Appendix A
List of Acronyms

AC .... Air conditioning
AFC .... Antifouling coating
AFFF .... Aqueous film forming foam
AFS .... Antifouling hull systems
AIS .... Aquatic Invasive Species
ANOVA .... Analysis of Variance
ASTM .... American Society for Testing and Materials
ATSDR .... Agency for Toxic Substances and Disease Registry
AWT .... Advanced Wastewater Treatment
BOD .... Biochemical oxygen demand
BLM .... Biotic Ligand Model
BM .... Benchmark
BMP .... Best management practice
BTEX .... Benzene, toluene, ethylbenzene, xylene
C .... Celsius
CCC .... Criteria Continuous Concentration
CFR .... Code of Federal Register
CFU .... Colony Forming Units
CMC .... Criteria Maximum Concentration
C-PORT .... Conference of Professional Operators for Response Towing
CRWQCB .... California Regional Water Quality Control Board
CSO .... Combined sewer overflow
CSV .... Comma-separated value
COC .... Chain of custody
COD .... Chemical oxygen demand
CTR .... California Toxics Rule
CWA .... Clean Water Act
DBP .... Di-n-butyl phthalate

DC .... Direct current
DEHP .... Bis(2-ethylhexyl) phthalate
DO .... Dissolved oxygen
DOC .... Dissolved organic carbon
DOD .... Department of Defense
EDD .... Electronic data deliverable
EPA .... Environmental Protection Agency
F .... Fahrenheit
f_d .... Average dissolved fraction
FW .... Fresh water
gpd .... Gallons per day
gpm .... Gallons per minute
GRT .... Gross register ton
HEM .... N-hexane extractable materials
HH .... Human health
HPLC .... High performance liquid chromatography
HQ .... Hazard quotient
ICCP .... Impressed current cathodic protection
IDL .... Interactive Data Language
IQR .... Interquartile range
kw .... Kilowatt
LCDR .... Lieutenant Commander
LCPL .... Landing craft personnel large
LNB .... Lower Newport Bay
MA DEP .... Massachusetts Department of Environmental Protection
MARPOL .... International Convention for the Prevention of Pollution from Ships
MDL .... Maximum daily load
MdR .... Marina del Rey
MF .... Membrane filtration
MISLE .... Marine Information for Safety and Law Enforcement

MPN ....Most Probable Number
MS...Microsoft
MSD......................................Marine Sanitation Device
MSIS.....................................Marine Safety Information System
MTBE...................................Methyl tertiary butyl ether
ND..Not detected
NH3-N ....Ammonia (total, as nitrogen)
NMMA ....National Marine Manufacturers Association
NO3/NO2-N ....Nitrate/Nitrite (as nitrogen)
NOAA...................................National Oceanic and Atmospheric Administration
NP ....Nonylphenol
NPEC....................................Nonylphenol polyethoxy carboxylate
NPEO ....Nonylphenol polyethoxylate
NRWQC................................National Recommended Water Quality Criteria
NTU ....Nephelometric Turbidity Units
O&G.....................................Oil and grease
OCPD ....Oceans and Coastal Protection Division
OPEO ....Octylphenol polyethoxylate
OWOW ....Office of Wetlands, Oceans, and Watersheds
PAH ....Polycyclic aromatic hydrocarbon
PBT.......................................Persistent, bioaccumulative, and toxic chemical
PHQ......................................Potential hazard quotient
P.L. ....Public Law
POTW ....Publicly owned treatment works
PPCP ....Pharmaceuticals and personal care product
ppt..Part(s) per thousand
PSU ....Practical salinity unit
P:T ....Power to tonnage ratio
QA/QC ....Quality assurance/quality control
QAPP....................................Quality Assurance Project Plan
QCW.....................................Quality Criteria for Water

RIB .... Rigid inflatable boat
RL .... Reporting limit
RPD .... Relative percent difference
RPM .... Rotations per minute
RSW .... Refrigerated seawater
SCCWRP .... Southern California Coastal Water Research Project
SDRWQCB .... San Diego Regional Water Quality Control Board
SGT-HEM .... Silica Gel Treated n-hexane extractable materials
SH .... Shellfish harvesting
SIYB .... Shelter Island Yacht Basin
SWRCB .... State Water Resources Control Board
SSO .... Sanitary sewer overflow
SVOC .... Semivolatile organic compound
SW .... Salt water
TBT .... Tributyltin
TIC .... Tentatively identified compound
TIE .... Toxicity identification and evaluation
TKN .... Total Kjeldahl Nitrogen
TMDL .... Total maximum daily load
TOC .... Total organic carbon
TP .... Total phosphorus
TRC .... Total residual chlorine
TSS .... Total suspended solids
UK .... United Kingdom
UNDS .... Uniform National Discharge Standards
U.S. .... United States
U.S.C .... United States Code
USCG .... United States Coast Guard
USGS .... United States Geological Survey
VGP .... Vessel General Permit
VESDOC .... Merchant Vessels of the United States

VOC..Volatile organic compound

W+O.......................................Water Quality Criteria for Human Health based on Water and Organism Consumption

WHO......................................World Health Organization

WHOI....................................Woods Hole Oceanographic Institute

WOD05..................................World Ocean Database 2005

WTLUS..................................Waterborne Transportation Lines of the United States

Appendix B
Additional Characteristics of the P.L. 110 – 299 Vessel Population

This appendix provides additional details regarding study vessels. These details include additional information on vessel subcategories, general information about vessels' areas of operation (based upon their hailing port), and additional details regarding vessels' age and areas of operation. The discussion is based on data from the 139,814 vessels in the MISLE database identified as being within the study vessel population. These data have limitations as discussed in section B.6.

B.1 Vessel Subcategories

Table B.1 presents the top five subcategories by each general vessel service to provide insight into the various types of vessels included the categories. Except for utility vessels (for which the top five vessel classes are listed), vessel types are displayed for all other vessel service categories. Vessel class generally relates to the vessel construction or design whereas the type is a more detailed explanation of the vessels purpose and capabilities.[1] As shown in Table B.1, fish catching vessels – which are the focus of the definition of commercial fishing vessels included by reference in P.L. 110-299 – account for the vast majority of commercial fishing vessels recorded in MISLE.

Table B.1: Top Five Vessel Subcategories by Vessel Service[ab]

Vessel Service	Vessel Type/Class[c]	Number of Vessels
Commercial Fishing Vessel	Fish Catching Vessel	68,343
	Fishing Catching/Processing Vessel	178
	General	174
	Motor Propelled Vessels	155
	Fishing Support Vessel	116
Other non-recreational vessels (less than 79 feet in length)		
Freight Barge	General	6,954
	Dry Cargo Barge	411
	Deck Barge	295
	Lash / Seabee Barge	36
	Container Barge	8
Freight Ship	General	533
	Fishing Support Vessel	23
	Fish Catching Vessel	21
	Container Ship	14
	Ro-Ro/Container	4
Passenger Vessel	General	12,559
	Charter Fishing Vessel	2,053
	Excursion/Tour Vessel	1,233
	Diving Vessel (Recreational)	305
	Water Taxi	298

[1] In addition, although not shown in *Table B.1*, a more detailed category exists in the database, *vessel subtype*. This field further breaks out the vessel types. For example, subtype fields that exist for fish catching vessels include trawlers, shrimpers, and whalers.

Vessel Service	Vessel Type/Class[c]	Number of Vessels
Public Vessel, Unclassified	General	145
	Law Enforcement (Non-military) Vessel	47
	Buoy/Lighthouse Tender	16
	Search and Rescue Vessel	14
	Patrol Ship	10
Tank Barge	Bulk Liquid Cargo (Tank) Barge	838
	Bulk Liquefied Gas Barge	10
	Dry Cargo Barge	7
	General	7
	Integrated Tug and Barge (Barge)	4
Tank Ship	General	102
	Petroleum Oil Tank Ship	22
	Gas Carrier	20
	Chemical Tank Ship	14
	Bulk Liquid Cargo (Tank) Barge	1
Utility Vessel	Towing Vessel	7,372
	Offshore	650
	Research Ship	488
	Barge	396
	School Ship	60

a This table is based on operational, U.S. flagged commercial fishing vessels (all lengths) and other non-recreational vessel less than 79 feet, including vessels that have an unspecified length (zero or null).
b "Unspecified" or "Miscellaneous Vessel" subcategories were not included among the top five vessel subcategories.
c Vessel *types* are displayed for all vessel service categories except for utility vessels; the top five vessel *classes* are listed for utility vessels.
Source:U.S. Coast Guard MISLE database, 2009

B.1.1 Population of Vessels undergoing Discharge Analysis

Table B.2 summarizes the population of specific vessel sub-types that were investigated and sampled by EPA: commercial fishing vessels, water taxis/ferries, tour vessels, towing vessels, emergency boats, and vessels classified as recreational vessels that operate as non-recreational vessels[2]. The vessel counts presented in the table provide rough estimates of the number of vessels that may be represented by each category of sampled vessels.[3]

EPA generally used the vessel service or current usage to categorize study vessels, however, the MISLE vessel classification generally refers to the category of vessel based on its original construction. The MISLE vessel type field provides the more detailed explanation of the vessels' purpose and current use. A more detailed vessel *subtype* category also exists in the MISLE database to further break out the vessel *types*. For example, MISLE has subtype entries for trawlers, shrimpers, and whalers within the fish catching vessel type, allowing for the population of vessels within these specific subtypes to be estimated.

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[2] EPA discusses the vessels sampled for this report in greater detail in Chapter 2 of this report.
[3] EPA considers these estimates to be only approximate counts due to the potential misclassification of vessels in MISLE as well as some of the dataset's ambiguous vessel classifications (e.g. categorizing a vessel as "general").

Table B.2: Total Number of Vessels in a Given Subtype which EPA Subsampled

Vessel Service	Vessel Type	Number of Vessels[a]	Percent of Vessel Type within Vessel Service
Commercial Fishing Vessel		69,944	100.0%
	All Commercial Fishing Vessel	*69,944*	*100.0%*
Passenger Vessels[b]		20,953	100.0%
	Water Taxi	*298*	*1.4%*
	Ferry	*272*	*1.3%*
	Excursion/Tour Vessel	*1,233*	*5.9%*
Utility Vessel		11,034	100.0%
	Towing Vessel (includes Tugboats)	*7,751*	*70.2%*
Non-Recreational Vessel		69,870	100.0%
	Classified as Recreational (on the basis of vessel type)	*1,624*	*2.3%*

a Number of vessels accounts for all vessels less than 79 feet in length, including vessels of unspecified length (zero or null)
b Most passenger vessels are listed as "general" passenger vessels: out of the approximately 21,000 passenger vessels, nearly 13,000 are listed as "general" passenger vessels.
Source: U. S. Coast Guard, MISLE database, 2009

In addition to the specific vessel types listed above, EPA sampled recreational vessels used in non-recreational service, in part to determine whether characteristics of their discharges differ from those of other types of vessels used in similar applications. The Clean Boating Act of 2008 covers vessels manufactured for recreational uses, unless they are inspected vessels used commercially.

Table B.3 provides examples of the most common vessels classified as recreational vessels in MISLE but that are identified as operating in a non-recreational capacity. Because the analysis presented throughout this section generally defines the population of moratorium vessels on the basis of the vessel service rather than original manufacture purpose, the vessel population estimate of generated for this report may overestimates the number of vessels to which the moratorium in P.L. 110-299 applies. Most vessels manufactured primarily for pleasure are permanently excluded from NPDES requirements by the Clean Boating Act[4] rather than the shorter-term moratorium in P.L. 110-299 as long those vessels meet the definition of a recreational vessel under the Clean Boating Act.

[4] The Clean Boating Act, P.L. 110-288 defines the term 'recreational vessel' to mean any vessel that is— ''(i) manufactured or used primarily for pleasure; or (ii) leased, rented, or chartered to a person for the pleasure of that person." However, the term recreational vessel excludes any vessel "that is subject to Coast Guard inspection and that is (i) engaged in commercial use or (ii) carries paying passengers.".

Table B.3: Examples of Study Vessels in a Non-Recreational Vessel Service, Classified as Recreational Vessels

Vessel Class	Vessel Service	Vessel Type	Number of Vessels
Recreational	Passenger Vessel	Passenger (Uninspected)	767
Recreational	Commercial Fishing Vessel	Commercial Fishing Vessel	232
Recreational	Utility Vessel	Research Vessel	22
Source: U. S. Coast Guard, MISLE database, 2009			

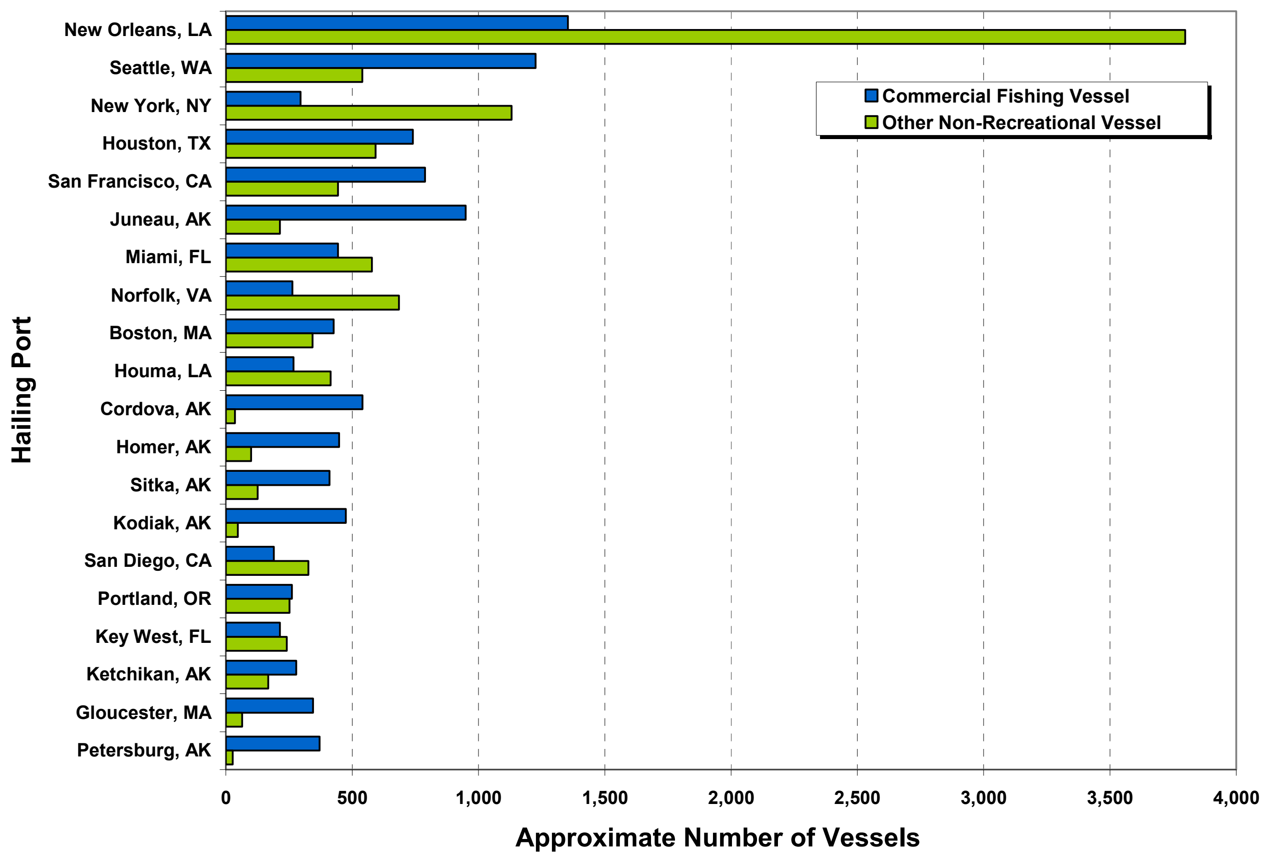
B.2 Vessel Geographical Area of Operation

EPA used MISLE data on hailing port of individual vessel records to characterize the geographical area of operation of vessels in the selected population. Although the hailing port does not account for the detailed traffic patterns of a vessel or for the amount of time a given vessel spends in the listed port, it nevertheless can provide information on a vessel's general area of operation. This may be particularly true of vessels that may have a fairly limited range of operation by virtue of their smaller size or the nature of activities they engage in (e.g., tug boat that operates within a given port area). Out of the 139,814 vessels in the study vessel population, 76,956 MISLE vessel records had sufficiently detailed information to determine their hailing state and general region of operation.[5]

Of the approximately 77,000 vessels records having sufficiently detailed information to determine their state and general region of operation, 20,000 vessels provided one of the hailing ports listed in Figure B.1. As evidenced by the figure, certain port cities, such as Seattle, WA and Juneau, AK are predominantly commercial fishing centers, while New Orleans, LA and New York, NY are predominantly listed by other non-recreational vessels. New Orleans, LA, is the most frequently cited hailing port with approximately 1,300 commercial fishing vessels and 3,800 other non-recreational vessels less than 79 feet. These hailing port distributions were used to inform estimates of vessels in a given water body for EPA's screening level modeling in Chapter 4 of this report.

[5] For the remaining vessels, the hailing port information was either missing or too incomplete to be used in the analysis (e.g., only city name is provided).

Figure B.1: Approximate Number of Study Vessels for Hailing Ports Frequently Cited in MISLE



Note: This table is based on 76,956 operational, U.S. flagged commercial fishing vessels and other non-recreational vessel less than 79 feet for which hailing port information is provided in MISLE. EPA notes that the hailing port information is only available for about half of the "study vessels" listed in the MISLE database.

Source: U. S. Coast Guard, MISLE database, 2009

Table B.4 presents the number of vessels by vessel service and the nine census divisions, as displayed in *Figure B.2* below.[6] The divisions are defined by the U.S. Census Bureau as standard geographical units for reporting data for aggregated states. Although not specifically designed for this purpose, the divisions tend to follow the major maritime trade axes and waterways (e.g., coastwise, inland, Great Lakes, Pacific and Atlantic Oceans, Mississippi River, Gulf of Mexico) and therefore provide useful groupings for reporting vessel population estimates. The majority of approximately 70,000 vessels within the scope of P.L. 110-299 for which MISLE provides a U.S. hailing port operate within the Pacific and South Atlantic divisions (28 and 25 percent of vessels, respectively). This regional distribution is driven in part by the large concentration of commercial fishing vessels in the two regions primarily in Alaska with 6,560 vessels and Florida with 3,804 vessels.

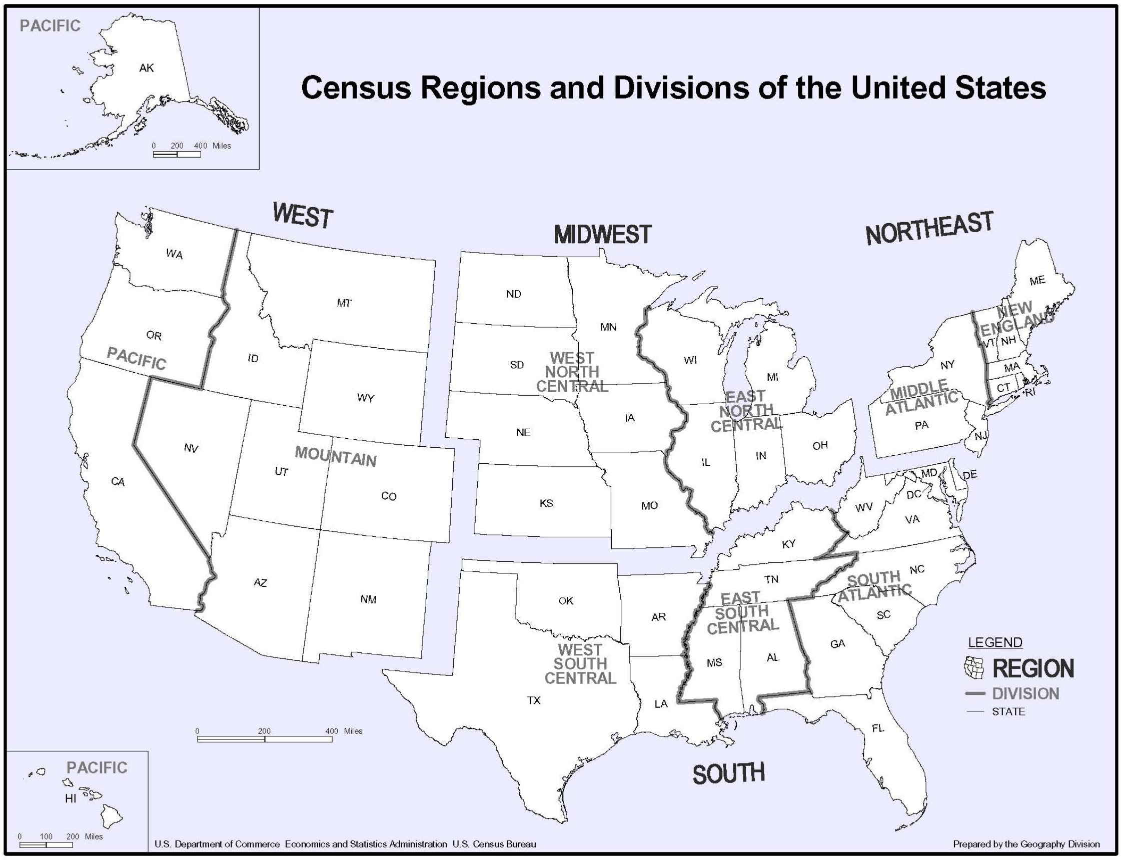
[6] In addition, separate vessel counts are provided for U.S. territories (Puerto Rico, US Virgin Islands, American Samoa, and Guam), Canadian provinces (Newfoundland and Labrador, New Brunswick, Quebec, Nova Scotia, Ontario, Alberta, and British Columbia), and for vessels that listed either another foreign hailing port or did not list a hailing port.

Table B.4: Number of Study Vessels by Vessel Service and Census Division, based on Hailing Port Information Provided in MISLE.

