R60213	LC2R60213	960257-3	MB4R80213	LC2R80213	960257-3
RT-125	III-EB165-DEF-CHAMA-NORM-C	960170004	MB4R60201	LC2R60201	960170-3	MB4R80201	LC2R80201	960170-3
RT-126	III-EB165-DEF-CHAMA-NORM-C	960257004	MB4R60213	LC2R60213	960257-3	MB4R80213	LC2R80213	960257-3
RT-127	III-EB165-DEF-SPONDYLUS-NORM-A	960169002	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-128	III-EB165-DEF-SPONDYLUS-NORM-A	960256002	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-129	III-EB165-DEF-SPONDYLUS-NORM-B	960169003	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-130	III-EB165-DEF-SPONDYLUS-NORM-B	960256003	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-131	III-EB165-DEF-SPONDYLUS-NORM-C	960169015	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-132	III-EB165-DEF-SPONDYLUS-NORM-C	960256015	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-133	III-EB165-DEF-CHUB-NORM-A	960322018	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-134	III-EB165-DEF-CHUB-NORM-A	960322020	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20

Table D-245. (Continued).

Sample ID	Field ID	Lab ID	^{226}Ra			^{228}Ra		
			Blank ID	Standard ID	Spike ID	Blank ID	Standard ID	Spike ID
RT-135	III-EB165-DEF-CHUB-NORM-B	960326004	MB4R60226	LC2R60226	960326-1	MB4R80226	LC2R80226	960326-12
RT-136	III-EB165-DEF-CHUB-NORM-B	960326012	MB4R60226	LC2R60226	960326-1	MB4R80226	LC2R80226	960326-12
RT-137	III-EB165-DEF-CHUB-NORM-C	960322012	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-138	III-EB165-DEF-CHUB-NORM-C	960324009	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-139	III-EB165-DEF-CREOLEFISH-NORM-A	960323013	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-140	III-EB165-DEF-CREOLEFISH-NORM-A	960323014	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-141	III-EB165-DEF-CREOLEFISH-NORM-B	960326009	MB4R60226	LC2R60226	960326-1	MB4R80226	LC2R80226	960326-12
RT-142	III-EB165-DEF-CREOLEFISH-NORM-B	960326011	MB4R60226	LC2R60226	960326-1	MB4R80226	LC2R80226	960326-12
RT-143	III-EB165-DEF-CREOLEFISH-NORM-C	960324011	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-144	III-EB165-DEF-CREOLEFISH-NORM-C	960324012	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-145	III-EB165-DEF-SERGMAJOR-NORM-A	960324006	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-146	III-EB165-DEF-SERGMAJOR-NORM-A	960326006	MB4R60226	LC2R60226	960326-1	MB4R80226	LC2R80226	960326-12
RT-147	III-EB165-DEF-SERGMAJOR-NORM-B	960325003	MB2R60226	LC1R60226	960325-2	MB2R80226	ST1R80226	960325-9
RT-148	III-EB165-DEF-SERGMAJOR-NORM-B	960326014	MB4R60226	LC2R60226	960326-1	MB4R80226	LC2R80226	960326-12
RT-149	III-EB165-DEF-SERGMAJOR-NORM-C	960323018	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-150	III-EB165-DEF-SERGMAJOR-NORM-C	960323020	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-151	III-HI356-DEF-CHAMA-NORM-A	960169008	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-152	III-HI356-DEF-CHAMA-NORM-A	960256008	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-153	III-HI356-DEF-CHAMA-NORM-B	960169011	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-154	III-HI356-DEF-CHAMA-NORM-B	960256011	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-155	III-HI356-DEF-CHAMA-NORM-C	960169010	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-156	III-HI356-DEF-CHAMA-NORM-C	960256010	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-157	III-HI356-DEF-SPONDYLUS-NORM-A	960169016	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-158	III-HI356-DEF-SPONDYLUS-NORM-A	960256016	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-159	III-HI356-DEF-SPONDYLUS-NORM-B	960169007	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-160	III-HI356-DEF-SPONDYLUS-NORM-B	960256007	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-161	III-HI356-DEF-SPONDYLUS-NORM-C	960169013	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-162	III-HI356-DEF-SPONDYLUS-NORM-C	960256013	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-163	III-HI356-DEF-CHUB-NORM-A	960322007	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-164	III-HI356-DEF-CHUB-NORM-A	960322010	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-165	III-HI356-DEF-CHUB-NORM-B	960322008	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-166	III-HI356-DEF-CHUB-NORM-B	960322015	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-167	III-HI356-DEF-CHUB-NORM-C	960322003	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-168	III-HI356-DEF-CHUB-NORM-C	960322006	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20

Table D-245. (Continued).