Census Division	Commercial Fishing Vessel	Freight Barge	Freight Ship	Passenger Vessel	Public Vessel, Unclassified	Tank Barge	Tank Ship	Utility Vessel	Unspecified
New England	7,173	41	39	1,158	14	12	6	302	939
Middle Atlantic	1,585	466	27	1,414	4	8	7	645	1,016
East North Central	414	53	20	1,274	2	28		487	1,467
West North Central	45	181	7	175		4	1	538	172
South Atlantic	9,400	440	83	4,821	15	39	18	1,347	3,062
East South Central	1,606	21	2	378	3	1		479	261
West South Central	6,386	2,238	22	1,107	5	65	4	2,732	924
Mountain	59	11	1	142				24	81
Pacific	14,482	129	133	3,187	19	64	5	1,155	2,281
National Total	**41,150**	**3,580**	**334**	**13,656**	**62**	**221**	**41**	**7,709**	**10,203**
U.S. Territories	*230*	*8*	*1*	*353*	*3*	*8*		*46*	*129*
Canadian Province	*3*			*2*					
Unknown / Other	*28,561*	*4,428*	*433*	*6,942*	*557*	*694*	*138*	*3,279*	*17,043*

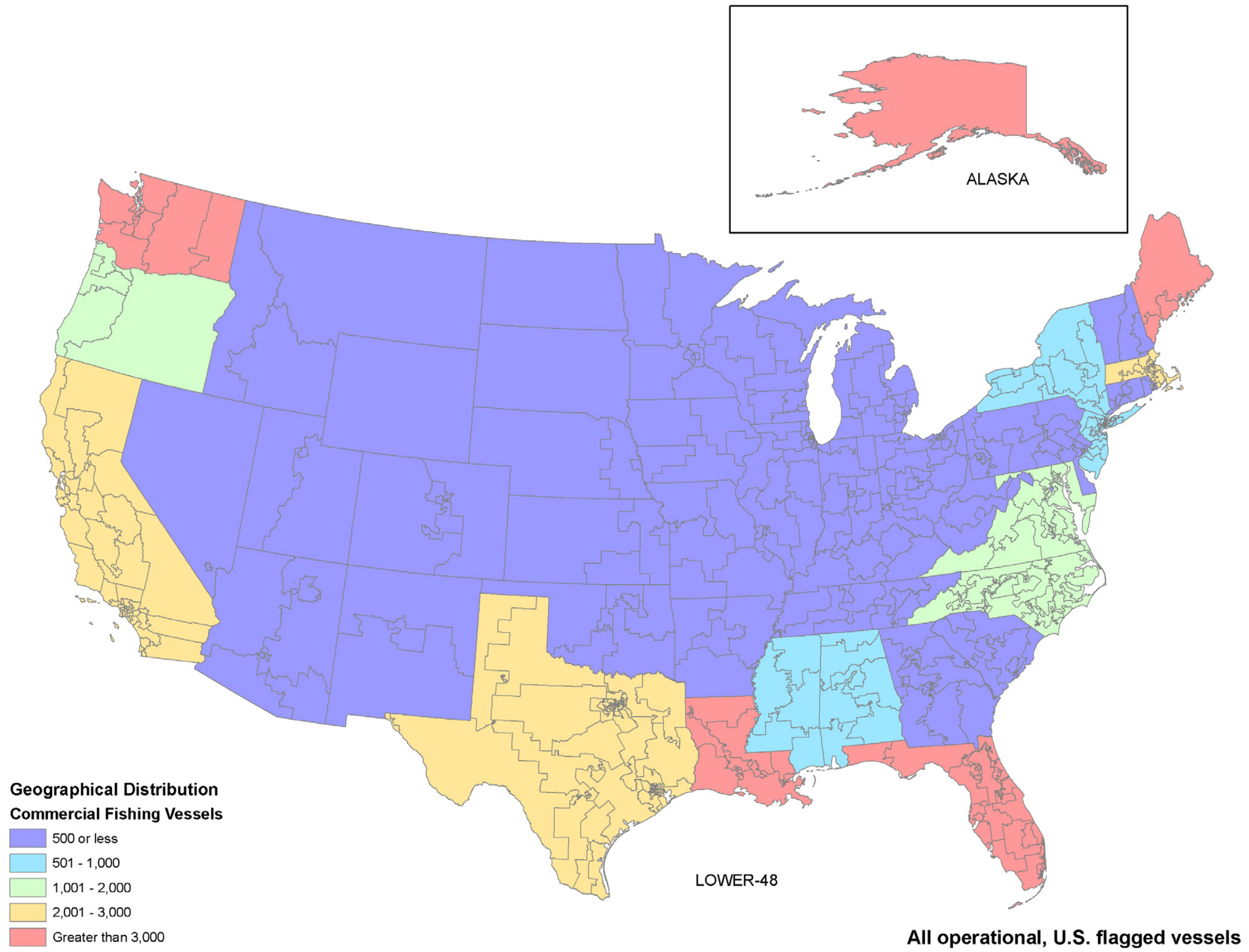
This table is based on operational, U.S. flagged commercial fishing vessels and other non-recreational vessel less than 79 feet (including vessels of unspecified length) for which MISLE provides sufficiently detailed hailing port information.
Source: U. S. Coast Guard, MISLE database, 2009

Figure B.2: Geographical Definitions of U.S. Census Divisions



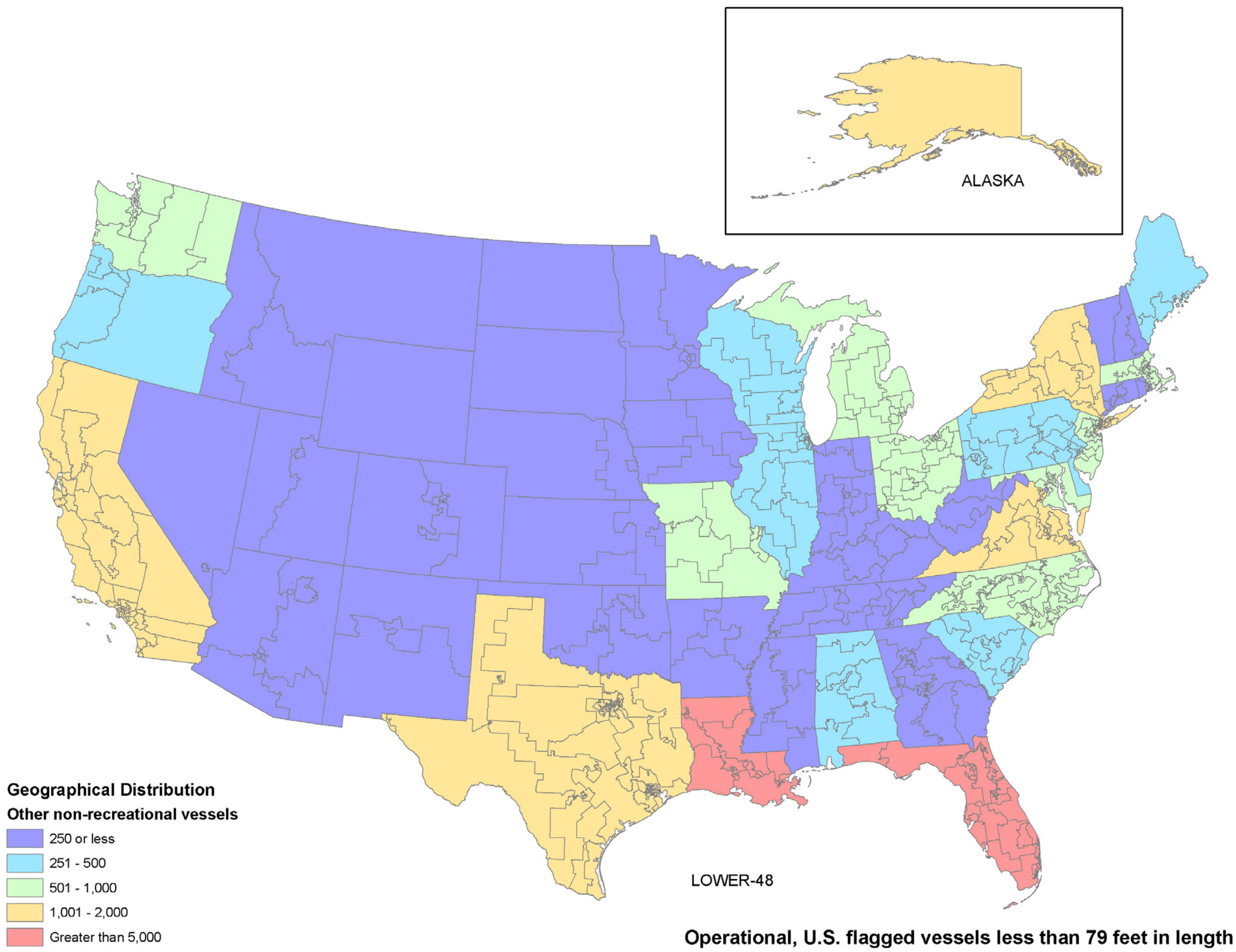
The geographical distribution of commercial fishing vessels and other non-recreational vessels less than 79 feet is illustrated in the maps of Figure B.3 and Figure B.4, respectively. Commercial fishing vessels tend to cluster exclusively along the coastlines. Non-recreational vessels less than 79 feet tend to be found on the major U.S. shipping waterways such as the Mississippi river and the Great Lakes.

Figure B.3: Geographical Distribution of Commercial Fishing Vessels by Hailing Port State



Source: U. S. Coast Guard, MISLE database, 2009; based on subset of operational, U.S. flagged commercial fishing vessels for which MISLE provides a hailing port.

Figure B.4: Geographical Distribution of Study Vessels (excluding Commercial Fishing Vessels) by Hailing Port State



Source: U. S. Coast Guard, MISLE database, 2009; based on subset of operational, U.S. flagged other non-recreational vessels less than 79 feet in length (including vessels of unspecified length) for which MISLE provides a hailing port.

Alaska and Florida both report a high number of commercial fishing vessels. These states have long coastal shorelines and the vessel density by miles of tidal shorelines is lower than in other states such as Mississippi, New Hampshire, and Massachusetts that have comparatively fewer miles of shoreline but access to large fishing grounds. According to National Marine Fisheries Service data, for example, Massachusetts alone accounted for over half of fish landings recorded in New England states in 2007, by pound.[7] Figure B.5 illustrates these differences by showing the density of commercial fishing vessels by miles of tidal shorelines. The states represented in Figure B.5 account for 99 percent of commercial fishing vessels recorded in MISLE that report a hailing port.

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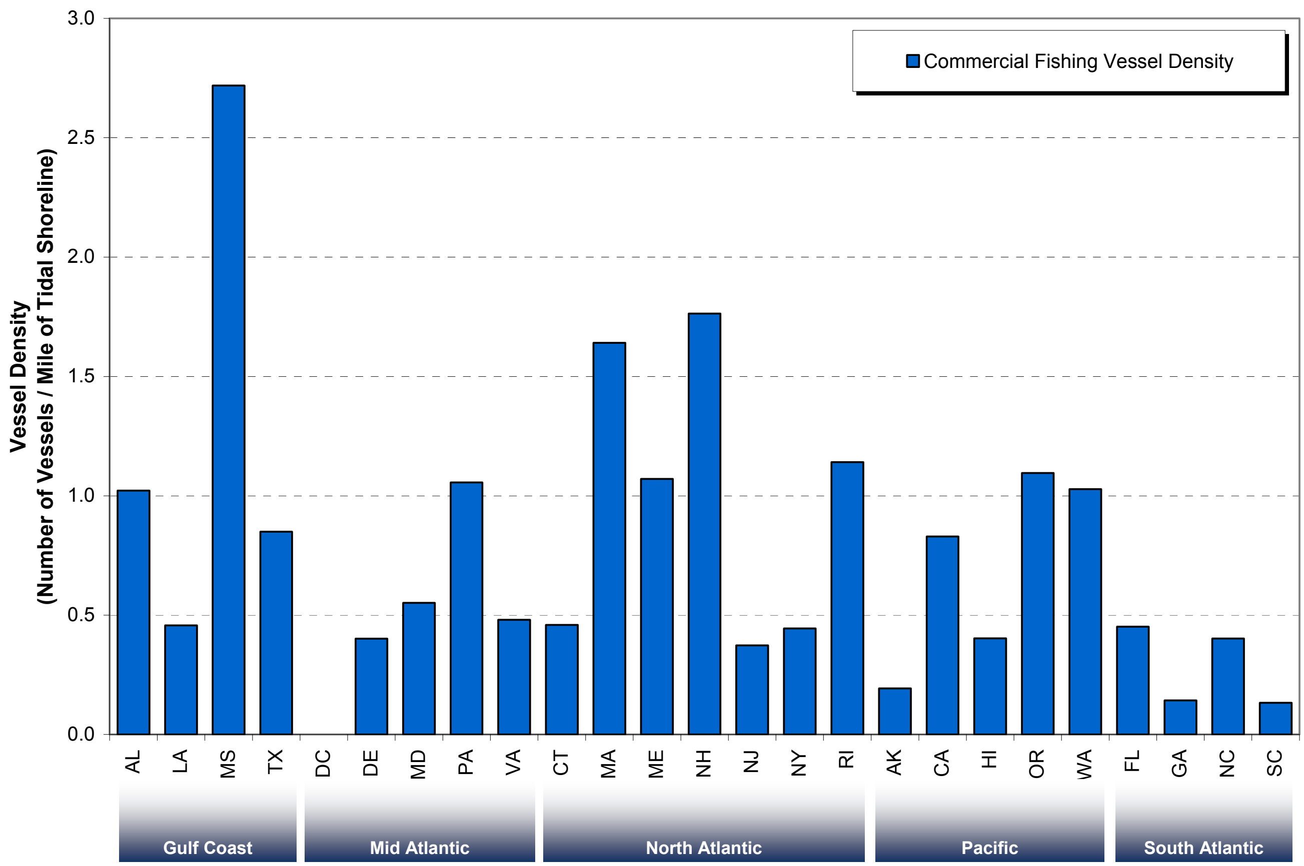
[7] *Annual Commercial Landing Statistics* database (http://www.st.nmfs.noaa.gov/st1/commercial/landings/annual_landings.html), Accessed May 26, 2009.

Figure B.5: Density of Commercial Fishing Vessels in Coastal States, by Mile of Tidal Shoreline

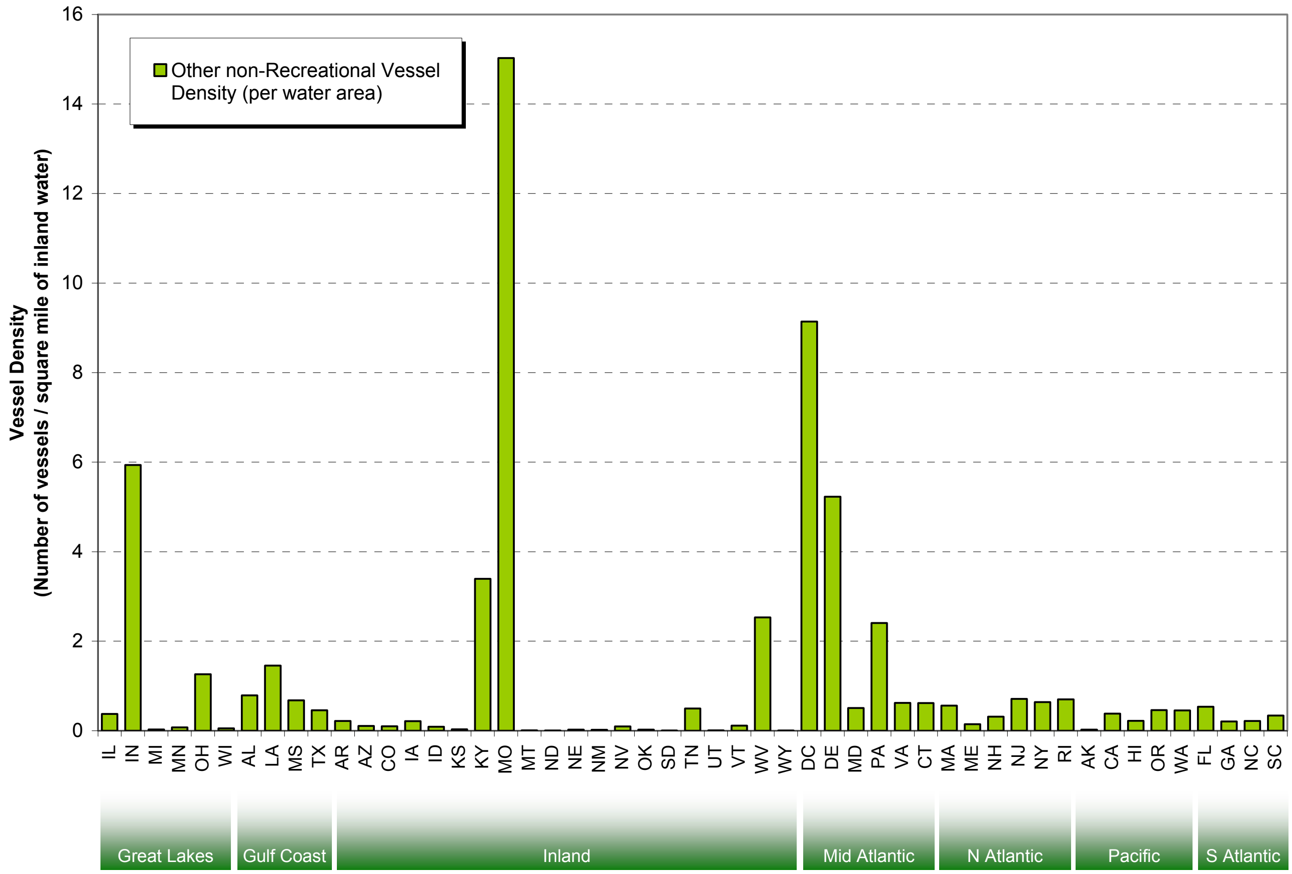


Coastal states included above account for 99 percent of commercial fishing vessels recorded in MISLE,

Sources: U. S. Coast Guard, MISLE database, 2009; based on subset of operational, U.S. flagged commercial fishing vessels for which MISLE provides a U.S. hailing port. Miles of tidal shoreline from U.S. Geological Survey and National Oceanic Atmospheric Administration, National Atlas of the United States, Coastline and Shoreline. Miles include shoreline of the outer coast, offshore islands, sounds, and bays, as well as the tidal portion of rivers and creeks.

In contrast to commercial fishing vessels, which are found almost exclusively along U.S. coasts, about a third of other non-recreational vessels less than 79 feet in length for which MISLE provides hailing port information have a hailing port located along inland waterways. Figure B.6 shows the density of these vessels by state, based on inland water area. Several inland and Great Lakes states (e.g., Missouri, Indiana, and Kentucky) exhibit a high vessel density in relation to their inland water areas, reflecting these states' adjacency to key navigable waterways such as the Mississippi or Missouri Rivers. However, though a vessel lists a city or state as its hailing port, it is unlikely that all vessel operations are confined exclusively to those states waters for many vessels. Additionally, as most vessel traffic may take place on only a small set of navigable waterways, vessel density in these navigable waters is likely to be even greater than implied by the state-wide numbers shown in Figure B.6. Hence, these are relative densities which likely depict which state waters have higher vessel activity.

Figure B.6: Density Study Vessels (excluding Commercial Fishing Vessels) by State, by Water Area



Sources: U. S. Coast Guard, MISLE database, 2009; based on subset of operational, U.S. flagged other non-recreational vessels less than 79 feet in length (including vessels of unspecified length) for which MISLE provides a U.S. hailing port. State statistics on square miles of water obtained from U.S. Census, Statistical Abstract of the United States, 2008. The area includes inland, coastal, Great Lakes, and territorial waters.

B.3 Other Vessel Characteristics: Construction and Propulsion

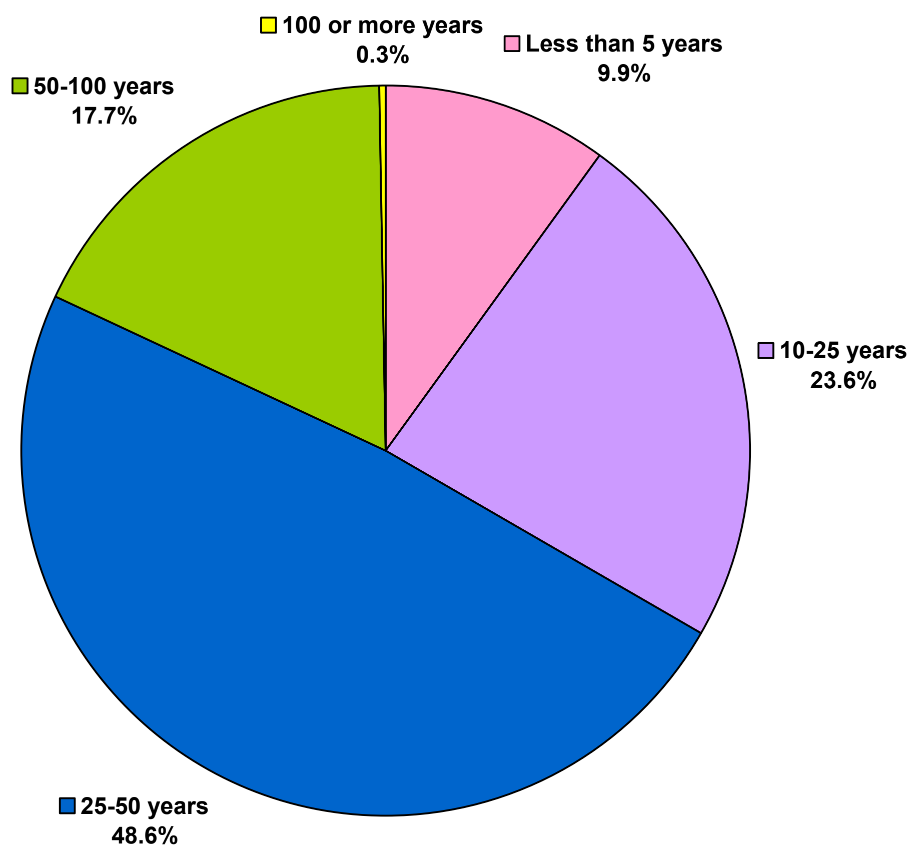
This section presents information on other various characteristics of study vessels that not only influence how vessels are used (e.g., for towing or icebreaking purposes vs. lighter service), but may also affect the characteristics of discharges incidental to vessel operations. In particular, the section provides statistics on the age of the vessels (Section B.3.1), hull material (Section B.3.2), propulsion method and fuel type (Section B.3.3), and, for self-propelled vessels, engine power rating (Section B.3.4). As for other vessel statistics presented in this report, the data are obtained from the USCG's MISLE database.

B.3.1 Vessel Age

Figure B.7 and Figure B.8 present the distribution of study vessels by vessel construction date or age. Figure B.7 summarizes the information across the entire selected population whereas details for each vessel service category are provided in Figure B.8. As seen from both figures, nearly half of the vessels fall within the age range of 25 to 50 years. The average age of vessels across all service categories is 33 years.

Vessel age is one of the factors that generally determines the type and performance of equipment used onboard vessels and the characteristics of discharges from the equipment. However, EPA recognizes that older vessels often have equipment which is rebuilt or replaced. For example, if an older vessel replaces its engine, the engine effluent will be influenced by the type and performance of the engine, not by the vessel's age. Freight ships and tank ships tend to have been in service longer than passenger vessels and generally have a greater level of rebuilding and replacement of original equipment.

Figure B.7: Distribution of Study Vessels by Age, in Years

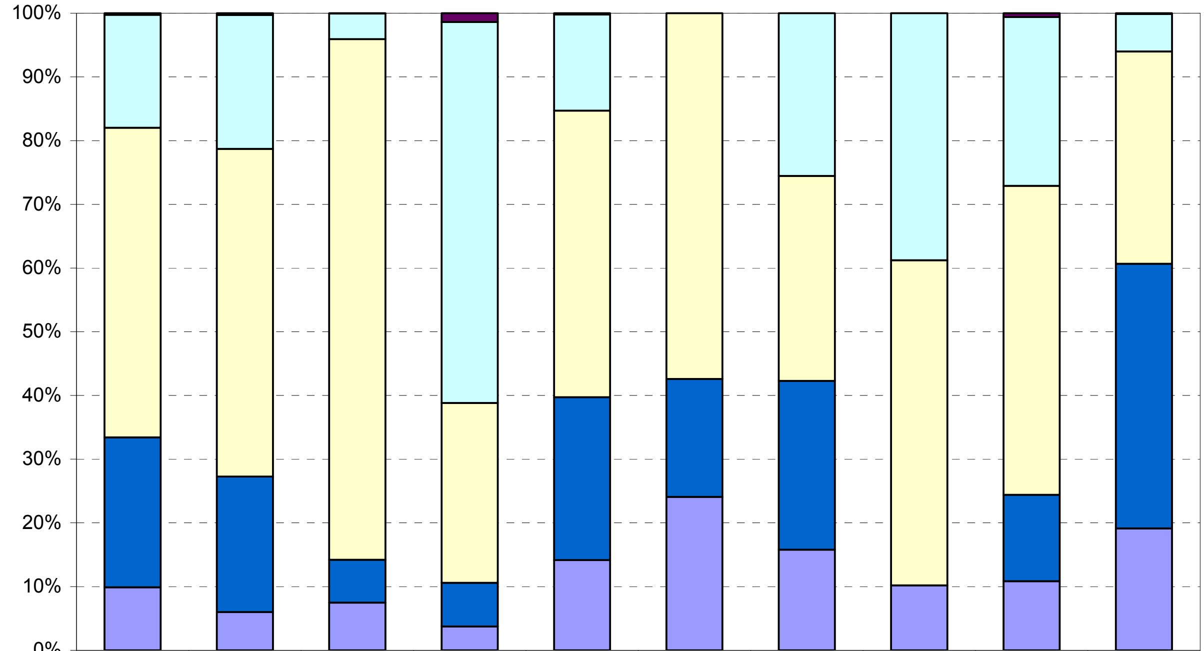


Note: This table is based on operational, U.S. flagged commercial fishing vessels and other non-recreational vessel less than 79 feet (including vessels of unspecified length).

Vessel age was either not reported or an invalid age (i.e. less than zero) was reported for approximately 43,000 vessels.

Source: U. S. Coast Guard, MISLE database, 2009

Figure B.8: Distribution of Study Vessels by Age and Vessel Service



	All Vessels	Commercial Fishing Vessel	Freight Barge	Freight Ship	Passenger Vessel	Public Vessel, Unclassified	Tank Barge	Tank Ship	Utility Vessel	Unspecified
100 or more years	256	146	2	7	36				50	15
50-100 years	17,231	10,921	173	305	2,669		81	19	2,246	817
25-50 years	47,208	26,715	3,514	144	7,954	31	102	25	4,111	4,612
10-25 years	22,892	11,049	290	35	4,525	10	84		1,148	5,751
Less than 5 years	9,603	3,125	321	19	2,502	13	50	5	920	2,648

Note: This table is based on operational, U.S. flagged commercial fishing vessels and other non-recreational vessel less than 79 feet (including vessels of unspecified length).

Vessel age was either not reported or an invalid age (i.e. less than zero) was reported for approximately 43,000 vessels.

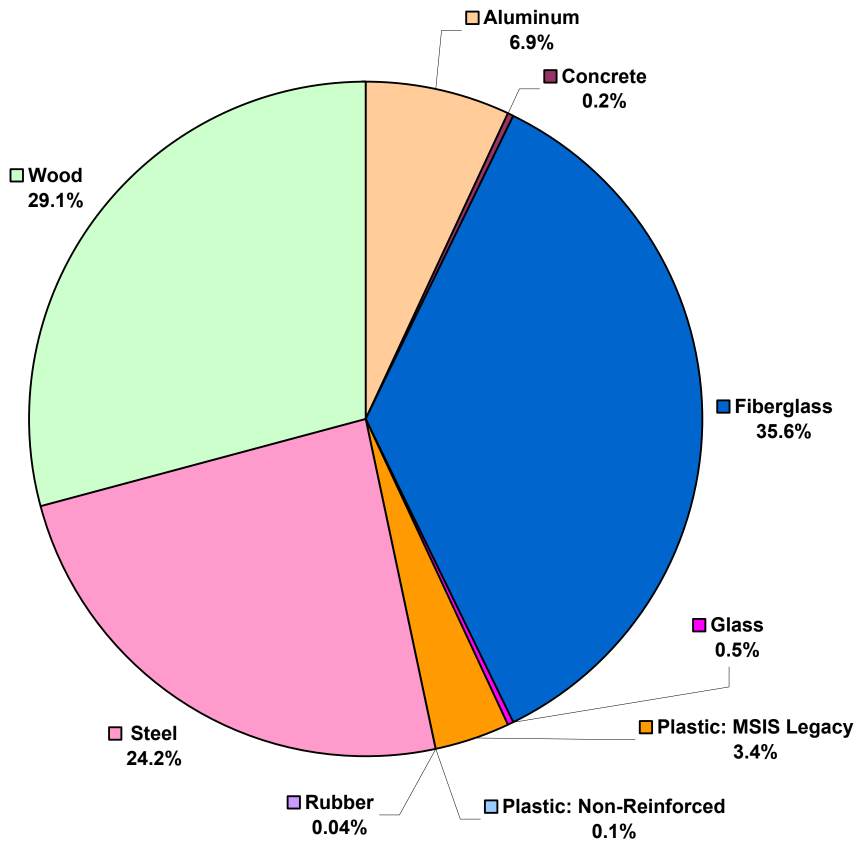
Source: U. S. Coast Guard, MISLE database, 2009

B.3.2 Hull Material Type

Figure B.9 and Figure B.10 present the distribution of vessels by type of hull material type. Figure B.9 provides a summary across all vessel service categories whereas Figure B.10 presents the information disaggregated by each category of vessel service.

The three most common hull material types are fiberglass, wood, and steel in order of most common usage. Commercial fishing vessels with wood hulls account for over three quarters of the total number of wood hulled vessels, although wood is also used in the hulls of a significant share of freight ships and passenger vessels less than 79 feet in length. The type of hull material affects the type of anti-foulant coatings that are applied and has implications on vessel discharges and receiving water quality. For example, steel hulls often have an anti-corrosive as well as anti-foulant hull coatings. The type of hull material may also affect the frequency with which certain maintenance procedures such as hull inspections are conducted.

Figure B.9: Number of Study Vessels by Hull Material Type

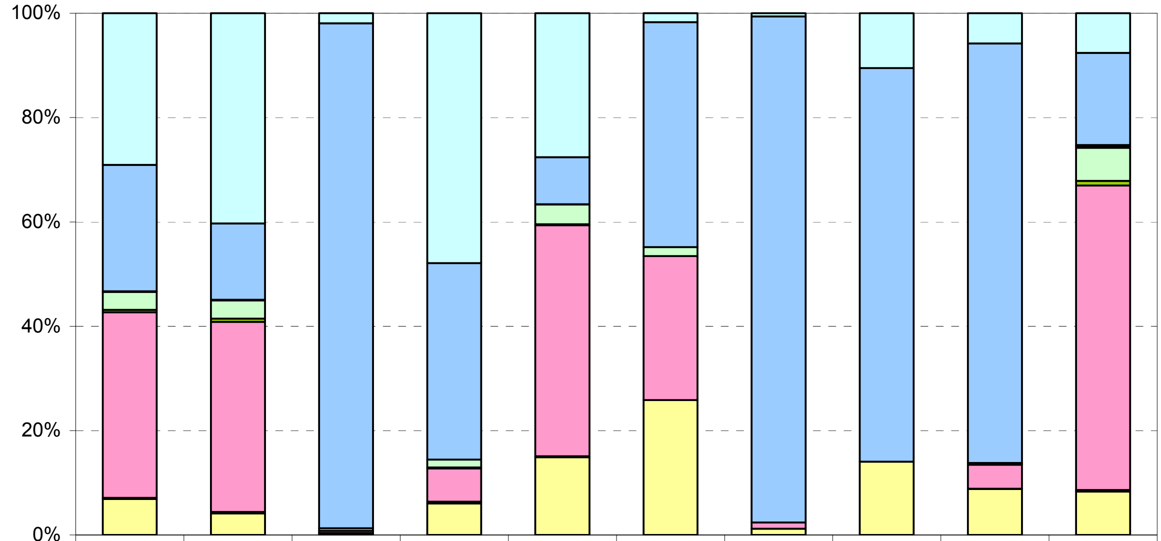


Note: This table is based on operational, U.S. flagged commercial fishing vessels and other non-recreational vessel less than 79 feet (including vessels of unspecified length).

Hull material type was not reported for approximately 43,000 vessels.

Source: U. S. Coast Guard, MISLE database, 2009

Figure B.10: Distribution of Study Vessels by Hull Material and Vessel Service



	All Vessels	Commercial Fishing Vessel	Freight Barge	Freight Ship	Passenger Vessel	Public Vessel, Unclassified	Tank Barge	Tank Ship	Utility Vessel	Unspecified
Wood	28,226	21,474	87	285	5,002	1	2	6	510	859
Steel	23,524	7,805	4,391	224	1,633	25	323	43	7,082	1,998
Rubber	34	1			10				2	21
Plastic: Non-Reinforced	98	58			2				2	36
Plastic: MSIS Legacy	3,318	1,875	22	9	684	1			10	717
Glass	463	310		1	33				16	103
Fiberglass	34,536	19,433	20	38	8,022	16	4		408	6,595
Concrete	213	137	2	2	36				1	35
Aluminum	6,704	2,211	15	36	2,698	15	4	8	778	939

Note: This table is based on operational, U.S. flagged commercial fishing vessels and other non-recreational vessel less than 79 feet (including vessels of unspecified length).

Approximately 43,000 vessels reported in MISLE do not have a hull material or have a material other than the primary materials listed above.

Source: U. S. Coast Guard, MISLE database, 2009

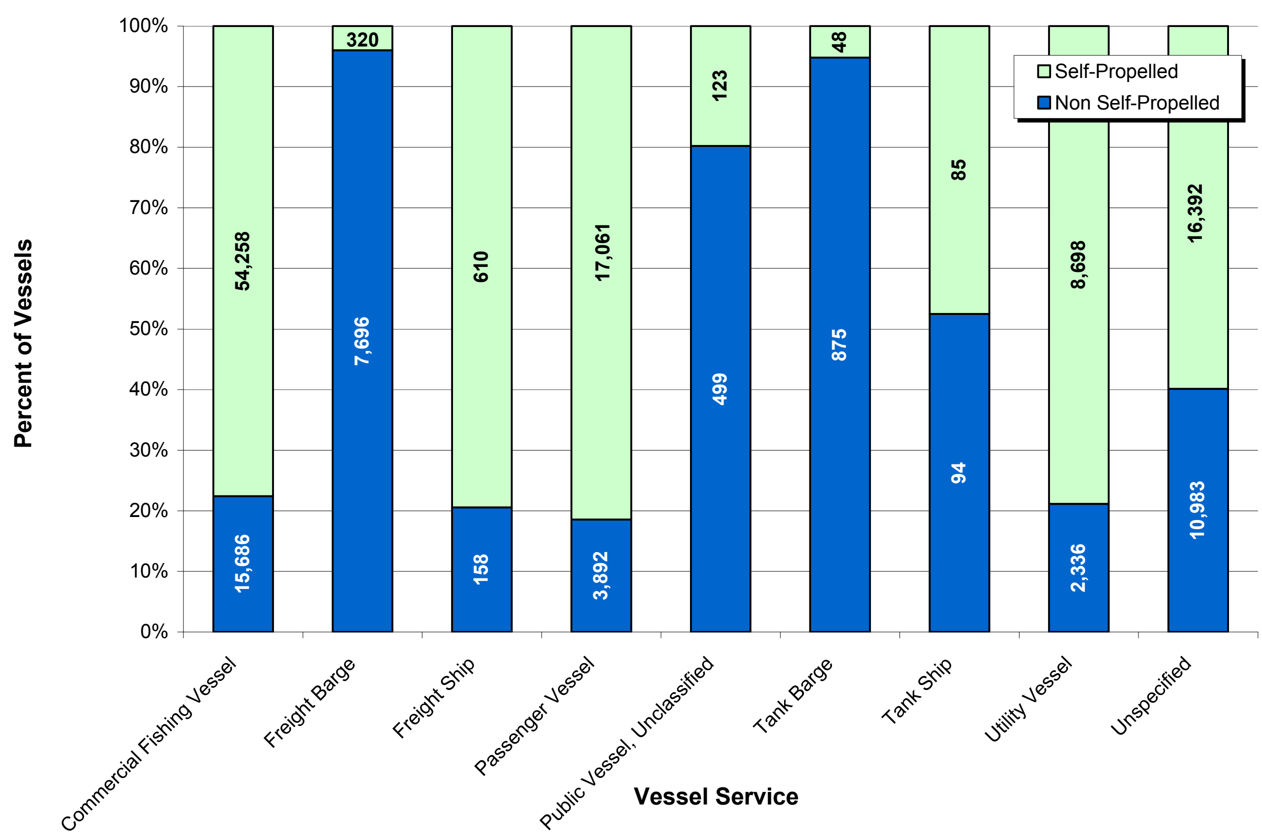
B.3.3 Propulsion Method and Type

Figure B.11 presents the number and percentage of vessels by vessel service and propulsion *method*. A vessel is characterized as *self-propelled* if the vessel uses self-contained engines and other machinery to propel the vessel (wind-driven vessels are also included in this category). *Non-self propelled* vessels are generally propelled by a separate towing vessel e.g. a barge or mobile offshore drilling unit is propelled by a tugboat.

Overall, within the selected subset of the study vessel population for which data are available in MISLE, 70 percent of vessels are self-propelled. The fraction of self-propelled vessels by service type varies from a low of 4 to 5 percent for freight barges and tank barges, to approximately 80 percent for commercial fishing vessels, freight ships, passenger vessels, and utility vessels. Most self-propelled vessels recorded in MISLE are propelled by either diesel motors (66.5 percent) or gasoline motors (26.9 percent).

Self-propelled vessels that use mechanical propulsion methods have certain types of equipment such as an engine, propeller shaft, and propulsion fuel tanks, which would affect the characteristics of discharges under normal operations. Discharges from these vessels may be more likely to have higher concentrations of oil, grease, organic compounds, and metals due to their use of lubricants, fuels and machinery.

Figure B.11: Distribution of Study Vessels by Propulsion Method



Note: This table is based on operational, U.S. flagged commercial fishing vessels and other non-recreational vessel less than 79 feet (including vessels of unspecified length).

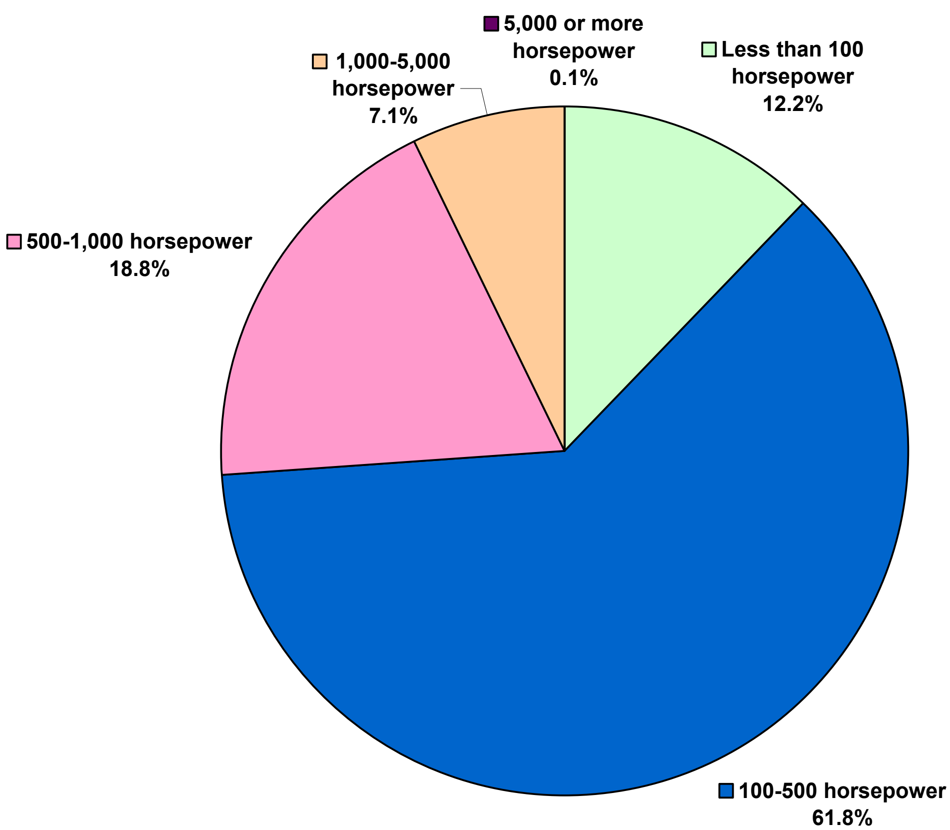
Source: U. S. Coast Guard, MISLE database, 2009

B.3.4 Horsepower Ahead

Figure B.12 and Figure B.13 display the distribution of study vessels by horsepower ahead. Horsepower ahead represents the rated power of a vessel's engine in forward motion (as opposed to horsepower astern) and is expressed as the work accomplished per unit of time (e.g., 1 hp = 550 foot-pounds of work per second). This power is transferred to the propulsion mode (e.g., jet or propeller) to create thrust and determines the vessel's speed at any given weight, or the weight that can be moved at any given speed. Figure B.12 summarizes the information across all vessels within the selected population whereas Figure B.13 presents the information by vessel service category. Vessel power rating may determine the amount and characteristics of discharges from operating vessels by affecting the size, type, and complexity of onboard propulsion equipment.

As evidenced by the two figures, nearly 62 percent of all vessels have a horsepower ahead ranging between 100 and 500. The average value across all vessels is 411 horsepower. The utility vessel and public vessel service categories have the highest proportion of vessels with a horsepower rating of 1,000 or greater. This is expected given the type of activities conducted by vessels in these service categories, e.g., towing and ice breaking. While not reflected in the figure, the MISLE data suggests a general relationship between vessel size and horsepower rating, within a given category of vessels.

Figure B.12: Distribution of Study Vessels by Horsepower Ahead

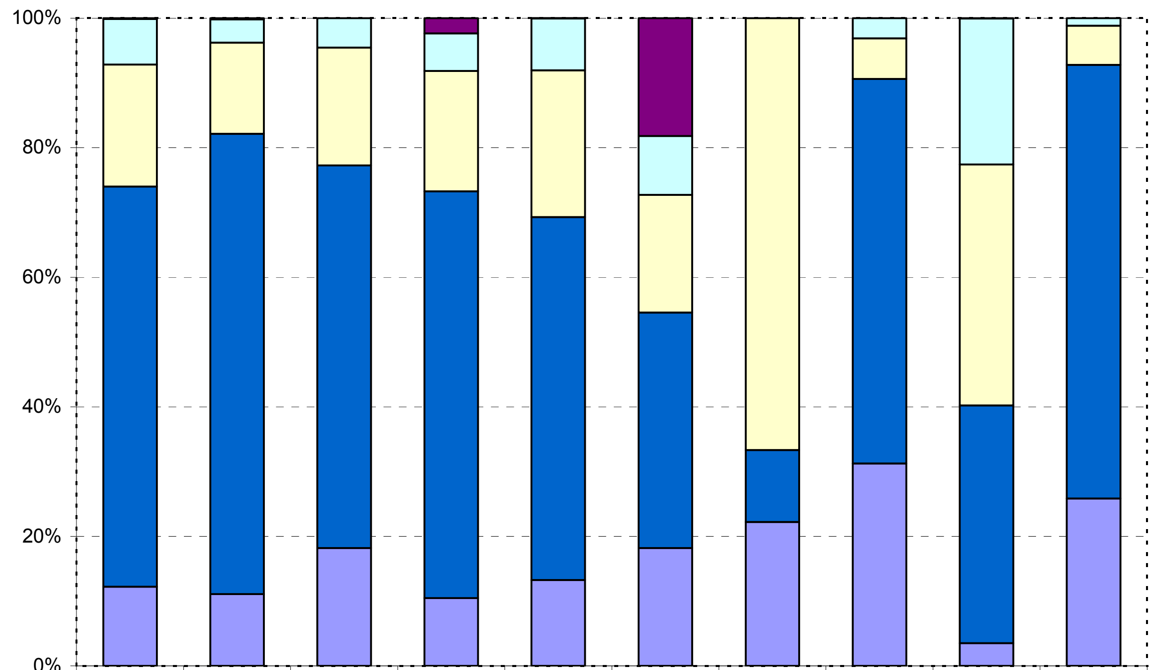


Note: This table is based on operational, U.S. flagged commercial fishing vessels and other non-recreational vessel less than 79 feet (including vessels of unspecified length).