Sample ID	Field ID	Lab ID	^{226}Ra			^{228}Ra		
			Blank ID	Standard ID	Spike ID	Blank ID	Standard ID	Spike ID
RT-169	III-HI356-DEF-CREOLEFISH-NORM-A	960322004	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-170	III-HI356-DEF-CREOLEFISH-NORM-A	960322009	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-171	III-HI356-DEF-CREOLEFISH-NORM-B	960322001	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-172	III-HI356-DEF-CREOLEFISH-NORM-B	960322002	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-173	III-HI356-DEF-CREOLEFISH-NORM-C	960322011	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-174	III-HI356-DEF-CREOLEFISH-NORM-C	960324010	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-175	III-HI356-DEF-SERGMAJOR-NORM-A	960323009	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-176	III-HI356-DEF-SERGMAJOR-NORM-A	960323010	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-177	III-HI356-DEF-SERGMAJOR-NORM-B	960323011	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-178	III-HI356-DEF-SERGMAJOR-NORM-B	960323012	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-179	III-HI356-DEF-SERGMAJOR-NORM-C	960324013	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-180	III-HI356-DEF-SERGMAJOR-NORM-C	960324014	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-181	III-GC19-DEF-CHAMA-NORM-A	960169009	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-182	III-GC19-DEF-CHAMA-NORM-A	960256009	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-183	III-GC19-DEF-CHAMA-NORM-B	960169006	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-184	III-GC19-DEF-CHAMA-NORM-B	960256006	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-185	III-GC19-DEF-CHAMA-NORM-C	960169005	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-186	III-GC19-DEF-CHAMA-NORM-C	960256005	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-187	III-GC19-DEF-SPONDYLUS-NORM-A	960170002	MB4R60201	LC2R60201	960170-3	MB4R80201	LC2R80201	960170-3
RT-188	III-GC19-DEF-SPONDYLUS-NORM-A	960257002	MB4R60213	LC2R60213	960257-3	MB4R80213	LC2R80213	960257-3
RT-189	III-GC19-DEF-SPONDYLUS-NORM-B	960169001	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-190	III-GC19-DEF-SPONDYLUS-NORM-B	960256001	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-191	III-GC19-DEF-SPONDYLUS-NORM-C	960169020	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-192	III-GC19-DEF-SPONDYLUS-NORM-C	960256020	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-193	III-GC19-DEF-CHUB-NORM-A	960324003	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-194	III-GC19-DEF-CHUB-NORM-A	960324004	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-195	III-GC19-DEF-CHUB-NORM-B	960325008	MB2R60226	LC1R60226	960325-2	MB2R80226	ST1R80226	960325-9
RT-196	III-GC19-DEF-CHUB-NORM-B	960325009	MB2R60226	LC1R60226	960325-2	MB2R80226	ST1R80226	960325-9
RT-197	III-GC19-DEF-CHUB-NORM-C	960323002	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-198	III-GC19-DEF-CHUB-NORM-C	960323008	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-199	III-GC19-DEF-CREOLEFISH-NORM-A	960323004	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-200	III-GC19-DEF-CREOLEFISH-NORM-A	960323005	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-201	III-GC19-DEF-CREOLEFISH-NORM-B	960322017	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-202	III-GC19-DEF-CREOLEFISH-NORM-B	960322019	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20

Table D-245. (Continued).

Sample ID	Field ID	Lab ID	^{226}Ra			^{228}Ra		
			Blank ID	Standard ID	Spike ID	Blank ID	Standard ID	Spike ID
RT-203	III-GC19-DEF-CREOLEFISH-NORM-C	960324005	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-204	III-GC19-DEF-CREOLEFISH-NORM-C	960324008	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-205	III-GC19-DEF-TRIGGERFISH-NORM-A	960326005	MB4R60226	LC2R60226	960326-1	MB4R80226	LC2R80226	960326-12
RT-206	III-GC19-DEF-TRIGGERFISH-NORM-A	960326013	MB4R60226	LC2R60226	960326-1	MB4R80226	LC2R80226	960326-12
RT-207	III-GC19-DEF-TRIGGERFISH-NORM-B	960322014	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-208	III-GC19-DEF-TRIGGERFISH-NORM-B	960322016	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-209	III-GC19-DEF-TRIGGERFISH-NORM-C	960322005	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-210	III-GC19-DEF-TRIGGERFISH-NORM-C	960322013	MB2R60223	LC1R60223	960322-19	MB2R80223	LC1R80223	960322-20
RT-211	III-EI361-DEF-CHAMA-NORM-A	960170003	MB4R60201	LC2R60201	960170-3	MB4R80201	LC2R80201	960170-3
RT-212	III-EI361-DEF-CHAMA-NORM-A	960257003	MB4R60213	LC2R60213	960257-3	MB4R80213	LC2R80213	960257-3
RT-213	III-EI361-DEF-CHAMA-NORM-B	960169017	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-214	III-EI361-DEF-CHAMA-NORM-B	960256017	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-215	III-EI361-DEF-CHAMA-NORM-C	960169018	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-216	III-EI361-DEF-CHAMA-NORM-C	960256018	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-217	III-EI361-DEF-SPONDYLUS-NORM-A	960169012	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-218	III-EI361-DEF-SPONDYLUS-NORM-A	960256012	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-219	III-EI361-DEF-SPONDYLUS-NORM-B	960169014	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-220	III-EI361-DEF-SPONDYLUS-NORM-B	960256014	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-221	III-EI361-DEF-SPONDYLUS-NORM-C	960169004	MB2R60201	LC1R60201	960169-17	MB2R80201	LC1R80201	960169-19
RT-222	III-EI361-DEF-SPONDYLUS-NORM-C	960256004	MB2R60213	LC1R60213	960256-8	MB2R80213	ST1R80213	960256-10
RT-223	III-EI361-DEF-CHUB-NORM-A	960324007	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-224	III-EI361-DEF-CHUB-NORM-A	960326008	MB4R60226	LC2R60226	960326-1	MB4R80226	LC2R80226	960326-12
RT-225	III-EI361-DEF-CHUB-NORM-B	960324001	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-226	III-EI361-DEF-CHUB-NORM-B	960324002	MB6R60223	LC3R60223	960324-3	MB6R80223	LC3R80223	960324-8
RT-227	III-EI361-DEF-CHUB-NORM-C	960323001	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-228	III-EI361-DEF-CHUB-NORM-C	960323003	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-229	III-EI361-DEF-CREOLEFISH-NORM-A	960325004	MB2R60226	LC1R60226	960325-2	MB2R80226	ST1R80226	960325-9
RT-230	III-EI361-DEF-CREOLEFISH-NORM-A	960326003	MB4R60226	LC2R60226	960326-1	MB4R80226	LC2R80226	960326-12
RT-231	III-EI361-DEF-CREOLEFISH-NORM-B	960325006	MB2R60226	LC1R60226	960325-2	MB2R80226	ST1R80226	960325-9
RT-232	III-EI361-DEF-CREOLEFISH-NORM-B	960326015	MB4R60226	LC2R60226	960326-1	MB4R80226	LC2R80226	960326-12
RT-233	III-EI361-DEF-CREOLEFISH-NORM-C	960326007	MB4R60226	LC2R60226	960326-1	MB4R80226	LC2R80226	960326-12
RT-234	III-EI361-DEF-CREOLEFISH-NORM-C	960326010	MB4R60226	LC2R60226	960326-1	MB4R80226	LC2R80226	960326-12
RT-235	III-EI361-DEF-TRIGGERFISH-NORM-A	960323016	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-236	III-EI361-DEF-TRIGGERFISH-NORM-A	960323017	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17