MISLE does not report horsepower ahead for approximately 114,000 non-recreational study vessels.

Source: U. S. Coast Guard, MISLE database, 2009

Figure B.13: Distribution of Study vessels by Horsepower Ahead and Vessel Service



	All Vessels	Commercial Fishing Vessel	Freight Barge	Freight Ship	Passenger Vessel	Public Vessel, Unclassified	Tank Barge	Tank Ship	Utility Vessel	Unspecified
5,000 or more horsepower	28	21		2	1	2			2	
1,000-5,000 horsepower	1,831	443	1	5	642	1		1	711	27
500-1,000 horsepower	4,886	1,732	4	16	1,808	2	6	2	1,174	142
100-500 horsepower	16,041	8,748	13	54	4,473	4	1	19	1,159	1,570
Less than 100 horsepower	3,167	1,364	4	9	1,059	2	2	10	111	606

Note: This table is based on operational, U.S. flagged commercial fishing vessels and other non-recreational vessel less than 79 feet (including vessels of unspecified length).

Approximately 114,000 vessels reported in MISLE have no horsepower ahead value or a value of zero.

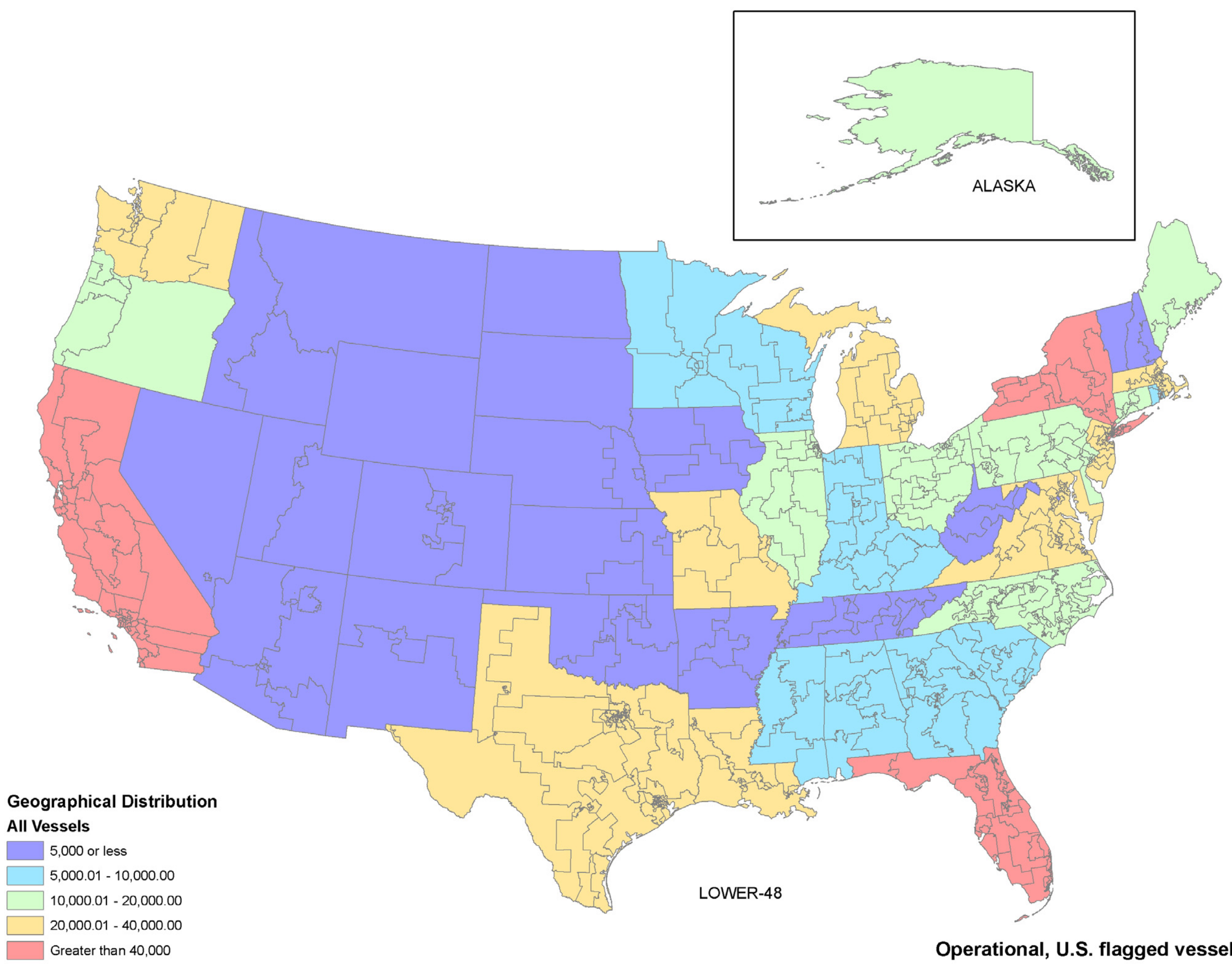
Source: U. S. Coast Guard, MISLE database, 2009

B.4 Distribution of the Study Vessel Universe versus the Recreational Vessel Universe

While the analysis presented in this section generally focuses on the subset of study vessels, a comparison of those vessels to the overall population is pertinent to understanding how discharges may differ between these vessels. At the same time, comparison of estimates provided in different sources also helps verify the population estimate derived from MISLE data. As discussed later in this section, the MISLE database appears to provide reasonably accurate data for larger recreational vessels; however, the database does not appear to provide accurate information for recreational vessels less than 25 feet.

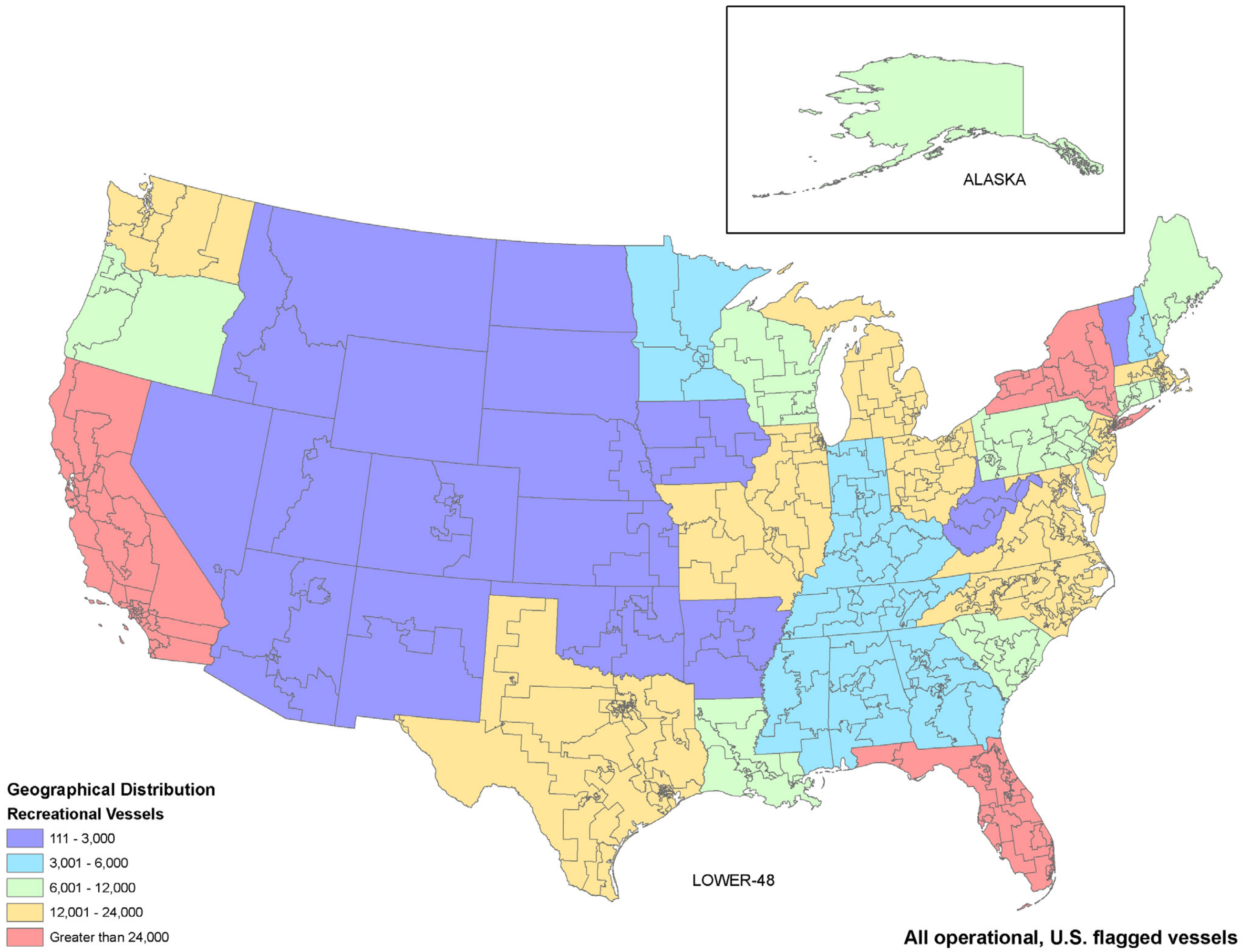
A comparison of the geographical distribution of the selected vessel population to that of the overall MISLE vessel universe (including all operational, U.S. flagged vessels) highlights some key differences. As discussed below in this section, recreational vessels less than 25 feet are not well represented in MLSE; hence, the values presented in these tables do not accurately reflect vessel numbers of these smaller vessels. As reflected in Figure B.14 below, several states that have hailing ports with a high percentage of the study vessel population account for a comparatively low percentage of the total universe of vessels. Conversely, States, such as California, with the largest number of vessels overall have comparatively fewer vessels in the population of commercial fishing vessels and non-recreational vessels less than 79 feet. The difference is generally attributable to the geographical distribution of recreational vessels (Figure B.15) as larger recreational vessels tend to be concentrated in certain states due to the states' longer coastlines, higher population or income, and/or a longer boating season. For these states, one can expect considerably greater numbers of recreational versus non-recreational vessels. The relative shares of non-recreational and recreation vessel categories are illustrated in Figure B.16 which summarizes the overall vessel universe by state and vessel service category, based on information provided in MISLE.

Figure B.14: Geographical Distribution of MISLE Vessel Universe by Hailing Port State



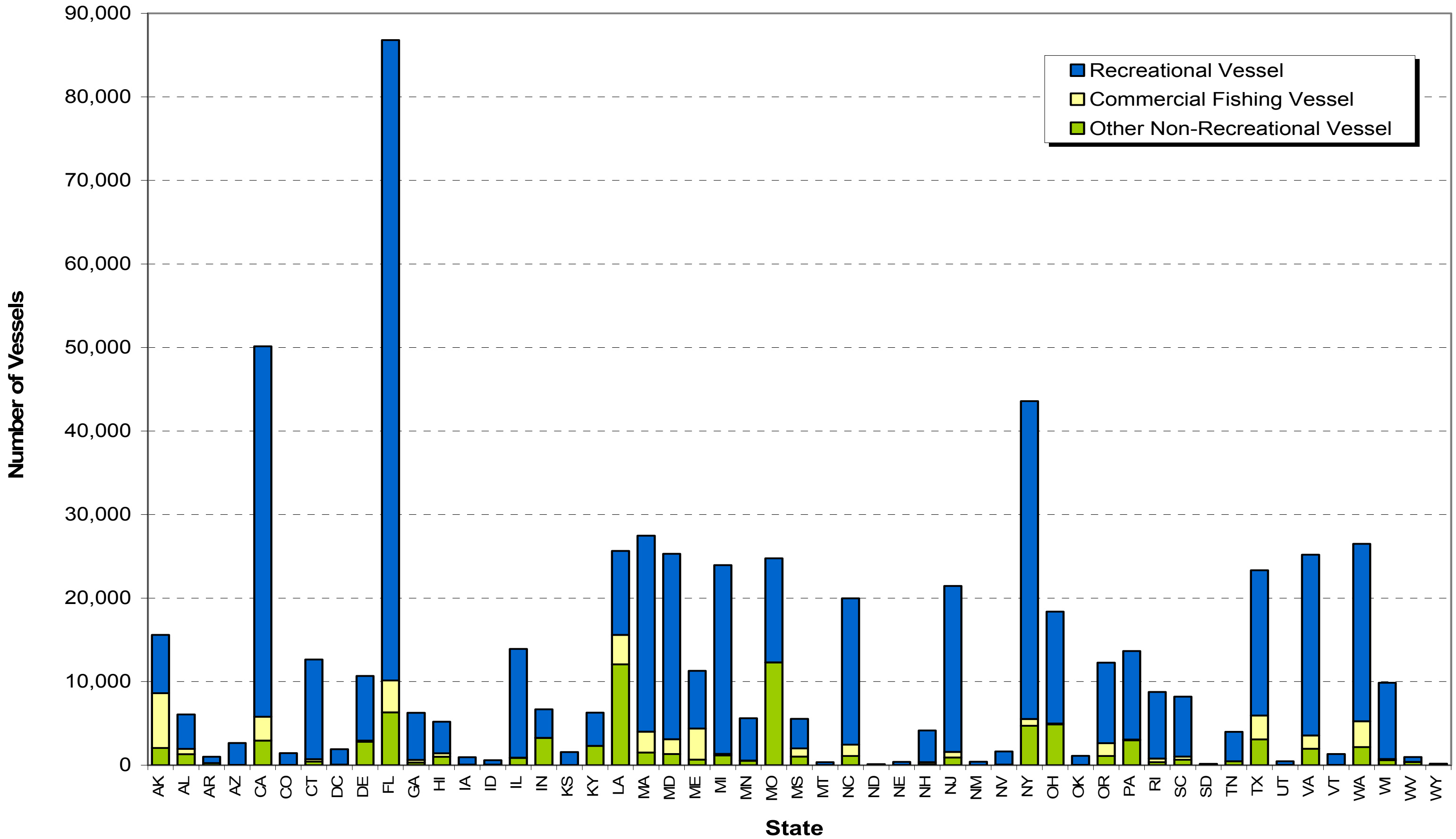
Source: U. S. Coast Guard, MISLE database, 2009; based on operational, U.S. flagged vessels for which MISLE provides a hailing port. Note that MLSE does not provide accurate estimates for smaller recreational vessels.

Figure B.15: Geographical Distribution of Recreational Vessels by Hailing Port State



Source: U. S. Coast Guard, MISLE database, 2009. Note that MLSE does not provide accurate estimates for smaller recreational vessels.

Figure B.16 Comparison of the Number of MLSE recorded (Larger) Recreational vessels to Study Vessels by State



Note: The hailing port state was either not listed or a foreign port was listed for approximately 285,000 and 6,000 vessels, respectively. All vessels are included within each of the three vessel service categories, regardless of length.

The data likely only includes larger recreational vessels captured in MISLE and is therefore a gross underestimate of the total population of recreational vessels.

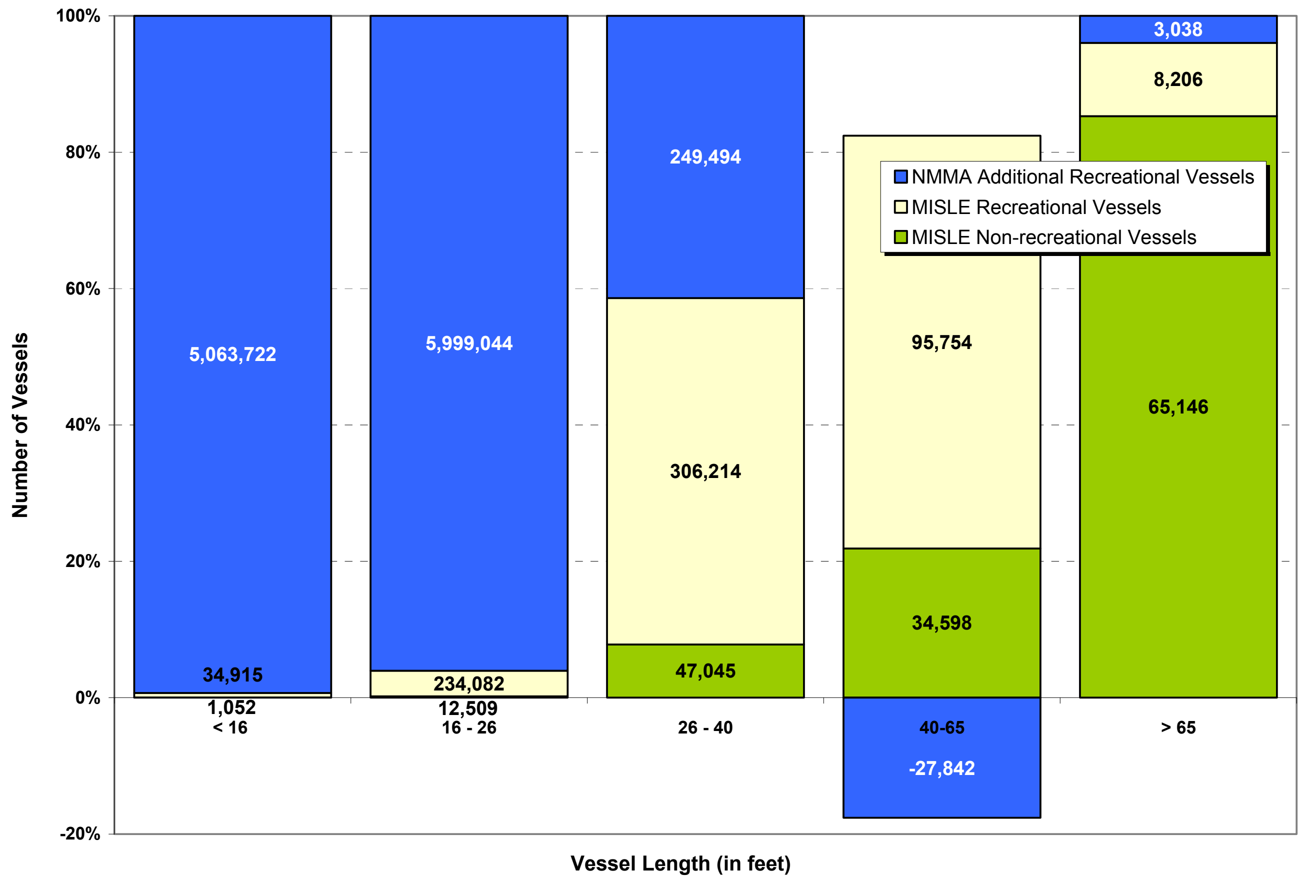
Source: U. S. Coast Guard, MISLE database, 2009

Study vessels represent a very small share of the total number of vessels operating on U.S. waters is evidenced by comparisons of the estimated number of study vessels (139,814 vessels) to the national statistics on recreational vessels. While the number of recreational vessels reported in MISLE is large (700,000 vessels), the actual number of recreational vessels found on U.S. waters is known to be significantly greater, or about 17 million. This is because industry estimates indicate a much larger number of recreational vessels than are captured in MISLE, particularly for smaller vessels less than 26 feet.

In its *2008 Recreational Boating Statistical Abstract*, the National Marine Manufacturers Association (NMMA) estimates that there are approximately 16.9 million recreational vessels in the U.S., including 13 million registered and/or documented boats and more than 4 million non-registered boats. This is a significantly greater estimate than the number of vessels documented in MISLE, which records the characteristics of 722,522 recreational vessels. The difference is accounted for by state-registered vessels that are not subject to documentation requirements[8], hence, they are captured by NMMA but not by MLSE. Figure B.17 illustrates the distribution of vessels by service and length, this time *including additional recreational vessels captured in industry estimates* (NMMA, 2009). Figure B.18 compares recreational vessels reported by MLSE and NMMA across the various census regions are covered in MISLE. As shown in these figures, there are a significantly greater number of small recreational vessels (less than 26 feet in length) than suggested by MISLE data alone. While MISLE grossly underestimates the number of recreational vessels below 26 feet, it appears to provide more reliable estimates for larger recreational vessel (MISLE over-represents the number of recreational vessels in the 40 to 65 feet length category, while it accounts for 55 percent and 73 percent of recreational vessels recorded by NMMA in the 26 to 40 feet and greater than 65 feet categories, respectively). Across all size categories with the exception of vessels greater than 65 feet, non-recreational vessels account for a relatively small fraction of the total universe of domestic vessels operating in U.S. waters.

[8] Additional state boating regulations require that non-documented vessels, including smaller recreational vessels less than five tons, register with state authorities. While vessel registration requirements under State boating regulations vary, many states require that vessels of any size equipped with primary or secondary propulsion be registered; in some cases, non-motored vessels above 15 feet in length must also be registered. See additional discussion under Section B.5.