Table D-245. (Continued).

Sample ID	Field ID	Lab ID	^{226}Ra			^{228}Ra		
			Blank ID	Standard ID	Spike ID	Blank ID	Standard ID	Spike ID
RT-237	III-EI361-DEF-TRIGGERFISH-NORM-B	960323006	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-238	III-EI361-DEF-TRIGGERFISH-NORM-B	960323007	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-239	III-EI361-DEF-TRIGGERFISH-NORM-C	960323015	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17
RT-240	III-EI361-DEF-TRIGGERFISH-NORM-C	960323019	MB4R60223	LC2R60223	960323-1	MB4R80223	LC3R80223	960323-17

Table D-246. ^{226}Ra activity in method blanks for tissue sample analyses.

Blank ID	Activity (pCi/g)
MB2R60213	0.002
MB2R680817	0.003
MB2R60201	-0.008
MB2R60223	0.000
MB2R60226	0.001
MB2R60726	0.002
MB2R60727	-0.023
MB2R60803	0.004
MB4R60213	0.002
MB4R680815	0.004
MB4R680817	0.008
MB4R60201	0.002
MB4R60223	-0.001
MB4R60226	-0.001
MB4R60727	-0.003
MB2R60728	0.007
MB6R60223	-0.012

Table D-247. Percent recovery of ^{226}Ra in reference standard samples for tissue sample analyses.

Standard ID	Percent Recovery
LC1R60213	108
LC1R60817	104
LC1R60201	106
LC1R60223	108
LC1R60226	101
LC1R60726	103
LC1R60727	126
LC1R60803	97
LC2R60213	101
LC2R60815	102
LC2R60817	104
LC2R60201	95
LC2R60223	97
LC2R60226	99
LC2R60727	98
LC1R60728	99
LC3R60223	119

Table D-248. Percent recovery of ^{226}Ra in spiked samples for tissue sample analyses.

Spike ID	Percent Recovery
960256-8	80
951795-3	86
960169-17	70
960322-19	85
960325-2	98
951622-2	94
951623-1	107
951649-1	89
960257-3	86
951794-10	107
951796-1	90
960170-3	66
960323-1	93
960326-1	87
951624-9	109
951625-5	97
960324-3	88

Table D-249. ^{228}Ra activity in method blanks for tissue sample analyses.

Blank ID	Activity (pCi/g)
MB1R80213	-0.016
MB2R680817	0.010
MB2R80201	0.018
MB2R80223	0.005
MB2R80226	-0.004
MB2R80726	-0.008
MB2R80727	0.000
MB2R80803	0.013
MB4R80213	-0.070
MB4R680815	0.004
MB4R680817	0.011
MB4R80201	0.005
MB4R80223	0.008
MB4R80226	0.012
MB4R80727	0.006
MB2R80728	0.004
MB6R80223	-0.062

Table D-250. Percent recovery of ^{228}Ra in reference standard samples for tissue samples analyses.

Standard ID	Percent Recovery
ST1R80213	89
LC1R80817	106
LC1R80201	114
LC1R80223	100
ST1R80226	78
LC1R80726	115
LC1R80727	95
LC1R80803	108
LC2R80213	118
LC2R80815	98
LC2R80817	104
LC2R80201	108
LC3R80223	98
LC2R80226	103
LC2R80727	98
LC1R80728	95
LC3R80223	74

Table D-251. Percent recovery of ^{228}Ra in spiked samples for tissue sample analyses.

Spike ID	Percent Recovery
960256-10	52
951795-18	92
960169-19	70
960322-20	100
960325-9	82
951622-12	111
951623-10	96
951694-16	80
960257-3	87
951794-16	98
951769-10	104
960170-3	107
960323-17	92
960326-12	88
951626-2	98
951625-12	83
960324-8	105

APPENDIX E

RESULTS OF INTERLABORATORY COMPARISONS

Table E-1. Comparisons of volatile organic compound results (µg/L) for a produced water sample analyzed by the Battelle Ocean Science (BOS) and Arthur D. Little, Inc. (ADL) laboratories.

Analyte	BOS	ADL
Benzene	550	730
Toluene	360	700
Ethylbenzene	63	72
C_3-Benzene	44	180
C_4-Benzene	8.2	56

Table E-2. Comparison of volatile organic compound results (µg/L) for an ambient seawater sample analyzed by the Battelle Ocean Sciences (BOS) and Arthur D. Little, Inc. (ADL) laboratories.

Analyte	BOS	ADL
Benzene	0.28J	ND
Toluene	0.53	ND
Ethylbenzene	ND	ND
C_3-Benzene	0.44J	ND
C_4-Benzene	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table E-3. Comparison of volatile organic compound analytical results (ng/g wet weight) for a jewel box tissue sample analyzed by the Battelle Ocean Sciences (BOS) and Arthur D. Little, Inc. (ADL) laboratories.

Analyte	BOS	ADL
Benzene	ND	ND
Toluene	ND	8.8
Ethylbenzene	ND	ND
C_3-Benzene	ND	ND
C_4-Benzene	ND	ND

ND = Concentration below the method detection limit.

Table E-4. Comparison of volatile organic compound analytical results (ng/g wet weight) for a yellow chub tissue sample analyzed by the Battelle Ocean Sciences (BOS) and Arthur D. Little, Inc. (ADL) laboratories.

Analyte	BOS	ADL
Benzene	ND	ND
Toluene	ND	ND
Ethylbenzene	ND	ND
C_3-Benzene	ND	ND
C_4-Benzene	ND	ND

ND = Concentration below the method detection limit.

Table E-5. Comparison of volatile organic compound analytical results (ng/g wet weight) for a creole-fish tissue sample analyzed by the Battelle Ocean Sciences (BOS) and Arthur D. Little, Inc. (ADL) laboratories.

Analyte	BOS	ADL
Benzene	ND	ND
Toluene	ND	ND
Ethylbenzene	ND	ND
C_3-Benzene	ND	ND
C_4-Benzene	ND	ND

ND = Concentration below the method detection limit.

Table E-6. Comparison of volatile organic compound analytical results (ng/g wet weight) for a red snapper tissue sample analyzed by the Battelle Ocean Sciences (BOS) and Arthur D. Little, Inc. (ADL) laboratories.

Analyte	BOS	ADL
Benzene	ND	ND
Toluene	ND	ND
Ethylbenzene	ND	ND
C_3-Benzene	ND	ND
C_4-Benzene	ND	ND

ND = Concentration below the method detection limit.

Table E-7. Comparison of volatile organic compound analytical results (ng/g wet weight) for a rockhind tissue sample analyzed by the Battelle Ocean Sciences (BOS) and Arthur D. Little, Inc. (ADL) laboratories.

Analyte	BOS	ADL
Benzene	ND	ND
Toluene	ND	ND
Ethylbenzene	ND	ND
C_3-Benzene	ND	ND
C_4-Benzene	ND	ND

ND = Concentration below the method detection limit.

Table E-8. Comparison of volatile organic compound analytical results (ng/g wet weight) for a spadefish tissue sample analyzed by the Battelle Ocean Sciences (BOS) and Arthur D. Little, Inc. (ADL) laboratories.

Analyte	BOS	ADL
Benzene	ND	ND
Toluene	ND	ND
Ethylbenzene	ND	ND
C_3-Benzene	ND	ND
C_4-Benzene	ND	ND

ND = Concentration below the method detection limit.

Table E-9. Comparison of semivolatile organic compound analytical results (ng/L) for a produced water sample analyzed by the Arthur D. Little, Inc. (ADL) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	ADL	BOS
Phenol	290,000	370,000
Naphthalene	18,000	15,000
2-C_1-Naphthalene	7,700	9,300
1-C_1-Naphthalene	6,100	7,600
2,6-C_2-Naphthalene	1,000	1,300
2,3,5-C_3-Naphthalene	360	270
C_1-Naphthalenes	8,800	9,100
C_2-Naphthalenes	5,100	4,500
C_3-Naphthalenes	2,400	2,300
C_4-Naphthalenes	1,400	940
Acenaphthylene	560	730
Acenaphthene	140	ND
Biphenyl	840	840
Fluorene	130	140
C_1-Fluorenes	820	270
C_2-Fluorenes	870	450
C_3-Fluorenes	470	ND
Anthracene	ND	ND
Phenanthrene	160	170
1-C_1-Phenanthrene	74	87
C_1-Phenanthrenes/anthracenes	360	330
C_2-Phenanthrenes/anthracenes	390	480
C_3-Phenanthrenes/anthracenes	240	400
C_4-Phenanthrenes/anthracenes	ND	322
Dibenzothiophene	120	94
C_1-Dibenzothiophenes	290	210
C_2-Dibenzothiophenes	500	300
C_3-Dibenzothiophenes	490	340
Flouranthene	20	ND
Pyrene	25	ND
C_1-Flouranthenes/pyrenes	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND
Benzo[a]anthracene	ND	ND
Chrysene	ND	ND
C_1-Chrysenes	ND	ND
C_2-Chrysenes	ND	ND
C_3-Chrysenes	ND	ND
C_4-Chrysenes	ND	ND
Benzo[b]fluoranthene	ND	ND
Benzo[k]fluoranthene	ND	ND
Bis(ethylhexyl)phthalate	160JB	100B
Benzo[e]pyrene	ND	ND
Benzo[a]pyrene	ND	ND
Perylene	86	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND
Dibenzo[a,h]anthracene	ND	ND
Benzo[g,h,i]perylene	ND	ND