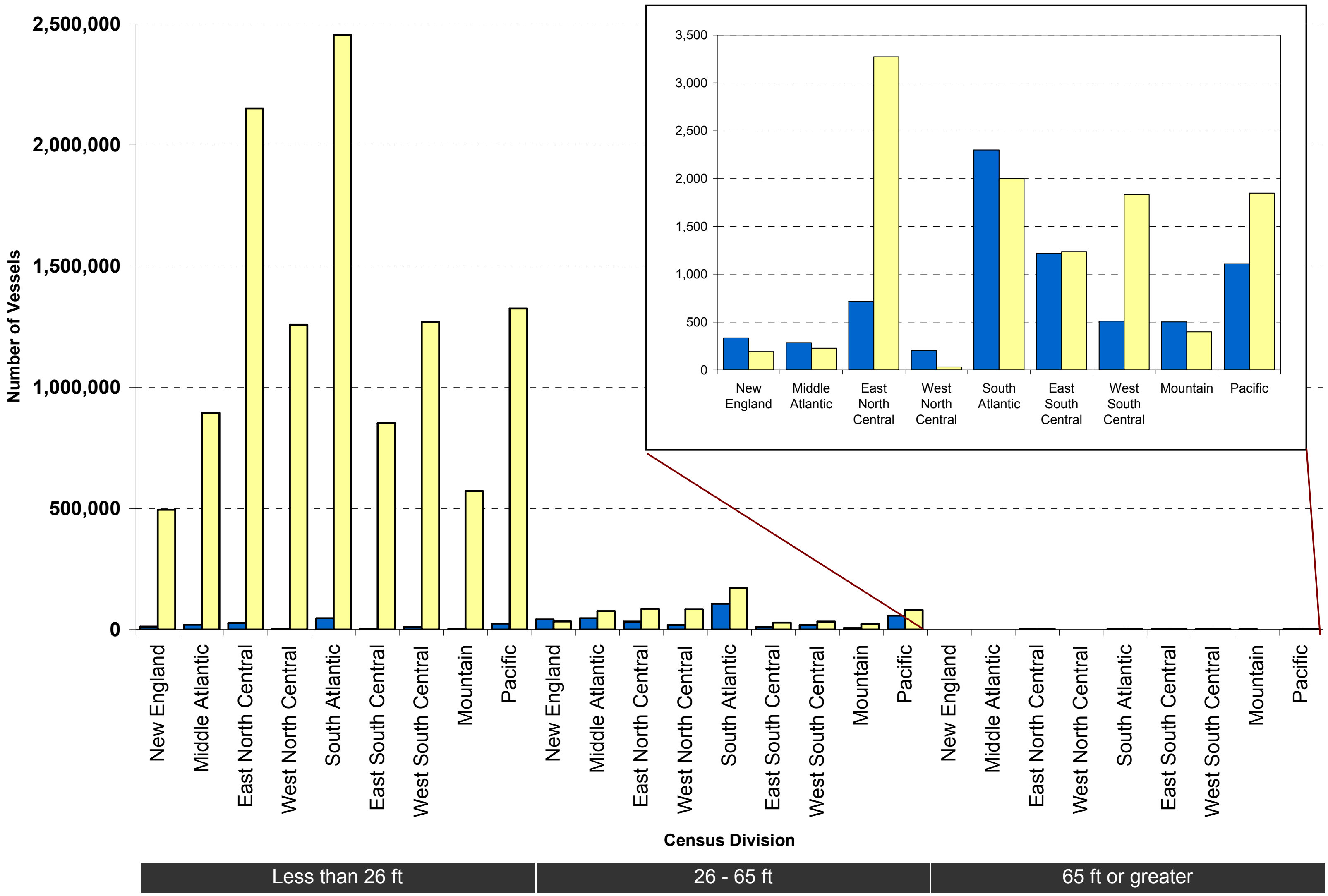
Figure B.17: Distribution of Vessels by Service Category and Length (in feet), Accounting for MISLE AND NMMA Estimates of Recreational Vessels



Source: U. S. Coast Guard, MISLE database, 2009 and NMMA 2007 Recreational Boating Statistical Abstract.

An additional 43,351 vessels are included in MISLE but do not have length information. These vessels are therefore excluded from the figure.

Figure B.18: Recreational Vessels as Reported in MISLE and as Estimated by NMMA



Yellow bars represent NMMA data while blue bars represent MISLE data

Source: U. S. Coast Guard, MISLE database, 2009 and NMMA 2007 Recreational Boating Statistical Abstract

B.5 Vessels Documented, Inspected, and/or State Registered

The MISLE database classifies vessels as documented, inspected, and/or state registered. These classifications are used to identify the types of requirements to which a given vessel is subject. According to a Coast Guard representative, generally only vessels that are not documented at the national level are state registered.[9] On the other hand, based on the MISLE dataset, nearly all (4,982) of the 5,259 inspected vessels are *also* either documented or state registered.

In order to be classified as a *documented* vessel, the vessel "must measure at least five tons and, with the exception of certain oil spill response vessels, must be wholly owned by a citizen of the U.S."[10] According to a Coast Guard representative, "*documentation* provides conclusive evidence of nationality for international purposes, provides for unhindered commerce between the states, and admits vessels to certain restricted trades, such as coastwise trade and the fisheries."

A vessel is listed as *inspected* in MISLE when the vessel is subject to inspection requirements under one of several U.S. Coast Guard regulations. According to a Coast Guard representative, certain U.S. vessels (e.g. passenger vessels that meet threshold size and passenger requirements) are required to undergo safety and security inspections, which includes inspections on a vessel's machinery, hull, safety equipment, and proper documents, before they can operate commercially in U.S. waters.[11]

A vessel is listed as *state registered* when the vessel is registered by a state authority. Only vessels that are not documented at the national level are state registered. Although each state sets its own registration requirements and therefore these requirements can vary from state to state, generally, any undocumented vessel that is self-propelled (meaning that machinery is used to propel the vessel) must be registered with the state.

Table B.5, below, presents the number of study vessels – by vessel service – classified as documented, inspected or state registered in MISLE. As seen within Table B.5, overall, approximately 36 percent of vessels reporting in MISLE are documented, 4 percent of vessels are inspected, and 26 percent of vessels are state registered, although the fractions of vessels in each class varies across the vessel service categories.

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[9] Approximately 1,200 vessels are listed as *both* documented and state-registered.
[10] Source: Personal email communication with Harold Krevait of the U.S. Coast Guard. April 22, 2009. Note, however that fishing vessels with only a "registry" endorsement on their certification of documentation do not have to be wholly owned by U.S. citizens but may be under majority control by U.S. interest (Personal communication with Division Chief, Fishing Vessel Safety Division (CG-5433), Fishing Vessel Safety Program, May 26, 2009).
[11] Source: Personal email communication with Harold Krevait of the U.S. Coast Guard. April 22, 2009.

Table B.5: Number of Study Vessels Documented, Inspected, and State Registered, by Vessel Service

	Total(1)	Documented(2)		Inspected(2)		State Registered	
Vessel Service	Number	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Commercial Fishing Vessel	69,944(3)	27,770(3)	39.7%	3	0.0%	22,438(1)	32.1%
Freight Barge	8,016	811	10.1%	1	0.0%	48	0.6%
Freight Ship	768	211	27.5%	14	1.8%	40	5.2%
Passenger Vessel	20,953	10,613(4)	50.7%	4,968	23.7%	4,044	19.3%
Public Vessel, Unclassified	622	22	3.5%	3	0.5%	21	3.4%
Tank Barge	923	116	12.6%	49	5.3%	10	1.1%
Tank Ship	179	24	13.4%	15	8.4%	8	4.5%
Utility Vessel	11,034	6,008	54.4%	199	1.8%	1,020	9.2%
Unspecified	27,375	4,183	15.3%	7	0.0%	9,030	33.0%
All Vessels	*139,814*	*49,758*	*35.6%*	*5,259*	*3.8%*	*36,659*	*26.2%*

Note: This table is based on operational, U.S. flagged commercial fishing vessels and other non-recreational vessel less than 79 feet.
Source: U. S. Coast Guard, MISLE database, 2009
(1) Total number of other non-recreational vessels (other than commercial fishing vessels) includes all vessels less than 79 feet in length and vessels of unspecified length (zero or null).
(2) "Documented" and "Inspected" are not mutually exclusive categories. The number of documented vessel *includes* inspected vessels.
(3) The U.S. Coast Guard's Fishing Vessel Safety Program generally uses a figure of 80,000 as the approximate number of commercial fishing vessels, including about 20,000 documented vessels and 60,000 state-registered vessels. In 2007, the states reported a total of over 58,000 vessels that fish commercially and are registered in their jurisdictions.[12]
(4) 3,904 passenger vessels are both documented *and* inspected.

As described in Chapter 1, MISLE also includes additional vessels not subject to the documentation, inspection, or state registration requirements; information for these vessels was obtained through other Coast Guard activities such as non-mandatory inspections or incident investigations.

B.6 Uncertainty

The analysis presented in this section draws largely on national-level data collected by the U.S. Coast Guard. Several factors contribute to uncertainty in the estimates and findings presented:

- *Scope*. Some vessels may not be captured in the database due to the procedures by which vessels are identified and entered into the database. Data coverage is believed to be relatively good for vessels subject to documentation or inspection requirements (e.g., vessels engaged in coastwise trade or passenger vessels), but more incomplete for smaller vessels. The absence of information on the smaller, undocumented, uninspected vessels which were not manufactured or used for pleasure may lead EPA to under-estimate the size of the study vessels population. Conversely, categories used to classify vessels in MISLE may be broader than vessels that would otherwise be considered "in scope" for this study; for example, passenger vessels may include vessels that would meet the Clean Boating Act definition of recreational vessel, depending on their use.

[12] Source: Personal communication with Division Chief, Fishing Vessel Safety Division (CG-5433), Fishing Vessel Safety Program, May 26, 2009.

- *Completeness*. Analyses of vessel characteristics were limited by the information provided for a vessel or the manner in which the information is entered. For example, the hailing port or horsepower ahead is provided for a only subset of vessels in the database. To the extent that the absence of the information is unevenly distributed among the vessel population, distributions drawn from the data may provide a biased understanding of the characteristics of the vessel population.

- *Accuracy*. Even when vessel data are populated, there may be issues with the accuracy of the information. For example, the status of vessels no longer operational (i.e., out of service) may not have been properly updated or vessel types may be misclassified. These errors are difficult to detect and may lead to inaccurate estimates of the actual population.

Uncertainty related to the scope of the data used in the analysis is discussed in greater detail below. Where possible, EPA compared findings drawn from the MISLE data to information from other sources, such as NMMA and NOAA, to ascertain and quantify the magnitude of the error on the population estimate. This review suggests that MISLE under-represents the population of recreational vessels smaller than about 25 feet in length and may similarly under-represent small non-recreational vessels. For larger recreational vessels, however, the number of vessels reported in MISLE is close, or for some size classes even greater than, the number estimated by NMMA. Based on this comparison, it is apparent that MISLE is significantly limited in terms of its characterization of the universe of small recreational vessels[13]. Since the analysis focuses more specifically on non-recreational vessels, however, EPA does not consider these limitations to be critical. In general, EPA believes that national vessel databases such as MISLE provide adequate coverage for the subset of study vessels, since a significant fraction of these vessels can be expected to be larger than about 25 feet in length, and useful data on the physical and operational characteristics of the study vessel population.

While MISLE constitutes the most comprehensive and readily available national-level data sets on vessels, it is important to note that the MISLE database covers a subset of vessels that are either required to be documented under federal regulations (e.g., at least five net tons) or vessels known to the U.S. Coast Guard through vessel inspections or incident investigations. Generally, the five ton tonnage threshold means that only those vessels more than about 25 feet in length are covered.

Unlike recreational vessels, there is no alternate national-level data source that would provide recent and comprehensive figures for the number of commercial fishing vessel by size category to allow EPA to assess MISLE coverage for these vessels. The MISLE database reports a total of 69,944 commercial fishing vessels nationally. This number does not include all state-registered vessels that commercially fish, but is generally comparable with industry totals reported in other sources. For example, Hoovers reports that 25,000 commercial fishing vessels have combined annual revenue of $4 billion. An additional 55,000 small, undecked vessels are also used to catch wild fish for economic gain, though the report notes that industry impact of these undecked vessels is “negligible.” The total number of commercial fishing vessels reported in Hoovers would therefore be around 80,000. [14] Additionally, the U.S. Coast Guard’s Fishing Vessel Safety Program generally uses a figure of 80,000 as the

[13] EPA notes that MISLE is not designed or managed to provide accurate estimates of the small recreational vessel universe.
[14] (Source: http://www.hoovers.com/commercial-fishing, accessed 05/01/2009).

approximate number of commercial fishing vessels, including about 20,000 documented vessels and 60,000 state-registered vessels.[15]

No separate inventory of other non-recreational vessels less than 79 feet could be found to evaluate the coverage of these vessels in MISLE. It is therefore not possible to ascertain the extent to which MISLE under represent smaller utility vessels and other non-recreational vessels.

EPA also compared the number of commercial fishing vessels identified in MISLE with the number of vessels holding fishing permit licenses in New England, as obtained from NOAA's regional office, and with separate state-registered vessel estimates provided by the U.S. Coast Guard. Table B.6 presents the count of permitted fishing vessels within NOAA's New England division permitted vessel list and the count of commercial fishing vessels within MISLE that listed a New England hailing state. The table also provides estimates of the number of state-registered vessels used in commercial fisheries. As seen in the table, the MISLE dataset contains nearly double the number of commercial fishing vessels as permitted in NOAA's New England division. This difference may be due to the slightly different scopes of the NOAA and MISLE dataset. NOAA's dataset only includes permit holders of NOAA Fisheries Northeast Region[16] 2008 Vessel permits, whereas the MISLE dataset includes vessels that may not have fishery permits for that year (such as fishing *support* vessels) in addition to those that would hold permits. Additionally, as mentioned in the introduction to this section, it is possible that some of the commercial fishing vessels that Coast Guard considers to be operational were not actively engaged in fishing activities during 2008. With regards to numbers provided in MISLE as compared to state-registered vessel estimates, the MISLE data seem to slightly under-represent the vessels registered in New England states. Overall, however, comparison of commercial fishing vessel estimates across sources suggests that MISLE may adequately represent the population of these vessels despite the vessels' relatively small size and potentially higher probability of being excluded from the database scope.

[15]Personal communication with Division Chief, Fishing Vessel Safety Division (CG-5433), Fishing Vessel Safety Program, May 26, 2009.
[16] Our table specifically compares the *New England* division data.

Table B.6: Comparison Among NOAA, State-registered and MISLE New England Region Commercial Fishing Vessel Populations

State	Number of Vessels		
	NOAA[a]	State-registered[b]	MISLE
CT	77	256	284
MA	1,514	2,006	2,492
ME	1,535	6,508	3,725
NH	196	0	231
RI	335	630	438
VT	0	0	3
New England Total	**3,657**	**9,400**	**7,173**

a Although NOAA's Northeast Region Vessel and Permit Listing documents 5,227 vessels, only 3,657 of these vessels list a principal hailing state in the New England region.
b. Some of the state registered fishing vessels reported by states for 2007 are also included in the reported MISLE numbers.[17]
Source: National Oceanic and Atmospheric Administration (NOAA) New England Commercial Fishing Permit Listing, 2009, U. S. Coast Guard, MISLE database, 2009, and Personal Communication with U.S. Coast Guard personnel, May 2009.

17 Personal communication with Division Chief, Fishing Vessel Safety Division (CG-5433), Fishing Vessel Safety Program, May 26, 2009.

Appendix C
Public Law 110-299 (S. 3298) and Public Law 110-288 (S. 2766)

Public Law 110-299 (S. 3298)

One Hundred Tenth Congress
of the
United States of America

AT THE SECOND SESSION

Begun and held at the City of Washington on Thursday, the third day of January, two thousand and eight

An Act

To clarify the circumstances during which the Administrator of the Environmental Protection Agency and applicable States may require permits for discharges from certain vessels, and to require the Administrator to conduct a study of discharges incidental to the normal operation of vessels.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. DEFINITIONS.

In this Act:
(1) ADMINISTRATOR.—The term "Administrator" means the Administrator of the Environmental Protection Agency.
(2) COVERED VESSEL.—The term "covered vessel" means a vessel that is—
(A) less than 79 feet in length; or
(B) a fishing vessel (as defined in section 2101 of title 46, United States Code), regardless of the length of the vessel.
(3) OTHER TERMS.—The terms "contiguous zone", "discharge", "ocean", and "State" have the meanings given the terms in section 502 of the Federal Water Pollution Control Act (33 U.S.C. 1362).

SEC. 2. DISCHARGES INCIDENTAL TO NORMAL OPERATION OF VESSELS.

(a) NO PERMIT REQUIREMENT.—Except as provided in subsection (b), during the 2-year period beginning on the date of enactment of this Act, the Administrator, or a State in the case of a permit program approved under section 402 of the Federal Water Pollution Control Act (33 U.S.C. 1342), shall not require a permit under that section for a covered vessel for—
(1) any discharge of effluent from properly functioning marine engines;
(2) any discharge of laundry, shower, and galley sink wastes; or
(3) any other discharge incidental to the normal operation of a covered vessel.
(b) EXCEPTIONS.—Subsection (a) shall not apply with respect to—
(1) rubbish, trash, garbage, or other such materials discharged overboard;
(2) other discharges when the vessel is operating in a capacity other than as a means of transportation, such as when—
(A) used as an energy or mining facility;

(B) used as a storage facility or a seafood processing facility;
(C) secured to a storage facility or a seafood processing facility; or
(D) secured to the bed of the ocean, the contiguous zone, or waters of the United States for the purpose of mineral or oil exploration or development;
(3) any discharge of ballast water; or
(4) any discharge in a case in which the Administrator or State, as appropriate, determines that the discharge—
(A) contributes to a violation of a water quality standard; or
(B) poses an unacceptable risk to human health or the environment.

SEC. 3. STUDY OF DISCHARGES INCIDENTAL TO NORMAL OPERATION OF VESSELS.

(a) IN GENERAL.—The Administrator, in consultation with the Secretary of the department in which the Coast Guard is operating and the heads of other interested Federal agencies, shall conduct a study to evaluate the impacts of—
(1) any discharge of effluent from properly functioning marine engines;
(2) any discharge of laundry, shower, and galley sink wastes; and
(3) any other discharge incidental to the normal operation of a vessel.
(b) SCOPE OF STUDY.—The study under subsection (a) shall include—
(1) characterizations of the nature, type, and composition of discharges for—
(A) representative single vessels; and
(B) each class of vessels;
(2) determinations of the volumes of those discharges, including average volumes, for—
(A) representative single vessels; and
(B) each class of vessels;
(3) a description of the locations, including the more common locations, of the discharges;
(4) analyses and findings as to the nature and extent of the potential effects of the discharges, including determinations of whether the discharges pose a risk to human health, welfare, or the environment, and the nature of those risks;
(5) determinations of the benefits to human health, welfare, and the environment from reducing, eliminating, controlling, or mitigating the discharges; and
(6) analyses of the extent to which the discharges are currently subject to regulation under Federal law or a binding international obligation of the United States.
(c) EXCLUSION.—In carrying out the study under subsection (a), the Administrator shall exclude—
(1) discharges from a vessel of the Armed Forces (as defined in section 312(a) of the Federal Water Pollution Control Act (33 U.S.C. 1322(a));
(2) discharges of sewage (as defined in section 312(a) of the Federal Water Pollution Control Act (33 U.S.C. 1322(a)) from a vessel, other than the discharge of graywater from a vessel operating on the Great Lakes; and
(3) discharges of ballast water.
(d) PUBLIC COMMENT; REPORT.—The Administrator shall—
(1) publish in the Federal Register for public comment a draft of the study required under subsection (a);
(2) after taking into account any comments received during the public comment period, develop a final report with respect to the study; and
(3) not later than 15 months after the date of enactment of this Act, submit the final report to—
(A) the Committee on Transportation and Infrastructure of the House of Representatives; and
(B) the Committees on Environment and Public Works and Commerce, Science, and Transportation of the Senate.

Speaker of the House of Representatives.
Vice President of the United States and President of the Senate.

Public Law 110-288 (S. 2766)

One Hundred Tenth Congress of the United States of America

AT THE SECOND SESSION

Begun and held at the City of Washington on Thursday, the third day of January, two thousand and eight

An Act

To amend the Federal Water Pollution Control Act to address certain discharges incidental to the normal operation of a recreational vessel.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Clean Boating Act of 2008".

SEC. 2. DISCHARGES INCIDENTAL TO THE NORMAL OPERATION OF RECREATIONAL VESSELS.

Section 402 of the Federal Water Pollution Control Act (33 U.S.C. 1342) is amended by adding at the end the following:
"(r) DISCHARGES INCIDENTAL TO THE NORMAL OPERATION OF RECREATIONAL VESSELS.—No permit shall be required under this Act by the Administrator (or a State, in the case of a permit program approved under subsection (b)) for the discharge of any graywater, bilge water, cooling water, weather deck runoff, oil water separator effluent, or effluent from properly functioning marine engines, or any other discharge that is incidental to the normal operation of a vessel, if the discharge is from a recreational vessel.".

SEC. 3. DEFINITION.

Section 502 of the Federal Water Pollution Control Act (33 U.S.C. 1362) is amended by adding at the end the following: "(25) RECREATIONAL VESSEL.— "(A) IN GENERAL.—The term 'recreational vessel' means any vessel that is—
"(i) manufactured or used primarily for pleasure; or
"(ii) leased, rented, or chartered to a person for the pleasure of that person. "(B) EXCLUSION.—The term 'recreational vessel' does not include a vessel that is subject to Coast Guard inspection and that— "(i) is engaged in commercial use; or "(ii) carries paying passengers.".

SEC. 4. MANAGEMENT PRACTICES FOR RECREATIONAL VESSELS.

Section 312 of the Federal Water Pollution Control Act (33 U.S.C. 1322) is amended by adding at the end the following: "(o) MANAGEMENT PRACTICES FOR RECREATIONAL VESSELS.—
"(1) APPLICABILITY.—This subsection applies to any discharge, other than a discharge of sewage, from a recreational vessel that is—
"(A) incidental to the normal operation of the vessel; and
"(B) exempt from permitting requirements under section 402(r). "(2) DETERMINATION OF DISCHARGES SUBJECT TO MANAGEMENT PRACTICES.— "(A) DETERMINATION.— "(i) IN GENERAL.—The Administrator, in

consultation with the Secretary of the department in which the Coast Guard is operating, the Secretary of Commerce, and interested States, shall determine the discharges incidental to the normal operation of a recreational vessel for which it is reasonable and practicable to develop management practices to mitigate adverse impacts on the waters of the United States. "(ii) PROMULGATION.—The Administrator shall promulgate the determinations under clause (i) in accordance with section 553 of title 5, United States Code. "(iii) MANAGEMENT PRACTICES.—The Administrator shall develop management practices for recreational vessels in any case in which the Administrator determines that the use of those practices is reasonable and practicable. "(B) CONSIDERATIONS.—In making a determination under subparagraph (A), the Administrator shall consider— "(i) the nature of the discharge; "(ii) the environmental effects of the discharge; "(iii) the practicability of using a management practice; "(iv) the effect that the use of a management practice would have on the operation, operational capability, or safety of the vessel; "(v) applicable Federal and State law; "(vi) applicable international standards; and "(vii) the economic costs of the use of the management practice. "(C) TIMING.—The Administrator shall— "(i) make the initial determinations under subparagraph (A) not later than 1 year after the date of enactment of this subsection; and "(ii) every 5 years thereafter— "(I) review the determinations; and "(II) if necessary, revise the determinations based on any new information available to the Administrator. "(3) PERFORMANCE STANDARDS FOR MANAGEMENT PRACTICES.—

"(A) IN GENERAL.—For each discharge for which a management practice is developed under paragraph (2), the Administrator, in consultation with the Secretary of the department in which the Coast Guard is operating, the Secretary of Commerce, other interested Federal agencies, and interested States, shall promulgate, in accordance with section 553 of title 5, United States Code, Federal standards of performance for each management practice required with respect to the discharge.