B = Analyte present in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table E-10. Comparison of semivolatile organic compound analytical results (ng/L) for an ambient seawater sample analyzed by the Arthur D. Little, Inc. (ADL) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	ADL	BOS
Phenol	110	ND
Naphthalene	9.7J	ND
2-C_1-Naphthalene	ND	ND
1-C_1-Naphthalene	ND	ND
2,6-C_2-Naphthalene	ND	ND
2,3,5-C_3-Naphthalene	ND	ND
C_1-Naphthalenes	ND	ND
C_2-Naphthalenes	ND	ND
C_3-Naphthalenes	ND	ND
C_4-Naphthalenes	ND	ND
Acenaphthylene	ND	ND
Acenaphthene	ND	ND
Biphenyl	ND	ND
Fluorene	ND	ND
C_1-Fluorenes	ND	ND
C_2-Fluorenes	ND	ND
C_3-Fluorenes	ND	ND
Anthracene	ND	ND
Phenanthrene	ND	ND
1-C_1-Phenanthrene	ND	ND
C_1-Phenanthrenes/anthracenes	ND	ND
C_2-Phenanthrenes/anthracenes	ND	ND
C_3-Phenanthrenes/anthracenes	ND	ND
C_4-Phenanthrenes/anthracenes	ND	ND
Dibenzothiophene	ND	ND
C_1-Dibenzothiophenes	ND	ND
C_2-Dibenzothiophenes	ND	ND
C_3-Dibenzothiophenes	ND	ND
Flouranthene	ND	ND
Pyrene	ND	ND
C_1-Flouranthenes/pyrenes	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND
Benzo[a]anthracene	ND	ND
Chrysene	ND	ND
C_1-Chrysenes	ND	ND
C_2-Chrysenes	ND	ND
C_3-Chrysenes	ND	ND
C_4-Chrysenes	ND	ND
Benzo[b]fluoranthene	ND	ND
Benzo[k]fluoranthene	ND	ND
Bis(ethylhexyl)phthalate	130JB	ND
Benzo[e]pyrene	ND	ND
Benzo[a]pyrene	ND	ND
Perylene	ND	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND
Dibenzo[a,h]anthracene	ND	ND
Benzo[g,h,i]perylene	ND	ND

B = Analyte present in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table E-11. Comparison of semivolatile organic compound analytical results (ng/g wet weight) for a jewel box tissue sample analyzed by the Arthur D. Little, Inc. (ADL) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	ADL	BOS
Phenol	59B	---
Naphthalene	ND	1.2
2-C_1-Naphthalene	ND	1.0
1-C_1-Naphthalene	ND	0.52
2,6-C_2-Naphthalene	ND	ND
2,3,5-C_3-Naphthalene	ND	ND
C_1-Naphthalenes	ND	1.0
C_2-Naphthalenes	ND	ND
C_3-Naphthalenes	1.9J	ND
C_4-Naphthalenes	ND	ND
Acenaphthylene	ND	ND
Acenaphthene	ND	ND
Biphenyl	ND	ND
Fluorene	ND	ND
C_1-Fluorenes	ND	ND
C_2-Fluorenes	ND	ND
C_3-Fluorenes	ND	ND
Anthracene	ND	ND
Phenanthrene	1.1J	1.8
1-C_1-Phenanthrene	ND	ND
C_1-Phenanthrenes/anthracenes	ND	ND
C_2-Phenanthrenes/anthracenes	ND	ND
C_3-Phenanthrenes/anthracenes	ND	ND
C_4-Phenanthrenes/anthracenes	ND	ND
Dibenzothiophene	ND	ND
C_1-Dibenzothiophenes	ND	ND
C_2-Dibenzothiophenes	ND	ND
C_3-Dibenzothiophenes	ND	ND
Flouranthene	ND	2.2
Pyrene	0.90J	2.0
C_1-Flouranthenes/pyrenes	0.93J	ND
C_2-Flouranthenes/pyrenes	ND	ND
Benzo[a]anthracene	0.64J	0.87
Chrysene	0.68J	0.98
C_1-Chrysenes	ND	ND
C_2-Chrysenes	ND	ND
C_3-Chrysenes	ND	ND
C_4-Chrysenes	ND	ND
Benzo[b]fluoranthene	ND	0.78
Benzo[k]fluoranthene	ND	ND
Bis(ethylhexyl)phthalate	39JB	---
Benzo[e]pyrene	ND	1.1
Benzo[a]pyrene	ND	0.71
Perylene	1.1J	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND
Dibenzo[a,h]anthracene	ND	ND
Benzo[g,h,i]perylene	ND	ND

B = Analyte present in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table E-12. Comparison of semivolatile organic compound analytical results (ng/g wet weight) for a yellow chub tissue sample analyzed by the Arthur D. Little, Inc. (ADL) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	ADL	BOS
Phenol	11J	---
Naphthalene	ND	0.82
2-C_1-Naphthalene	ND	ND
1-C_1-Naphthalene	ND	ND
2,6-C_2-Naphthalene	ND	ND
2,3,5-C_3-Naphthalene	ND	ND
C_1-Naphthalenes	ND	ND
C_2-Naphthalenes	ND	ND
C_3-Naphthalenes	ND	ND
C_4-Naphthalenes	ND	ND
Acenaphthylene	ND	ND
Acenaphthene	ND	ND
Biphenyl	ND	ND
Fluorene	ND	ND
C_1-Fluorenes	ND	ND
C_2-Fluorenes	ND	ND
C_3-Fluorenes	ND	ND
Anthracene	ND	ND
Phenanthrene	ND	ND
1-C_1-Phenanthrene	ND	ND
C_1-Phenanthrenes/anthracenes	ND	ND
C_2-Phenanthrenes/anthracenes	ND	ND
C_3-Phenanthrenes/anthracenes	ND	ND
C_4-Phenanthrenes/anthracenes	ND	ND
Dibenzothiophene	ND	ND
C_1-Dibenzothiophenes	ND	ND
C_2-Dibenzothiophenes	ND	ND
C_3-Dibenzothiophenes	ND	ND
Flouranthene	ND	ND
Pyrene	ND	ND
C_1-Flouranthenes/pyrenes	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND
Benzo[a]anthracene	ND	ND
Chrysene	ND	ND
C_1-Chrysenes	ND	ND
C_2-Chrysenes	ND	ND
C_3-Chrysenes	ND	ND
C_4-Chrysenes	ND	ND
Benzo[b]fluoranthene	ND	ND
Benzo[k]fluoranthene	ND	ND
Bis(ethylhexyl)phthalate	ND	---
Benzo[e]pyrene	ND	ND
Benzo[a]pyrene	ND	ND
Perylene	ND	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND
Dibenzo[a,h]anthracene	ND	ND
Benzo[g,h,i]perylene	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table E-13. Comparison of semivolatile organic compound analytical results (ng/g wet weight) for a red snapper tissue sample analyzed by the Arthur D. Little, Inc. (ADL) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	ADL	BOS
Phenol	27J	---
Naphthalene	ND	3.08
2-C_1-Naphthalene	ND	1.08
1-C_1-Naphthalene	ND	0.59
2,6-C_2-Naphthalene	ND	1.02
2,3,5-C_3-Naphthalene	5.0J	ND
C_1-Naphthalenes	ND	ND
C_2-Naphthalenes	ND	ND
C_3-Naphthalenes	ND	ND
C_4-Naphthalenes	ND	ND
Acenaphthylene	ND	ND
Acenaphthene	ND	ND
Biphenyl	ND	ND
Fluorene	ND	ND
C_1-Fluorenes	ND	ND
C_2-Fluorenes	ND	ND
C_3-Fluorenes	ND	ND
Anthracene	ND	ND
Phenanthrene	ND	ND
1-C_1-Phenanthrene	ND	ND
C_1-Phenanthrenes/anthracenes	ND	ND
C_2-Phenanthrenes/anthracenes	ND	ND
C_3-Phenanthrenes/anthracenes	ND	ND
C_4-Phenanthrenes/anthracenes	ND	ND
Dibenzothiophene	ND	ND
C_1-Dibenzothiophenes	ND	ND
C_2-Dibenzothiophenes	ND	ND
C_3-Dibenzothiophenes	ND	ND
Flouranthene	ND	ND
Pyrene	ND	ND
C_1-Flouranthenes/pyrenes	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND
Benzo[a]anthracene	ND	ND
Chrysene	ND	ND
C_1-Chrysenes	ND	ND
C_2-Chrysenes	ND	ND
C_3-Chrysenes	ND	ND
C_4-Chrysenes	ND	ND
Benzo[b]fluoranthene	ND	ND
Benzo[k]fluoranthene	ND	ND
Bis(ethylhexyl)phthalate	ND	---
Benzo[e]pyrene	ND	ND
Benzo[a]pyrene	ND	ND
Perylene	ND	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND
Dibenzo[a,h]anthracene	ND	ND
Benzo[g,h,i]perylene	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table E-14. Comparison of semivolatile organic compound analytical results (ng/g wet weight) for a rockhind tissue sample analyzed by the Arthur D. Little, Inc. (ADL) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	ADL	BOS
Phenol	53B	---
Naphthalene	2.2JB	2.4B
2-C_1-Naphthalene	ND	1.5
1-C_1-Naphthalene	ND	0.8
2,6-C_2-Naphthalene	ND	ND
2,3,5-C_3-Naphthalene	ND	ND
C_1-Naphthalenes	ND	1.4
C_2-Naphthalenes	ND	ND
C_3-Naphthalenes	ND	ND
C_4-Naphthalenes	ND	ND
Acenaphthylene	ND	ND
Acenaphthene	ND	ND
Biphenyl	ND	0.52
Fluorene	ND	ND
C_1-Fluorenes	ND	ND
C_2-Fluorenes	ND	ND
C_3-Fluorenes	ND	ND
Anthracene	ND	ND
Phenanthrene	ND	0.75
1-C_1-Phenanthrene	ND	ND
C_1-Phenanthrenes/anthracenes	ND	ND
C_2-Phenanthrenes/anthracenes	ND	ND
C_3-Phenanthrenes/anthracenes	ND	ND
C_4-Phenanthrenes/anthracenes	ND	ND
Dibenzothiophene	ND	ND
C_1-Dibenzothiophenes	ND	ND
C_2-Dibenzothiophenes	ND	ND
C_3-Dibenzothiophenes	ND	ND
Flouranthene	ND	ND
Pyrene	ND	ND
C_1-Flouranthenes/pyrenes	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND
Benzo[a]anthracene	ND	ND
Chrysene	ND	ND
C_1-Chrysenes	ND	ND
C_2-Chrysenes	ND	ND
C_3-Chrysenes	ND	ND
C_4-Chrysenes	ND	ND
Benzo[b]fluoranthene	ND	ND
Benzo[k]fluoranthene	ND	ND
Bis(ethylhexyl)phthalate	37JB	---
Benzo[e]pyrene	ND	ND
Benzo[a]pyrene	ND	ND
Perylene	ND	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND
Dibenzo[a,h]anthracene	ND	ND
Benzo[g,h,i]perylene	ND	ND