"(B) CONSIDERATIONS.—In promulgating standards under this paragraph, the Administrator shall take into account the considerations described in paragraph (2)(B).

"(C) CLASSES, TYPES, AND SIZES OF VESSELS.—The standards promulgated under this paragraph may— "(i) distinguish among classes, types, and sizes of vessels; "(ii) distinguish between new and existing vessels; and

"(iii) provide for a waiver of the applicability of the standards as necessary or appropriate to a particular class, type, age, or size of vessel. "(D) TIMING.—The Administrator shall—

"(i) promulgate standards of performance for a management practice under subparagraph (A) not later than 1 year after the date of a determination under paragraph (2) that the management practice is reasonable and practicable; and

"(ii) every 5 years thereafter— "(I) review the standards; and "(II) if necessary, revise the standards, in accordance with subparagraph (B) and based on any new information available to the Administrator.

"(4) REGULATIONS FOR THE USE OF MANAGEMENT PRACTICES.—

"(A) IN GENERAL.—The Secretary of the department in which the Coast Guard is operating shall promulgate such regulations governing the design, construction, installation, and use of management practices for recreational vessels as are necessary to meet the standards of performance promulgated under paragraph (3).

"(B) REGULATIONS.—

"(i) IN GENERAL.—The Secretary shall promulgate the regulations under this paragraph as soon as practicable after the Administrator promulgates standards with respect to the practice under paragraph (3), but not later than 1 year after the date on which the Administrator promulgates the standards.

"(ii) EFFECTIVE DATE.—The regulations promulgated by the Secretary under this paragraph shall be effective upon promulgation unless another effective date is specified in the regulations.

"(iii) CONSIDERATION OF TIME.—In determining the effective date of a regulation promulgated under this paragraph, the Secretary shall consider the period of time necessary to communicate the existence of the regulation to persons affected by the regulation.

"(5) EFFECT OF OTHER LAWS.—This subsection shall not affect the application of section 311 to discharges incidental to the normal operation of a recreational vessel.
"(6) PROHIBITION RELATING TO RECREATIONAL VESSELS.— After the effective date of the regulations promulgated by the Secretary of the department in which the Coast Guard is operating under paragraph (4), the owner or operator of a recreational vessel shall neither operate in nor discharge any discharge incidental to the normal operation of the vessel into, the waters of the United States or the waters of the contiguous zone, if the owner or operator of the vessel is not using any applicable management practice meeting standards established under this subsection.".

Speaker of the House of Representatives.
Vice President of the United States and President of the Senate.

Appendix D
List of Target Analytes

Analytical Class	Analyte Name	Analytical Method	CAS Number
Pathogens	E. Coli by MF	EPA 1603	NA
Pathogens	E. Coli by MPN	IDEXX Colilert 18 Quanti-Tray or Multiple Tube Fermentation	NA
Pathogens	Enterococci by MF	EPA 1600	NA
Pathogens	Enterococci by MPN	IDEXX Enterolert Quanti-Tray or ASTM D6503-99	NA
Pathogens	Fecal Coliform by MF	MF-SM9222D	NA
Pathogens	Fecal Coliform by MPN	Multiple Tube Fermentation	NA
Classicals	Biochemical Oxygen Demand (BOD)	SM 5210 B 20th	NA
Classicals	Chemical Oxygen Demand (COD)	Chemical Oxygen Demand by HACH	NA
Classicals	Conductivity	A2510B	NA
Classicals	Dissolved Organic Carbon (DOC)	SM5310 B	NA
Classicals	Dissolved Oxygen	SM 4500-O G	NA
Classicals	Hexane Extractable Material (HEM)	USEPA-1664A	NA
Classicals	pH	SM 4500-H B	NA
Classicals	Salinity	SM 2520 A	NA
Classicals	Silica Gel Treated HEM (SGT-HEM)	USEPA-1664A	68334-30-5
Classicals	Sulfide	SM4500S2D	18496-25-8
Classicals	Temperature	SM 2550	NA
Classicals	Total Organic Carbon (TOC)	SM5310 B	NA
Classicals	Total Residual Chlorine	SM 4500-Cl G	NA
Classicals	Total Suspended Solids (TSS)	SM 2540 D 20th	NA
Classicals	Turbidity	EPA 180.1	NA
Metals	Aluminum, Dissolved	EPA200.7	7429-90-5
Metals	Aluminum, Dissolved	EPA200.8	7429-90-5
Metals	Aluminum, Total	EPA200.7	7429-90-5
Metals	Aluminum, Total	EPA200.8	7429-90-5
Metals	Antimony, Dissolved	EPA200.8	7440-36-0
Metals	Antimony, Total	EPA200.8	7440-36-0
Metals	Arsenic, Dissolved	EPA200.7	7440-38-2
Metals	Arsenic, Dissolved	EPA200.8	7440-38-2
Metals	Arsenic, Total	EPA200.7	7440-38-2
Metals	Arsenic, Total	EPA200.8	7440-38-2
Metals	Barium, Dissolved	EPA200.8	7440-39-3
Metals	Barium, Total	EPA200.7	7440-39-3
Metals	Barium, Total	EPA200.8	7440-39-3
Metals	Beryllium, Dissolved	EPA200.8	7440-41-7
Metals	Beryllium, Total	EPA200.8	7440-41-7
Metals	Cadmium, Dissolved	EPA200.7	7440-43-9
Metals	Cadmium, Dissolved	EPA200.8	7440-43-9
Metals	Cadmium, Total	EPA200.7	7440-43-9
Metals	Cadmium, Total	EPA200.8	7440-43-9
Metals	Calcium, Dissolved	EPA200.7	7440-70-2
Metals	Calcium, Total	EPA200.7	7440-70-2
Metals	Chromium, Dissolved	EPA200.7	7440-47-3
Metals	Chromium, Dissolved	EPA200.8	7440-47-3
Metals	Chromium, Total	EPA200.7	7440-47-3
Metals	Chromium, Total	EPA200.8	7440-47-3

Analytical Class	Analyte Name	Analytical Method	CAS Number
Metals	Cobalt, Dissolved	EPA200.8	7440-48-4
Metals	Cobalt, Total	EPA200.8	7440-48-4
Metals	Copper, Dissolved	EPA200.7	7440-50-8
Metals	Copper, Dissolved	EPA200.8	7440-50-8
Metals	Copper, Total	EPA200.7	7440-50-8
Metals	Copper, Total	EPA200.8	7440-50-8
Metals	Iron, Dissolved	EPA200.7	7439-89-6
Metals	Iron, Total	EPA200.7	7439-89-6
Metals	Lead, Dissolved	EPA200.7	7439-92-1
Metals	Lead, Dissolved	EPA200.8	7439-92-1
Metals	Lead, Total	EPA200.7	7439-92-1
Metals	Lead, Total	EPA200.8	7439-92-1
Metals	Magnesium, Dissolved	EPA200.7	7439-95-4
Metals	Magnesium, Total	EPA200.7	7439-95-4
Metals	Manganese, Dissolved	EPA200.7	7439-96-5
Metals	Manganese, Dissolved	EPA200.8	7439-96-5
Metals	Manganese, Total	EPA200.7	7439-96-5
Metals	Manganese, Total	EPA200.8	7439-96-5
Metals	Nickel, Dissolved	EPA200.7	7440-02-0
Metals	Nickel, Dissolved	EPA200.8	7440-02-0
Metals	Nickel, Total	EPA200.7	7440-02-0
Metals	Nickel, Total	EPA200.8	7440-02-0
Metals	Potassium, Dissolved	EPA200.7	2023695
Metals	Potassium, Total	EPA200.7	2023695
Metals	Selenium, Dissolved	EPA200.7	7782-49-2
Metals	Selenium, Dissolved	EPA200.8	7782-49-2
Metals	Selenium, Total	EPA200.7	7782-49-2
Metals	Selenium, Total	EPA200.8	7782-49-2
Metals	Silver, Dissolved	EPA200.8	7440-22-4
Metals	Silver, Total	EPA200.8	7440-22-4
Metals	Sodium, Dissolved	EPA200.7	7440-23-5
Metals	Sodium,Total	EPA200.7	7440-23-5
Metals	Thallium, Dissolved	EPA200.8	7440-28-0
Metals	Thallium, Total	EPA200.8	7440-28-0
Metals	Vanadium, Dissolved	EPA200.8	7440-62-2
Metals	Vanadium,Total	EPA200.8	7440-62-2
Metals	Zinc, Dissolved	EPA200.7	7440-66-6
Metals	Zinc, Dissolved	EPA200.8	7440-66-6
Metals	Zinc, Total	EPA200.7	7440-66-6
Metals	Zinc, Total	EPA200.8	7440-66-6
Nonylphenols	Bisphenol A	MS004	NA
Nonylphenols	Nonylphenol decaethoxylate (NP10EO)	MS006	NA
Nonylphenols	Nonylphenol diethoxylate (NP2EO)	MS004	NA
Nonylphenols	Nonylphenol dodecaethoxylate (NP12EO)	MS006	NA
Nonylphenols	Nonylphenol heptadecaethoxylate (NP17EO)	MS006	NA
Nonylphenols	Nonylphenol heptaethoxylate (NP7EO)	MS006	NA
Nonylphenols	Nonylphenol hexadecaethoxylate (NP16EO)	MS006	NA
Nonylphenols	Nonylphenol hexaethoxylate (NP6EO)	MS006	NA
Nonylphenols	Nonylphenol monoethoxylate	MS004	NA
Nonylphenols	Nonylphenol nonaethoxylate (NP9EO)	MS006	NA
Nonylphenols	Nonylphenol octaethoxylate (NP8EO)	MS006	NA
Nonylphenols	Nonylphenol octodecaethoxylate (NP18EO)	MS006	NA

Analytical Class	Analyte Name	Analytical Method	CAS Number
Nonylphenols	Nonylphenol pendecaethoxylate (NP15EO)	MS006	NA
Nonylphenols	Nonylphenol pentaethoxylate (NP5EO)	MS006	NA
Nonylphenols	Nonylphenol tetradecaethoxylate (NP14EO)	MS006	NA
Nonylphenols	Nonylphenol tetraethoxylate (NP4EO)	MS006	NA
Nonylphenols	Nonylphenol tridecaethoxylate (NP13EO)	MS006	NA
Nonylphenols	Nonylphenol triethoxylate (NP3EO)	MS006	NA
Nonylphenols	Nonylphenol undecaethoxylate (NP11EO)	MS006	NA
Nonylphenols	Octylphenol	MS004	NA
Nonylphenols	Octylphenol decaethoxylate (OP10EO)	MS006	NA
Nonylphenols	Octylphenol diethoxylate (OP2EO)	MS006	NA
Nonylphenols	Octylphenol dodecaethoxylate (OP12EO)	MS006	NA
Nonylphenols	Octylphenol heptaethoxylate (OP7EO)	MS006	NA
Nonylphenols	Octylphenol hexaethoxylate (OP6EO)	MS006	NA
Nonylphenols	Octylphenol nonaethoxylate (OP9EO)	MS006	NA
Nonylphenols	Octylphenol octaethoxylate (OP8EO)	MS006	NA
Nonylphenols	Octylphenol pentaethoxylate (OP5EO)	MS006	NA
Nonylphenols	Octylphenol tetraethoxylate (OP4EO)	MS006	NA
Nonylphenols	Octylphenol triethoxylate (OP3EO)	MS006	NA
Nonylphenols	Octylphenol undecaethoxylate (OP11EO)	MS006	NA
Nonylphenols	Total Nonylphenol Polyethoxylates	MS006	NA
Nonylphenols	Total Nonylphenols	MS004	NA
Nonylphenols	Total Octylphenol Polyethoxylates	MS006	NA
Nutrients	Ammonia As Nitrogen (NH3-N)	Ammonia by 4500-NH3	7664-41-7
Nutrients	Nitrate/Nitrite (NO3/NO2-N)	EPA353.2	NA
Nutrients	Total Kjeldahl Nitrogen (TKN)	EPA351.2	NA
Nutrients	Total Phosphorus	Total Phosphorus by 365.4	7723-14-0
SVOC	1,2-Diethyl-Cyclobutane	SVOCs by EPA 625	NA
SVOC	1,2-Diphenyl hydrazine	SVOCs by EPA 625	122-66-7
SVOC	1,6-dimethylnaphthalene	SVOCs by EPA 625	575-43-9
SVOC	1-methylnaphthalene	SVOCs by EPA 625	90-12-0
SVOC	2,4,5-Trichlorophenol	SVOCs by EPA 625	95-95-4
SVOC	2,4,6-Trichlorophenol	SVOCs by EPA 625	88-06-2
SVOC	2,4-Dichlorophenol	SVOCs by EPA 625	120-83-2
SVOC	2,4-Dimethylphenol	SVOCs by EPA 625	105-67-9
SVOC	2,4-Dinitrophenol	SVOCs by EPA 625	51-28-5
SVOC	2,4-Dinitrotoluene	SVOCs by EPA 625	121-14-2
SVOC	2,6,10,14-Tetramethyl Pentadecane	SVOCs by EPA 625	1921-70-6
SVOC	2,6-Dinitrotoluene	SVOCs by EPA 625	606-20-2
SVOC	2-Butoxy ethanol	SVOCs by EPA 625	NA
SVOC	2-Chloronaphthalene	SVOCs by EPA 625	91-58-7
SVOC	2-Chlorophenol	SVOCs by EPA 625	95-57-8
SVOC	2-Cyclopenten1-one	SVOCs by EPA 625	NA
SVOC	2-Hydroxy-Benzaldehyde	SVOCs by EPA 625	90-02-8
SVOC	2-Mercaptobenzothiazole	SVOCs by EPA 625	149-30-4
SVOC	2-Methylnaphthalene	SVOCs by EPA 625	91-57-6
SVOC	2-Naphthalenecarboxaldehyde	SVOCs by EPA 625	NA
SVOC	2-Nitroaniline	SVOCs by EPA 625	88-74-4
SVOC	2-Nitrophenol	SVOCs by EPA 625	88-75-5
SVOC	3,3'-Dichlorobenzidine	SVOCs by EPA 625	91-94-1
SVOC	3,6-Dimethylundecane	SVOCs by EPA 625	NA
SVOC	3-Methyl-2-Heptanone	SVOCs by EPA 625	NA
SVOC	3-Methyl-Benzaldehyde	SVOCs by EPA 625	620-23-5
SVOC	3-Methyl-Butanoic Acid	SVOCs by EPA 625	NA

Analytical Class	Analyte Name	Analytical Method	CAS Number
SVOC	3-Methylphenol	SVOCs by EPA 625	NA
SVOC	3-Nitroaniline	SVOCs by EPA 625	99-09-2
SVOC	3-Phenyl-2-Propenal	SVOCs by EPA 625	104-55-2
SVOC	4,6-Dinitro-2-Methylphenol	SVOCs by EPA 625	534-52-1
SVOC	4-Bromophenyl Phenyl Ether	SVOCs by EPA 625	101-55-3
SVOC	4-Chloro-3-Methylphenol	SVOCs by EPA 625	59-50-7
SVOC	4-Chloroaniline	SVOCs by EPA 625	106-47-8
SVOC	4-Chlorophenyl Phenyl Ether	SVOCs by EPA 625	7005-72-3
SVOC	4-Methyl-Pentanoic Acid	SVOCs by EPA 625	NA
SVOC	4-Nitrobenzenamine	SVOCs by EPA 625	100-01-6
SVOC	4-Nitrophenol	SVOCs by EPA 625	100-02-7
SVOC	5-Butyl-Hexadecane	SVOCs by EPA 625	NA
SVOC	Acenaphthene	SVOCs by EPA 625	83-32-9
SVOC	Acenaphthylene	SVOCs by EPA 625	208-96-8
SVOC	Acetophenone	SVOCs by EPA 625	98-86-2
SVOC	Anthracene	SVOCs by EPA 625	120-12-7
SVOC	Atrazine	SVOCs by EPA 625	1912-24-9
SVOC	Benzeneacetic Acid	SVOCs by EPA 625	NA
SVOC	Benzenepropanoic Acid	SVOCs by EPA 625	NA
SVOC	Benzidine	SVOCs by EPA 625	92-87-5
SVOC	Benzo(A)Anthracene	SVOCs by EPA 625	56-55-3
SVOC	Benzo(A)Pyrene	SVOCs by EPA 625	50-32-8
SVOC	Benzo(B)Fluoranthene	SVOCs by EPA 625	205-99-2
SVOC	Benzo(G,H,I)Perylene	SVOCs by EPA 625	191-24-2
SVOC	Benzo(K)Fluoranthene	SVOCs by EPA 625	207-08-9
SVOC	Benzothiazole	SVOCs by EPA 625	95-16-9
SVOC	Bicyclo[2.2.1]Heptane,1,7,7-Trimethyl-	SVOCs by EPA 625	NA
SVOC	Biphenyl[a]	SVOCs by EPA 625	92-52-4
SVOC	Bis (2-Chloroisopropyl)Ether	SVOCs by EPA 625	108-60-1
SVOC	Bis(2-Chloroethoxy)Methane	SVOCs by EPA 625	111-91-1
SVOC	Bis(2-Chloroethyl)Ether	SVOCs by EPA 625	111-44-4
SVOC	Bis(2-Chloroisopropyl) Ether	SVOCs by EPA 625	39638-32-9
SVOC	Bis(2-Ethylhexyl) Phthalate	SVOCs by EPA 625	117-81-7
SVOC	Butyl Benzyl Phthalate	SVOCs by EPA 625	85-68-7
SVOC	Caprolactam	SVOCs by EPA 625	105-60-2
SVOC	Carbazole	SVOCs by EPA 625	86-74-8
SVOC	Cholesterol	SVOCs by EPA 625	NA
SVOC	Chrysene	SVOCs by EPA 625	218-01-9
SVOC	Cyclohexadecane	SVOCs by EPA 625	NA
SVOC	Dibenz(A,H)Anthracene	SVOCs by EPA 625	53-70-3
SVOC	Dibenzofuran	SVOCs by EPA 625	132-64-9
SVOC	Diethyl Phthalate	SVOCs by EPA 625	84-66-2
SVOC	Dimethyl Phthalate	SVOCs by EPA 625	131-11-3
SVOC	Di-N-Butyl Phthalate	SVOCs by EPA 625	84-74-2
SVOC	Di-N-Octyl Phthalate	SVOCs by EPA 625	117-84-0
SVOC	Dodecane	SVOCs by EPA 625	
SVOC	Eicosane	SVOCs by EPA 625	112-95-8
SVOC	Fluoranthene	SVOCs by EPA 625	206-44-0
SVOC	Fluorene	SVOCs by EPA 625	86-73-7
SVOC	Heneicosane	SVOCs by EPA 625	629-94-7
SVOC	Heptadecane	SVOCs by EPA 625	629-78-7
SVOC	Hexachlorobenzene	SVOCs by EPA 625	118-74-1
SVOC	Hexachlorobutadiene[a]	SVOCs by EPA 625	87-68-3