B = Analyte present in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table E-15. Comparison of semivolatile organic compound analytical results (ng/g wet weight) for a spadefish tissue sample analyzed by the Arthur D. Little, Inc. (ADL) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	ADL	BOS
Phenol	23JB	---
Naphthalene	3.0JB	1.95B
2-C_1-Naphthalene	ND	ND
1-C_1-Naphthalene	ND	ND
2,6-C_2-Naphthalene	ND	ND
2,3,5-C_3-Naphthalene	ND	ND
C_1-Naphthalenes	ND	ND
C_2-Naphthalenes	ND	ND
C_3-Naphthalenes	ND	ND
C_4-Naphthalenes	ND	ND
Acenaphthylene	ND	ND
Acenaphthene	ND	ND
Biphenyl	ND	ND
Fluorene	ND	ND
C_1-Fluorenes	ND	ND
C_2-Fluorenes	ND	ND
C_3-Fluorenes	ND	ND
Anthracene	ND	ND
Phenanthrene	ND	ND
1-C_1-Phenanthrene	ND	ND
C_1-Phenanthrenes/anthracenes	ND	ND
C_2-Phenanthrenes/anthracenes	ND	ND
C_3-Phenanthrenes/anthracenes	ND	ND
C_4-Phenanthrenes/anthracenes	ND	ND
Dibenzothiophene	ND	ND
C_1-Dibenzothiophenes	ND	ND
C_2-Dibenzothiophenes	ND	ND
C_3-Dibenzothiophenes	ND	ND
Flouranthene	ND	ND
Pyrene	ND	ND
C_1-Flouranthenes/pyrenes	ND	ND
C_2-Flouranthenes/pyrenes	ND	ND
Benzo[a]anthracene	ND	ND
Chrysene	ND	ND
C_1-Chrysenes	ND	ND
C_2-Chrysenes	ND	ND
C_3-Chrysenes	ND	ND
C_4-Chrysenes	ND	ND
Benzo[b]fluoranthene	ND	ND
Benzo[k]fluoranthene	ND	ND
Bis(ethylhexyl)phthalate	100JB	---
Benzo[e]pyrene	ND	ND
Benzo[a]pyrene	ND	ND
Perylene	ND	ND
Indeno[1,2,3,-c,d]pyrene	ND	ND
Dibenzo[a,h]anthracene	ND	ND
Benzo[g,h,i]perylene	ND	ND