Analytical Class	Analyte Name	Analytical Method	CAS Number
SVOC	Hexachlorocyclopentadiene	SVOCs by EPA 625	77-47-4
SVOC	Hexachloroethane	SVOCs by EPA 625	67-72-1
SVOC	Hexadecanoic Acid	SVOCs by EPA 625	NA
SVOC	Indeno(1,2,3-Cd)Pyrene	SVOCs by EPA 625	193-39-5
SVOC	Indole	SVOCs by EPA 625	NA
SVOC	Isophorone	SVOCs by EPA 625	78-59-1
SVOC	Isopropylbenzene-4,Methyl-1	SVOCs by EPA 625	99-87-6
SVOC	M-Cresol	SVOCs by EPA 625	108-39-4
SVOC	Naphthalene	SVOCs by EPA 625	91-20-3
SVOC	N-Hexadecane	SVOCs by EPA 625	544-76-3
SVOC	Nitrobenzene	SVOCs by EPA 625	98-95-3
SVOC	N-Nitroso Di-N-Propylamine	SVOCs by EPA 625	621-64-7
SVOC	N-Nitrosodimethylamine	SVOCs by EPA 625	62-75-9
SVOC	N-Nitrosodiphenylamine	SVOCs by EPA 625	86-30-6
SVOC	Nonadecane	SVOCs by EPA 625	629-92-5
SVOC	Nonanoic Acid	SVOCs by EPA 625	NA
SVOC	N-Pentadecane[a]	SVOCs by EPA 625	629-62-9
SVOC	N-Tetradecane[a]	SVOCs by EPA 625	629-59-4
SVOC	O-Cresol	SVOCs by EPA 625	95-48-7
SVOC	Octadecane	SVOCs by EPA 625	NA
SVOC	P-Cresol	SVOCs by EPA 625	106-44-5
SVOC	Pentachlorophenol	SVOCs by EPA 625	87-86-5
SVOC	Phenanthrene	SVOCs by EPA 625	85-01-8
SVOC	Phenol	SVOCs by EPA 625	108-95-2
SVOC	Pyrene	SVOCs by EPA 625	129-00-0
SVOC	Triethyl Phosphate	SVOCs by EPA 625	NA
VOC	(2-Methyl-1-Propenyl)-Benzene	VOCs by EPA 624	NA
VOC	(E)-2-Butenal	VOCs by EPA 624	NA
VOC	1,1,1,2-Tetrachloroethane	VOCs by EPA 624	630-20-6
VOC	1,1,1-Trichloroethane	VOCs by EPA 624	71-55-6
VOC	1,1,2,2-Tetrachloroethane	VOCs by EPA 624	79-34-5
VOC	1,1,2-Trichloroethane	VOCs by EPA 624	79-00-5
VOC	1,1-Dichloroethane	VOCs by EPA 624	75-34-3
VOC	1,1-Dichloroethene	VOCs by EPA 624	75-35-4
VOC	1,1-Dichloropropene	VOCs by EPA 624	563-58-6
VOC	1,2,3,4-Tetrahydro-5-Methylnaphthalene	VOCs by EPA 624	2809-64-5
VOC	1,2,3,4-Tetrahydro-6-Methylnaphthalene	VOCs by EPA 624	1680-51-9
VOC	1,2,3,4-Tetrahydronaphthalene	VOCs by EPA 624	119-64-2
VOC	1,2,3-Trichlorobenzene	VOCs by EPA 624	87-61-6
VOC	1,2,3-Trichloropropane	VOCs by EPA 624	96-18-4
VOC	1,2,4-Trichlorobenzene	VOCs by EPA 624	120-82-1
VOC	1,2,4-Trimethylbenzene	VOCs by EPA 624	95-63-6
VOC	1,2-Dibromo-3-Chloropropane	VOCs by EPA 624	96-12-8
VOC	1,2-Dibromoethane	VOCs by EPA 624	106-93-4
VOC	1,2-Dichlorobenzene	VOCs by EPA 624	95-50-1
VOC	1,2-Dichloroethane	VOCs by EPA 624	107-06-2
VOC	1,2-Dichloropropane	VOCs by EPA 624	78-87-5
VOC	1,3,5-Trimethylbenzene	VOCs by EPA 624	108-67-8
VOC	1,3-Dichlorobenzene	VOCs by EPA 624	541-73-1
VOC	1,3-Dichloropropane	VOCs by EPA 624	142-28-9
VOC	1,3-Methylnaphthalene	VOCs by EPA 624	NA
VOC	1,4-Dichlorobenzene	VOCs by EPA 624	106-46-7
VOC	1,7-Methylnaphthalene	VOCs by EPA 624	NA

Analytical Class	Analyte Name	Analytical Method	CAS Number
VOC	1-Ethyl-3-Methyl-Benzene	VOCs by EPA 624	NA
VOC	1-Methyl-2-(1-Methylethyl)-Benzene	VOCs by EPA 624	NA
VOC	1-Methyl-4-(1-Methylidene)-Cyclohexane	VOCs by EPA 624	NA
VOC	1-Methylnaphthalene[b]	VOCs by EPA 624	90-12-0
VOC	2- Heptanone	VOCs by EPA 624	NA
VOC	2,2-Dichloropropane	VOCs by EPA 624	594-20-7
VOC	2,3-Dihydro-4-Methyl-1h-Indene	VOCs by EPA 624	824-22-6
VOC	2,6-Dimethylnaphthalene	VOCs by EPA 624	581-42-0
VOC	2-Butanone	VOCs by EPA 624	78-93-3
VOC	2-Butenal	VOCs by EPA 624	NA
VOC	2-Ethyl-1,3,5-Trimethyl-Benzene	VOCs by EPA 624	NA
VOC	2-Ethyl-1,4-Dimethyl-Benzene	VOCs by EPA 624	2039-89-6
VOC	2-Ethyl-1-Hexanol	VOCs by EPA 624	104-76-7
VOC	2-Hexanone	VOCs by EPA 624	591-78-6
VOC	2-Methylnaphthalene[b]	VOCs by EPA 624	91-57-6
VOC	4-Chlorotoluene	VOCs by EPA 624	106-43-4
VOC	4-Isopropyltoluene	VOCs by EPA 624	99-87-6
VOC	4-Methyl-2-Pentanone	VOCs by EPA 624	108-10-1
VOC	Acetone	VOCs by EPA 624	67-64-1
VOC	Benzaldehyde	VOCs by EPA 624	100-52-7
VOC	Benzene	VOCs by EPA 624	71-43-2
VOC	Benzocycloheptatriene	VOCs by EPA 624	NA
VOC	Benzofuran	VOCs by EPA 624	271-89-6
VOC	Biphenyl	VOCs by EPA 624	92-52-4
VOC	Bromobenzene	VOCs by EPA 624	108-86-1
VOC	Bromochloromethane	VOCs by EPA 624	74-97-5
VOC	Bromodichloromethane	VOCs by EPA 624	75-27-4
VOC	Bromoform	VOCs by EPA 624	75-25-2
VOC	Bromomethane	VOCs by EPA 624	74-83-9
VOC	Carbon Disulfide	VOCs by EPA 624	75-15-0
VOC	Carbon Tetrachloride	VOCs by EPA 624	56-23-5
VOC	Chlorobenzene	VOCs by EPA 624	108-90-7
VOC	Chloroethane	VOCs by EPA 624	75-00-3
VOC	Chloroform	VOCs by EPA 624	67-66-3
VOC	Chloromethane	VOCs by EPA 624	74-87-3
VOC	Chlorotoluene	VOCs by EPA 624	25168-05-2
VOC	Cis-1,2-Dichloroethene	VOCs by EPA 624	156-59-2
VOC	Cis-1,3-Dichloropropene	VOCs by EPA 624	10061-01-5
VOC	Cyclohexane	VOCs by EPA 624	110-82-7
VOC	Dibromochloromethane	VOCs by EPA 624	124-48-1
VOC	Dibromomethane	VOCs by EPA 624	74-95-3
VOC	Dichlorodifluoromethane	VOCs by EPA 624	75-71-8
VOC	Dimethoxymethane	VOCs by EPA 624	NA
VOC	Ethylbenzene	VOCs by EPA 624	100-41-4
VOC	Fluorotrimethylsilane	VOCs by EPA 624	420-56-4
VOC	Hexachlorobutadiene	VOCs by EPA 624	87-68-3
VOC	Isopropylbenzene	VOCs by EPA 624	98-82-8
VOC	Limonene	VOCs by EPA 624	000138-86-3
VOC	M-,P-Xylene (Sum Of Isomers)	VOCs by EPA 624	NA
VOC	Methyl Acetate	VOCs by EPA 624	79-20-9
VOC	Methyl Tertiary Butyl Ether (MTBE)	VOCs by EPA 624	1634-04-4
VOC	Methylcyclohexane	VOCs by EPA 624	108-87-2
VOC	Methylene Chloride	VOCs by EPA 624	75-09-2

Analytical Class	Analyte Name	Analytical Method	CAS Number
VOC	Naphthalene[b]	VOCs by EPA 624	91-20-3
VOC	N-Butylbenzene	VOCs by EPA 624	104-51-8
VOC	Nonanal	VOCs by EPA 624	124-19-6
VOC	N-Pentadecane	VOCs by EPA 624	629-62-9
VOC	N-Propylbenzene	VOCs by EPA 624	103-65-1
VOC	N-Tetradecane	VOCs by EPA 624	629-59-4
VOC	O-Xylene	VOCs by EPA 624	95-47-6
VOC	Sec-Butylbenzene	VOCs by EPA 624	135-98-8
VOC	Styrene	VOCs by EPA 624	100-42-5
VOC	Sulfur Dioxide	VOCs by EPA 624	2025884
VOC	Tert-Butylbenzene	VOCs by EPA 624	98-06-6
VOC	Tetrachloroethene	VOCs by EPA 624	127-18-4
VOC	Tetrahydrofuran	VOCs by EPA 624	109-99-9
VOC	Toluene	VOCs by EPA 624	108-88-3
VOC	Trans-1,2-Dichloroethene	VOCs by EPA 624	156-60-5
VOC	Trans-1,3-Dichloropropene	VOCs by EPA 624	10061-02-6
VOC	Trichloroethene	VOCs by EPA 624	79-01-6
VOC	Trichlorofluoromethane	VOCs by EPA 624	75-69-4
VOC	Trichlorotrifluoroethane	VOCs by EPA 624	76-13-1
VOC	Trimethylsilanol	VOCs by EPA 624	1066-40-6
VOC	Vinyl Acetate	VOCs by EPA 624	108-05-4
VOC	Vinyl Chloride	VOCs by EPA 624	75-01-4

[a] Also measured analytically as a VOC using EPA Method 624. For the purposes of this report, this compound has been classified as a VOC to keep with other similar compounds.
[b] Also measured analytically as a SVOC using EPA Method 625. For the purposes of this report, this compound has been classified as an SVOC to keep with other PAHs.
NA = Not Applicable.

Appendix E
Analyte Concentrations and Summary Statistics from Ambient Water Samples

Analyte - Ambient Water[b,c]	#Waters	Min.	Mean	Median	Max.	Screening BM	Non Detects	Det. Limit(s)
Acetone	10	0.9	2.81	2.25	9.2	n/a	2	5
Aluminum, Dissolved	16	3.1	218.9	38.6	870	n/a	2	6.2
Aluminum, Total	16	29.2	653.9	357.5	3950	87	0	
Ammonia As Nitrogen (NH3-N)	15	0.02	0.15	0.066	0.93	1.2	6	0.04, 0.05
Arsenic, Dissolved	17	1	8.09	2	30	36	8	1, 4
Arsenic, Total	17	1	8.19	2.9	28.9	0.018	8	1, 4
Barium, Dissolved	10	14.2	39.04	34.55	65.2	n/a	0	
Barium, Total	10	13.3	45.96	33.9	96.3	1000	0	
Biochemical Oxygen Demand (BOD)	14	0.479	2.68	1.35	9.3	30	4	1, 4
Calcium, Dissolved	17	23000	104382	72100	310000	n/a	0	
Calcium, Total	17	23000	107876	71100	320000	n/a	0	
Chemical Oxygen Demand (COD)	15	10	298.3	72	1700	n/a	3	20
Conductivity	15	0.2215	10.49	7.18	38.2	n/a	0	
Copper, Dissolved	17	1.5	4.88	2.5	24.2	3.1[a]	7	5
Copper, Total	17	1.8	5.74	4	23.3	1300	7	5
Dissolved Organic Carbon (DOC)	17	1	4.66	4.4	8.5	n/a	1	3
Dissolved Oxygen	15	1	6.69	6.5	12.33	n/a	0	
E. Coli	9	5	3236	130	24196	130	1	10
Enterococci	9	5	1387	333	5099	33	1	10
Fecal Coliform	8	5	6452	220	44000	14	1	10
Iron, Total	10	50	812.2	382	4180	300	2	100
Magnesium, Dissolved	17	6000	304644	172000	1100000	n/a	0	
Magnesium, Total	17	6000	306001	168000	1100000	n/a	0	
Manganese, Dissolved	17	0.5	11.71	3.7	106	n/a	7	1, 2.5, 6.7, 17
Manganese, Total	17	1.25	60.54	43	165	100	2	2.5, 13
Nickel, Dissolved	17	2.3	4.60	5	7.2	8.2[a]	7	10
Nickel, Total	17	2.4	5.81	5	16.7	610	7	10
Nitrate/Nitrite (NO3/NO2-N)	15	0.025	0.36	0.097	1.5	n/a	6	0.05
pH	16	6.90	7.41	7.26	8.18	n/a	0	
Potassium, Dissolved	10	3600	72198	60700	175000	n/a	0	
Potassium, Total	10	3470	71119	59750	174000	n/a	0	
Salinity	14	0.1	6.06	3.85	22.4	n/a	0	
Selenium, Dissolved	17	1	22.51	5	100	5[a]	7	2, 10
Selenium, Total	17	1	22.71	5	93.9	170	10	2, 10
Sodium, Dissolved	10	17600	1446690	1009500	3630000	n/a	0	
Sodium,Total	10	17400	1459630	1160000	3680000	n/a	0	
Temperature	16	8.8	20.07	21.575	29.37	n/a	0	
Total Kjeldahl Nitrogen (TKN)	15	0.05	1.00	0.587	4.7	n/a	3	0.1
Total Organic Carbon (TOC)	13	2	6.12	5.1	19	n/a	0	
Total Phosphorus	15	0.0125	0.20	0.059	2	0.1	6	0.025, 0.05
Total Suspended Solids (TSS)	17	5	22.13	15	98	n/a	1	10
Turbidity	16	0.03	32.01	17.5	186	n/a	0	
Vanadium, Dissolved	10	0.5	0.94	0.5	2.3	n/a	6	
Vanadium,Total	10	0.5	2.90	1.6	9.3	n/a	5	1, 2.5, 10
Zinc, Dissolved	17	3.4	19.32	11.4	116	81	4	10
Zinc, Total	17	2.9	10.98	10.6	23.9	7400	4	10

Note:
(a) Screening benchmark (BM) is below detection limit(s)
(b) Analytes not listed in this table were not detected.
(c) Surrounding Ambient water (also used as service water on select vessels for deck washdown, firemain systems, or other services as specified in Chapter 3) was tested for the following classes of pollutants: pathogens, dissolved and total metals, the so-called 'classical pollutants', nutrient and nutrient related parameters, VOCs and SVOCs (see Appendix D).

Appendix F
Analyte Concentrations and Summary Statistics from Source Water Samples

Analyte - Source Water[b,c]	#Waters	Min.	Mean	Median	Max.	Screening BM	Non Detects	Det. Limit(s)
Aluminum, Dissolved	11	6.3	64.94	17.1	310	n/a	1	50
Aluminum, Total	11	8.6	64.06	27.5	250	87	1	50
Ammonia As Nitrogen (NH3-N)	10	0.02	0.18	0.041	0.731	1.2	5	0.04,0.05
Barium, Dissolved	7	11.4	29.14	29	58.5	n/a	0	
Barium, Total	7	11.9	29.07	30.1	56.9	1000	0	
Bromodichloromethane	8	1.25	7.84	5.65	18	0.55[a]	2	2.5, 5
Calcium, Dissolved	11	1450	28496	29600	88000	n/a	0	
Calcium, Total	11	1280	28409	29700	88000	n/a	0	
Chemical Oxygen Demand (COD)	11	5	11.55	10	28.6	n/a	6	10, 20
Chloroform	8	0.05	18.56	16	57.2	5.7	0	
Conductivity	10	0.159	33.39	0.4075	330.4	n/a	0	
Copper, Dissolved	11	2.4	16.11	6.2	65	3.1[a]	2	5
Copper, Total	11	2.5	20.55	8.7	82	1300	2	5
Dibromochloromethane	8	0.9	3.38	2.45	10	0.4[a]	3	2.5, 5
Dissolved Oxygen	10	2.07	6.87	6.96	11.72	n/a	0	
Magnesium, Dissolved	11	250	6815	7100	19000	n/a	2	500, 1000
Magnesium, Total	11	350	6855	7300	19000	n/a	2	1000
Manganese, Dissolved	11	0.5	6.00	1.25	33	n/a	6	1, 2.5
Manganese, Total	11	1	9.30	5.4	37	100	1	2.5
Nitrate/Nitrite (NO3/NO2-N)	11	0.025	1.26	1.6	2.4	n/a	1	0.05
pH	11	6.61	7.37	7.08	8.45	n/a	0	
Potassium, Dissolved	7	1000	3077	3340	5220	n/a	2	2000, 3000
Potassium, Total	7	1000	3003	2840	5270	n/a	1	2000
Sodium, Dissolved	7	16100	56057	24300	140000	n/a	0	
Sodium,Total	7	11500	55143	24100	144000	n/a	0	
Temperature	10	5.47	20.42	21.16	31.16	n/a	0	
Total Kjeldahl Nitrogen (TKN)	10	0.05	0.66	0.401	1.8	n/a	1	0.1
Total Organic Carbon (TOC)	8	1.5	3.21	2.35	10.4	n/a	3	3
Total Phosphorus	10	0.025	0.30	0.363	0.52	0.1	2	0.05
Total Residual Chlorine	10	0.05	0.46	0.415	1.3	0.0075[a]	3	0.1
Turbidity	11	0.5	5.89	2	19.3	n/a	2	1
Zinc, Dissolved	11	4.1	154.8	25.3	1200	81	0	
Zinc, Total	11	4.1	145.3	25.1	1100	7400	0	

Note:
(a) Screening benchmark (BM) is below detection limit(s)
(b) Analytes not listed in this table were not detected.
(c) Source and service water was tested for the following classes of pollutants: pathogens, dissolved and total metals, the so-called 'classical pollutants', nutrient and nutrient related parameters, VOCs and SVOCs (see Appendix D).