B = Analyte present in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table E-16. Comparison of semivolatile organic compound analytical results (ng/g wet weight) for a gray triggerfish tissue sample analyzed by the Arthur D. Little, Inc. (ADL) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	ADL	BOS
Phenol	13JB	---
Naphthalene	ND	1.5B
2-C_1-Naphthalene	6.5	ND
1-C_1-Naphthalene	3.0J	ND
2,6-C_2-Naphthalene	2.0J	ND
2,3,5-C_3-Naphthalene	0.89J	ND
C_1-Naphthalenes	6.4	ND
C_2-Naphthalenes	14	ND
C_3-Naphthalenes	12	ND
C_4-Naphthalenes	6.3	ND
Acenaphthylene	ND	ND
Acenaphthene	66	ND
Biphenyl	2.4J	ND
Fluorene	11	ND
C_1-Fluorenes	11	ND
C_2-Fluorenes	ND	ND
C_3-Fluorenes	ND	ND
Anthracene	6.9	ND
Phenanthrene	46	ND
1-C_1-Phenanthrene	24	ND
C_1-Phenanthrenes/anthracenes	11	ND
C_2-Phenanthrenes/anthracenes	ND	ND
C_3-Phenanthrenes/anthracenes	ND	ND
C_4-Phenanthrenes/anthracenes	ND	ND
Dibenzothiophene	4.0	ND
C_1-Dibenzothiophenes	2.8	ND
C_2-Dibenzothiophenes	2.3	ND
C_3-Dibenzothiophenes	0.62J	ND
Flouranthene	23	ND
Pyrene	17	ND
C_1-Flouranthenes/pyrenes	8	ND
C_2-Flouranthenes/pyrenes	ND	ND
Benzo[a]anthracene	4.4	ND
Chrysene	4.6	ND
C_1-Chrysenes	1.9J	ND
C_2-Chrysenes	ND	ND
C_3-Chrysenes	ND	ND
C_4-Chrysenes	ND	ND
Benzo[b]fluoranthene	3.4	ND
Benzo[k]fluoranthene	1.0J	ND
Bis(ethylhexyl)phthalate	ND	---
Benzo[e]pyrene	3.3	ND
Benzo[a]pyrene	2.6	ND
Perylene	ND	ND
Indeno[1,2,3,-c,d]pyrene	2.1J	ND
Dibenzo[a,h]anthracene	0.53J	ND
Benzo[g,h,i]perylene	2.3JB	ND

B = Analyte present in procedural blank.
J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table E-17. Comparison of metal analytical results (µg/L) for a produced water sample analyzed by the Florida Institute of Technology (FIT) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	FIT	BOS
Arsenic	22	19
Barium	150,000	150,000
Cadmium	ND	---
Mercury	0.020J	---

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.

Table E-18. Comparison of metal analytical results (µg/L) for an ambient seawater sample analyzed by the Florida Institute of Technology (FIT) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	FIT	BOS
Arsenic	1.2	1.2
Barium	11	12
Cadmium	ND	0.34
Mercury	<0.010	0.0017

ND = Concentration below the MDL.

Table E-19. Comparison of metal analytical results (µg/g dry weight) for a jewel box tissue water sample analyzed by the Florida Institute of Technology (FIT) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	FIT	BOS
Arsenic	39	29
Barium	49	28
Cadmium	8.6	5.6
Mercury	0.15	0.12

Table E-20. Comparison of metal analytical results (µg/g dry weight) for a yellow chub tissue sample analyzed by the Florida Institute of Technology (FIT) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	FIT	BOS
Arsenic	1.7	1.3
Barium	0.12	0.010
Cadmium	0.01	0.030
Mercury	0.057	0.040

Table E-21. Comparison of metal analytical results (µg/g dry weight) for a red snapper tissue water sample analyzed by the Florida Institute of Technology (FIT) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	FIT	BOS
Arsenic	0.88	0.35
Barium	0.027J	0.030
Cadmium	0.016	0.025
Mercury	0.21	0.26

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table E-22. Comparison of metal analytical results (µg/g dry weight) for a rockhind tissue sample analyzed by the Florida Institute of Technology (FIT) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	FIT	BOS
Arsenic	0.62	1.9
Barium	0.21	0.050
Cadmium	0.008	0.017
Mercury	0.45	0.52

Table E-23. Comparison of metal analytical results (µg/g dry weight) for a spadefish tissue water sample analyzed by the Florida Institute of Technology (FIT) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	FIT	BOS
Arsenic	3.4	2.4
Barium	0.038J	0.070
Cadmium	0.003J	0.015
Mercury	0.12	0.13

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).

Table E-24. Comparison of metal analytical results (µg/g dry weight) for a gray triggerfish tissue sample analyzed by the Florida Institute of Technology (FIT) and Battelle Ocean Sciences (BOS) laboratories.

Analyte	FIT	BOS
Arsenic	5.7	12
Barium	0.12	0.040
Cadmium	0.026	0.071
Mercury	0.076	0.93

Table E-25. Comparison of radiochemical results for a produced water sample, an ambient seawater sample, and from tissue samples analyzed by the CORE Laboratories (CORE) and Paragon Analytics (PARAGON) laboratories.

Matrix	Analyte	CORE	PARAGON
Produced Water	^{226}Ra (pCi/L)	95	432
	^{228}Ra (pCi/L)	648	470
Ambient Seawater	^{226}Ra (pCi/L)	0.16	ND
	^{228}Ra (pCi/L)	ND	ND
Thorny oyster (tissue)	^{226}Ra (pCi/g)	0.017	0.0068
	^{228}Ra (pCi/g)	ND	0.0063
Yellow chub (tissue)	^{226}Ra (pCi/g)	0.001J	0.0083
	^{228}Ra (pCi/g)	ND	ND
Creole-fish (tissue)	^{226}Ra (pCi/g)	ND	ND
	^{228}Ra (pCi/g)	ND	ND
Gray triggerfish (tissue)	^{226}Ra (pCi/g)	0.003	ND
	^{228}Ra (pCi/g)	ND	ND

J = Qualifier indicating the value is between the method detection limit (MDL) and the practical quantitation level (defined as five times MDL).
ND = Concentration below the MDL.