Appendix G
SUPPORTING INFORMATION FOR EPA'S SCREENING-LEVEL WATER QUALITY MODEL

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Fire Boat	Deck Wash	0.01	1 deck wash per month 50 gallons per wash All deck washes done pier side		50 gal per month/30 days = 1.67 gal/day
Fire Boat	Generator Engine	1.82	1 generator Inboard diesel engine	2 gpm cooling water flow rate 4 hours operation when fire call 1 fire call per day	2 gal per minute X 240 min per day = 480 gal/day
Fire Boat	Propulsion Engine	36.34	2 propulsion engines 420 hp inboard engine	20 gpm cooling water flow 4 hours operation when fire call	20 gal per minute X 240 min per day X 2 engines = 9600 gal/day
Fishing (Gillnetter)	Fish Hold	1.52	1.5 tons of ice per offload 1 offload per day		1.5 tons of ice (or 1524 kg) X 1kg/L X 1 offload/day = 1524 liters/day
Fishing (Gillnetter)	Fish Hold	0.08	50 lbs (25.2 liters) if ice per offload offloads daily		75.6 liters/day
Fishing (Gillnetter)	Fish Hold	0.70	1.75 tons of ice per offload Offload daily	Ice tank holds 50% fish, 35% ice, 15% air (0.61tons of ice or 691.48 liters of ice)	691.47 liters/day
Fishing (Gillnetter)	Propulsion Engine	14.93		20 gpm cooling water flow rate 1200 hours per year in operation	20 gal/min X 60 min/hour X 1200 hours/365 days = 3945 gal/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Fishing (Gillnetter)	Propulsion Engine	14.93	1 Caterpillar 350hp	20 gpm cooling water flow rate 1200 hours per year in operation	20 gal/min X 60 min/hour X 1200 hours/365 days = 3945 gal/day
Fishing (Gillnetter)	Propulsion Engine	14.93		20 gpm cooling water flow rate 1200 hours per year in operation	20 gal/min X 60 min/hour X 1200 hours/365 days = 3945 gal/day
Fishing (Gillnetter)	Propulsion Engine	14.93		20 gpm cooling water flow rate 1200 hours per year in operation	20 gal/min X 60 min/hour X 1200 hours/365 days = 3945 gal/day
Fishing (Lobster Boat)	Fish Hold	2.83		Used average of known Longliner fish hold flow rates	
Fishing (Longliner)	Bilge Water	0.45	1 manual pump	12v bilge pump at 20 gpm 10 minutes per pump out 2 pump outs per day	20 gal per min X 10 min X 2 pump/day = 120 gal/day
Fishing (Longliner)	Fish Hold	4.06	8 tons of ice per offload Offload every 2 days	Tanks are full at offload	8 tons of ice (or 8128 kg) X 1kg/L X 1 offload/ 2 days = 4064 liters/day
Fishing (Longliner)	Fish Hold	1.59	Fish hold tank is 8X10X4 ft (9.06 m^3) Emptied at each offload	Ice tank holds 50% fish, 35% ice, 15% air (3.17 $m^3$of ice) Offloads 1 every 2 days	9.06 m^3 X 35% X 1 offload/2 days = 1.59 m^3/day
Fishing (Purse Seiner)	Fish Hold	31.71	Fish hold tank is 8X20X20 ft (90.6 m^3) Emptied at each offload	ice tank holds 50% fish, 35% ice, 15% air (3.17 m^3 of ice) offloads daily	90.6 m^3 X 35% = 31.71 m^3/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Fishing (Purse Seiner)	Fish Hold	15.66	fish hold tank A is 15X10X6 ft (25.5 m^3) fish hold tank A is 15X8X6 ft (20.4 m^3) holds 60,000 lbs of fish (27215 kg) emptied at each offload	density of fish is 0.9 kg/L offloads daily	27215 kg / 0.9kg/L = 30,239 L of fish (30.24 m^3 of fish) 45.9 m^3 tank - 30.24 m^3 of fish = 15.66 m^3 of hold water 15.66 m^3 of hold water X = 15.66 m^3/day
Fishing (Purse Seiner)	Fish Hold	18.36	tank holds about 85,000lbs of fish (42,840 liters of fish)	holding tank is 70% fish, 30% water offloads daily	42,840 liters of fish X 30 / 70 = 18,360 Liters/day
Fishing (Purse Seiner)	Fish Hold	10.20	fish hold tank is 1200 ft^3 (33.99 m^3) emptied at each offload	holding tank is 70% fish, 30% water offloads daily	33.99 m^3 X 30% = 10.2 m^3/day
Fishing (Purse Seiner)	Fish Hold	5.34	fish hold tank is 630 ft^3 (17.84 m^3) emptied at each offload	holding tank is 70% fish, 30% water offloads daily	17.84 m3 X 30% = 5.34 m^3/day
Fishing (Purse Seiner)	Fish Hold Clean	1.33		30 minute wash garden hose flow rate is 11.67 gpm	11.67 gal per min X 30 min X 1 wash/day = 350.1 gal/day
Fishing (Purse Seiner)	Fish Hold Clean	2.33		30 minute wash garden hose flow rate is 11.67 gpm	11.67 gal per min X 30 min X 1 wash/day = 350.1 gal/day
Fishing (Purse Seiner)	Fish Hold Clean	3.33		30 minute wash garden hose flow rate is 11.67 gpm	11.67 gal per min X 30 min X 1 wash/day = 350.1 gal/day
Fishing (Purse Seiner)	Fish Hold Clean	0.04	tanks are cleaned 1 per month	30 minute wash garden hose flow rate is 11.67 gpm	11.67 gal per min X 30 min X 1 wash/30 days = 11.67gal/day
Fishing (Purse Seiner)	Fish Hold Clean	3.33	4 month season	30 minute wash garden hose flow rate is 11.67 gpm	11.67 gal per min X 30 min X 1 wash/day = 350.1 gal/day
Fishing (Purse Seiner)	Generator Engine	1.41	17,000 hours over 15 years	2 gpm cooling flow	2 gal/min X 60 min/hr X 17000hrs/15 years/365 days = 372.6 gal/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Fishing (Purse Seiner)	Propulsion Engine	16.59	1 Cummin 350hp inboard diesel engine 4000 hours in 3 years	20 gpm cooling flow	20 gal/min X 60 min/hr X 4000hrs/3 years/365 days = 4383.6 gal/day
Research	Propulsion Engine	0.03	1 200hp gas outboard engine 5 years old 250 hours of use	1 gpm cooling water flow rate	1 gal per minute X 250 hours/ 5 years of use X 1 engines X 365 days/year = 8.22 gal/day
Research	Propulsion Engine	0.15	2 225 hp gas outboard engine 5 years old 600 hours of use	1 gpm cooling water flow rate	1 gal per minute X 600 hours/ 5 years of use X 2 engines X 365 days/year = 39.45 gal/day
Fishing (Shrimp Trawler)	Bilge Water	2.84	5 min per pump out 1 pump out every day 150 gal/min bilge pump rate	150gpm, 5 min per pump out, once a day: 750 gal/day	150 gal per min X 5 min per day = 750 gal/min
Fishing (Shrimp Trawler)	Deck Wash	0.66	1 deck wash per day 15 minute deck wash with garden hose	garden hose flow rate is 11.67 gpm	11.67 gal per min X 15 min X 1 wash/day = 175.05 gal/day
Fishing (Shrimp Trawler)	Deck Wash	0.76	200 gallons per day		200 gal/ day
Fishing (Shrimp Trawler)	Deck Wash	0.15	1 deck wash per offload 10 minute deck wash with garden hose	1 offload every 3 days Garden hose flow rate is 11.67 gpm	11.67 gal per min X 10 min X 1 wash/ 3 days = 38.9 gal/day
Fishing (Shrimp Trawler)	Fish Hold	0..22	Holding tank hold 3000lbs of shrimp	Density of fish is 0.9 kg/liter Holding tank is 70%shrimp, 30% water Offloads 1 every 3 days	1360 kg of fish / 0.9kg/L = 1512 liters of fish 1512 X 30%/70% = 648L of ice slurry 648L / 3 days = 216 L/day
Fishing (Shrimp Trawler)	Fish Hold	2.12	Holding tank is 1500 ft^3 Generally half full at offload	Holding tank is 70%shrimp, 30% water Offloads 1 every 3 days	1500 ft^3 X 30% X 1/2 full X 1offload/3 days = 75 ft^3/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Fishing (Shrimp Trawler)	Fish Hold Clean	0.13		15 minute hose down after each offload Offloads 1 every 3 days Garden hose flow rate is 11.67 gpm	11.67 gal per min X 15 min X 1 wash/ 3 day X = 33.66 gal/day
Fishing (Shrimp Trawler)	Fish Hold Clean	0.13		15 minute hose down after each offload Offloads 1 every 3 days Garden hose flow rate is 11.67 gpm	11.67 gal per min X 15 min X 1 wash/ 3 day X = 33.66 gal/day
Fishing (Shrimp Trawler)	Deck Wash	0.08	1 deck wash per offload 60 gallons per wash	1 offload every 3 days	60 gal every 3 days X year = 20 gal/day
Fishing (Shrimp Trawler)	Deck Wash	0.04	1 deck wash per offload 30 gallons per wash	2 offload every 3 days	30 gal every 3 days X year = 20 gal/day
Fishing (Shrimp Trawler)	Fish Hold	1.77		Used average of known trawler fish hold flow rates	
Fishing (Shrimp Trawler)	Fish Hold	1.42	5000 gallon tank 75% full at offload	Holding tank is 70%shrimp, 30% water Offloads 1 every 3 days	5000 gal X 30% X 3/4 full X 1offload/3 days = 375 gal /day
Fishing (Shrimp Trawler)	Fish Hold Clean	0.13		15 minute hose down after each offload Offloads 1 every 3 days Garden hose flow rate is 11.67 gpm	11.67 gal per min X 15 min X 1 wash/ 3 day X = 33.66 gal/day
Supply Boat	Deck Wash	0.05	Cleaned with hose 15 minute per deckwash	Garden hose flow rate is 11.67 gpm 1 wash every 2 weeks	11.67 gal per min X 15 min X 1 wash/14 days =12.5 gal/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Fishing (Tender Vessel)	Fish Hold	32.82	3 tanks of 2700 ft^3 each (229.4 m^3 total) holds 325,000 lbs of fish (147417 kg of fish) emptied at offload	density of fish is 0.9 kg/L offloads 1 every 2 days	147417 kg / 0.9kg/L = 163,797 L of fish (163.8 m^3 of fish) 229.4 m^3 tank - 163.8 m^3 of fish = 65.6 m^3 of hold water 65.6 m^3 of hold water X 1 offload/ 2 days =32.82 m^3/day
Fishing (Tender Vessel)	Fish Hold	18.43	holds 170,000 lbs of fish (77,110 kg of fish) emptied at offload	density of fish is 0.9 kg/L holding tank is 70% fish, 30% water offloads 1 every 2 days	77,110 kg / 0.9kg/L = 85678 L of fish (86 m^3 of fish) 86 m^3 of fish X 30% / 70% X 1 offload / 2 days = 18.43 m^3/day
Fishing (Tender Vessel)	Fish Hold	6.81	fish hold tank is 1600 ft^3 (45.3 m3)	holding tank is 70% fish, 30% water offloads 1 every 2 days (480ft^3),	45.3 m^3 X 30% X 1 every 2 days = 6.81m3/day
Fishing (Tender Vessel)	Fish Hold Clean	0.38		30 minute wash after each offload 1 offload every 2 days garden hose flow rate is 11.67 gpm after each offload, I offload/2days	11.67 gal per min X 30 min X 1 wash/2 days = 100.95gal/day
Fishing (Tender Vessel)	Fish Hold Clean	0.38		30 minute wash after each offload 1 offload every 2 days garden hose flow rate is 11.67 gpm after each offload, I offload/2days	11.67 gal per min X 30 min X 1 wash/2 days = 100.95gal/day
Tour Boat	Bilge Water	0.05	5 min to pump bilge 1 pump per week	12v bilge pump at 20 gpm	20 gal per min X 5 min X 1 pump/7 days = 14.3 gal/day
Tour Boat	Bilge Water	0.03	pumped very rarely	12v bilge pump at 20 gpm rarely defined as 1 pump every 2 weeks 5 min to pump bilge	20 gal per min X 5 min X 1 pump/14 days = 7.2 gal/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Tour Boat	Deck Wash	0.06	1 deck wash per week 10 minute deck wash with a garden hose	garden hose flow rate is 11.67 gpm	11.67 gal per min X 10 min X 1 wash/7 days = 16.67 gal/day
Tour Boat	Deck Wash	0.22	1 deck wash per day 5 minute deck wash with garden hose	garden hose flow rate is 11.67 gpm	11.67 gal per min X 5 min X 1 wash/1 days = 58.35 gal/day
Tour Boat	Generator Engine	5.40	2 45kw 76hp inboard diesel engine heat exchange system 6 hours per day of operation	2 gpm cooling flow	2 gal per minute X 360 min per day X 2 engines =1440 gal/day
Tour Boat	Generator Engine	2.20	2 27kw 46hp inboard diesel engines raw water cooled 4500 hours used in last 5 years	2 gpm cooling flow	2 gal per minute X 900 hours/year X 2 engines = 591.78 gal/day
Tour Boat	Propulsion Engine	27.25	1 catapillar 86hp diesel inboard engine 20 years old heat exchanger 6 hours per day of operation	20 gpm cooling flow	20 gal per min X 360 min per day X = 7200 gal/day
Tour Boat	Propulsion Engine	54.51	2 catapilar 275 diesel inboard engines heat exchange system 6 hours per day of operation	20 gpm cooling flow	20 gal per min X 360 min per day X 2 engines = 14400 gal/day
Tour Boat	Propulsion Engine	44.80	2 catapilar 275 diesel inboard engines raw water cooled 9000 hours operated in last 5 years	20 gpm cooling flow	20 gal per min X 1800 hours per year X 2 engines = 11836 gal/day
Tow/Salvage	Bilge Water	0.05	2 min per pump out 1 pump out every 3 days	12v bilge pump at 20 gpm	20 gal per min X 2 min X 1 pump/3 days = 13 gal/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Tow/Salvage	Bilge Water	2.73	60 gal per minute flow rate 5 second per pump out 1 pump out every 10 minutes		60 gal per minute X 12 min/day = 720 gal/day
Tow/Salvage	Deck Wash	0.03	1 deck wash per week 50 gallons per wash		50 gal per wash/7 days per week = 7.14 gal/day
Tow/Salvage	Deck Wash	0.03	1 deck wash per week 50 gallons per wash		50 gal per wash/7 days per week = 7.14 gal/day
Tow/Salvage	Deck Wash	0.01	25 gallons per wash	1 deck wash every 2 weeks	25 gal per wash/14 days = 1.79 gal/day
Tow/Salvage	Deck Wash	0.02	2 deck washes per week 20 gallons per wash		20 gal per wash/3.5 days = 5.7 gal/day
Tow/Salvage	Deck Wash	0.03	1 deck wash per week 50 gallons per wash		50 gal per wash/7 days per week = 7.14 gal/day
Tow/Salvage	Propulsion Engine	0.15	1 225 hp evinrude etech outboard 1 year old engine with 243 hours raw water cooled	1 gpm cooling water flow rate	1 gal per min X 243 hours/year = 39.95 gal/day
Tow/Salvage	Propulsion Engine	0.91	1 suzuki 225 hp outboard engine operates 4 hours per day	1 gpm cooling water flow rate	1 gal per min X 4 hours/day = 240 gal/day
Tow/Salvage	Propulsion Engine	0.56	2 suzuki 175hp gas outboard engines 1800 hours operated in last 4 years	1 gpm cooling water flow rate	1 gal per min X 450 hours/year X 2 engines = 147.95 gal/day
Tow/Salvage	Propulsion Engine	2.88	1 cummin inboard 380hp diesel engine 463 hours in last 2 years	20 gpm cooling water flow rate	20 gal per min X 231.5 hours/year = 761.1 gal/day
Tow/Salvage	Propulsion Engine	0.26	2 yamaha 150hp outboard gas engines 420 hours operated in last 2 years	1 gpm cooling water flow rate	1 gal per min X 210 hours/year X 2 engines = 69.04 gal/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Fishing (Trawler)	Bilge Water	2.84		used average of known shrimp trawler bilge flow rates	150 gal per min X 5 min per day = 750 gal/min
Fishing (Trawler)	Deck Wash	0.34		used average of known shrimp trawler deck wash flow rates	
Fishing (Trawler)	Fish Hold	1.77		used average of known shrimp trawler fish hold flow rates	
Fishing (Trawler)	Fish Hold Clean	0.13		15 minute hose down after each offload offloads 1 every 3 days garden hose flow rate is 11.67 gpm	11.67 gal per min X 15 min X 1 wash/ 3 day X = 33.66 gal/day
Fishing (Troller)	Deck Wash	0.47	125 gal per power wash	1 wash per day	125 gal/day
Fishing (Troller)	Fish Hold	4.16	fish hold tank is 12x10x7 ft^3 (23.8 m^3) emptied at each offload tank is offloaded at half full	ice tank holds 50% fish, 35% ice, 15% air offloads daily	23.8m^3 X 35% X 50% = 4.16 m^3/day
Fishing (Troller)	Fish Hold	0.79	600 gallon ice box emptied at each offload	ice tank holds 50% fish, 35% ice, 15% air offloads daily	600 gal X 35% = 210 gal/day
Fishing (Troller)	Fish Hold	1.58	160 ft^3 tank (4.53 m^3 tank)	ice tank holds 50% fish, 35% ice, 15% air offloads daily	4.53 m3 X 35% = 1.58 m^3/day
Fishing (Troller)	Fish Hold	5.59	5.5 tons of ice per offload 1 offload per day	tank holds 5.5 tons of ice (5588.3kg of ice or 6141 liters of ice) and 11,000 of fish, discharged at each offload, offloads daily,	5.5 tons of ice (5588.3 kg) X 1kg/L = 5588.29 L/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Fishing (Troller)	Fish Hold Clean	0.38		1 deck wash per offload 15 minute deck wash with garden hose 1 offload daily garden hose flow rate is 11.67 gpm	11.67 gal per min X 15 min = 100.95 gal/day
Fishing (Troller)	Fish Hold Clean	1.38		2 deck wash per offload 15 minute deck wash with garden hose 1 offload daily garden hose flow rate is 11.67 gpm	11.67 gal per min X 15 min = 100.95 gal/day
Tugboat	Deck Wash	0..38	1 deck wash per 2 weeks with garden hose 2 hours per deck wash	garden hose flow rate is 11.67 gpm	11.67 gal per min X 120 min X 1 wash/14 days = 100 gal/day
Tugboat	Deck Wash	0.14	1.5 deck washes per week 15 minutes per deck wash	garden hose flow rate is 11.67 gpm	11.67 gal per min X 22.5 min X 1 wash/7 days = 37.8 gal/day
Tugboat	Deck Wash	0.17	1.5 deck washes per week with garden hose 15-20 minutes per deck wash	garden hose flow rate is 11.67 gpm	11.67 gal per min X 17.5 min X 1.5 wash/7 days = 43.76 gal/day
Tugboat	Deck Wash	0.14	1 deck wash per 2 week with garden hose 45 minutes per deck wash	garden hose flow rate is 11.67 gpm	11.67 gal per min X 45 min X 1 wash/14 days = 37.51 gal/day
Tugboat	Deck Wash	0.14	1 deck wash per week with garden hose 15-30 minutes per deck wash	garden hose flow rate is 11.67 gpm	11.67 gal per min X 22.5 min X 1 wash/7 days = 37.51 gal/day
Tugboat	Deck Wash	0.19	2 deck washes per week with garden hose 15 minutes per deck wash	garden hose flow rate is 11.67 gpm	11.67 gal per min X 15 min X 2 washes/7 days = 50.01 gal/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Tugboat	Deck Wash	0.00	Uses pressure washer at 2 gallons per wash 1 wash every month		2 gal per wash X 1 wash every month = 0.067 gal/day
Tugboat	Deck Wash	0.05		garden hose flow rate is 11.67 gpm 1 deck washes per 2 weeks with garden hose 15 minutes per deck wash (use data of sister vessel)	11.67 gal per min X 15 min X 1 wash/14 days =12.5 gal/day
Tugboat	Deck Wash	0.05	1 deck washes per 2 weeks with garden hose 15 minutes per deck wash	garden hose flow rate is 11.67 gpm	11.67 gal per min X 15 min X 1 wash/14 days =12.5 gal/day
Tugboat	Graywater - Laundry	0.22	front load washer 16 loads per week	front load washer uses 25 gal/load	25 gal/load X 16 loads/week = 57.14 gal/day
Tugboat	Graywater - Laundry	0.22	front load washer 16 loads per week	front load washer uses 25 gal/load	25 gal/load X 16 loads/week = 57.14 gal/day
Tugboat	Graywater - Laundry	0.11	standard washer 5 loads per week	standard washer uses 40 gal/load	40 gal/load X 5 loads/week = 28.57 gal/day
Tugboat	Graywater - Laundry	0.22	front load washer 4 crew	front load washer uses 25 gal/load 4 loads of laundry per crew per week	25 gal/load X 16 loads/week = 57.14 gal/day
Tugboat	Graywater - Laundry	0.13	standard washer 6 loads per week	standard washer uses 40 gal/load	40 gal/load X 5 loads/week = 34.29 gal/day
Tugboat	Graywater - Laundry	0.02	1 load per week	has standard washer standard washer uses 40 gal/load	40 gal/load X 1 loads/week = 6.86 gal/day
Tugboat	Graywater - Shower	0.16	3 crew	17.2 gal per shower 0.8 showers per person per day	3 crew X 17.2 gal per shower X 0.8 showers per person per day = 41.28 gal/day
Tugboat	Graywater - Shower	0.16	3 crew	17.2 gal per shower 0.8 showers per person per day	3 crew X 17.2 gal per shower X 0.8 showers per person per day = 41.28 gal/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Tugboat	Graywater - Shower	0.26	5 crew	17.2 gal per shower 0.8 showers per person per day	5 crew X 17.2 gal per shower X 0.8 showers per person per day = 68.8 gal/day
Tugboat	Graywater - Shower	0.21	4 crew	17.2 gal per shower 0.8 showers per person per day	4 crew X 17.2 gal per shower X 0.8 showers per person per day = 55.04 gal/day
Tugboat	Graywater - Shower	0.21	4 crew	17.2 gal per shower 0.8 showers per person per day	4 crew X 17.2 gal per shower X 0.8 showers per person per day = 55.04 gal/day
Tugboat	Graywater - Shower	0.16	3 crew	17.2 gal per shower 0.8 showers per person per day	3 crew X 17.2 gal per shower X 0.8 showers per person per day = 41.28 gal/day
Tugboat	Graywater - Sink	0.11	3 crew	30 min of sink use per crew per week 2.2 gal per min in standard sink	2.2 gal per min X 3 crew X 30 min/7days = 28.29 gal/day
Tugboat	Graywater - Sink	0.11	3 crew	30 min of sink use per crew per week 2.2 gal per min in standard sink	2.2 gal per min X 3 crew X 30 min/7days = 28.29 gal/day
Tugboat	Graywater - Sink	0.18	5 crew	30 min of sink use per crew per week 2.2 gal per min in standard sink	2.2 gal per min X 5 crew X 30 min/7days = 47.14 gal/day
Tugboat	Graywater - Sink	0.14	4 crew	30 min of sink use per crew per week 2.2 gal per min in standard sink	2.2 gal per min X 4 crew X 30 min/7days = 37.71 gal/day
Tugboat	Graywater - Sink	0.14	4 crew	30 min of sink use per crew per week 2.2 gal per min in standard sink	2.2 gal per min X 4 crew X 30 min/7days = 37.71 gal/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Tugboat	Graywater - Sink	0.11	3 crew	30 min of sink use per crew per week 2.2 gal per min in standard sink	2.2 gal per min X 3 crew X 30 min/7days = 28.29 gal/day
Tugboat	Shaft Water	0.01	operates 5 days/week	10 mL/min constant drip (3.8 gal/day drip)	3.8 gal per day X 5 days/week = 2.71 gal/day
Tugboat	Shaft Water	0.01	operates 5 days/week	10 mL/min constant drip (3.8 gal/day drip)	3.8 gal per day X 5 days/week = 2.71 gal/day
Tugboat	Shaft Water	0.01	operates 5 days/week	10 mL/min constant drip (3.8 gal/day drip)	3.8 gal per day X 5 days/week = 2.71 gal/day
Tugboat	Shaft Water	0.01	operates 5 days/week	10 mL/min constant drip (3.8 gal/day drip)	3.8 gal per day X 5 days/week = 2.71 gal/day
Tugboat	Shaft Water	0.01	operates 5 days/week	10 mL/min constant drip (3.8 gal/day drip)	3.8 gal per day X 5 days/week = 2.71 gal/day
Tugboat	Shaft Water	0.01	operates 5 days/week	10 mL/min constant drip (3.8 gal/day drip)	3.8 gal per day X 5 days/week = 2.71 gal/day
Tugboat	Shaft Water	0.01	operates 5 days/week	10 mL/min constant drip (3.8 gal/day drip)	3.8 gal per day X 5 days/week = 2.71 gal/day
Tugboat	Shaft Water	0.01	operates 5 days/week	10 mL/min constant drip (3.8 gal/day drip)	3.8 gal per day X 5 days/week = 2.71 gal/day
Water Taxi	Bilge Water	0.13	2000 gal per hour pump 1 minute per pump out bilge pump operates when engine is turned on		33.33 gal per min X 1 min per pump out X 1 pump out/day =33.2 gal/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Water Taxi	Bilge Water	0.13	2000 gal per hour pump 1 minute per pump out bilge pump operates when engine is turned on		33.33 gal per min X 1 min per pump out X 1 pump out/day =33.2 gal/day
Water Taxi	Bilge Water	0.13	2000 gal per hour pump 1 minute per pump out bilge pump operates when engine is turned on		33.33 gal per min X 1 min per pump out X 1 pump out/day =33.2 gal/day
Water Taxi	Deck Wash	0.01	1 deck washes per month with garden hose 10 minutes per deck wash	garden hose flow rate is 11.67 gpm	11.67 gal per min X 10 min X 1 wash/30 days = 3.89 gal/day
Water Taxi	Deck Wash	0.01	1 deck washes per month with garden hose 10 minutes per deck wash	garden hose flow rate is 11.67 gpm	11.67 gal per min X 10 min X 1 wash/30 days = 3.89 gal/day
Water Taxi	Deck Wash	0.09	1 deck washes every week with garden hose 15 minutes per deck wash	garden hose flow rate is 11.67 gpm	11.67 gal per min X 15 min X 1 wash/7 = 25 gal/day
Water Taxi	Deck Wash	0.02	1 deck washes per month with garden hose 12.5 minutes per deck wash	garden hose flow rate is 11.67 gpm	11.67 gal per min X 12.5 min X 1 wash/30 days= 4.86 gal/day
Water Taxi	Generator Engine	9.08	2 21.5kw diesel generators heat exchange system operates 10 hours/day	2 gal per min cooling flow	2 gal per minute X 600 min per day X 2 engines = 2400 gal/day
Water Taxi	Graywater - Sink	0.28		100 passengers wash their hands/day faucet flow rate is 2.2 gal/min 20 seconds per wash	100 passengers/day X 20 second/wash X 2.2 gal/min = 73.34 gal/day

Appendix G.1: Vessel-Specific Flow Calculations by Discharge Type

Vessel Class (Vessel Subclass)	Discharge Type	Flow Rate (m^3/day)	Known Information	Assumptions	Calculations
Water Taxi	Propulsion Engine	33.18	2 95hp diesel inboard engines 20,000 hours of operation in 15 years	20 gal per min cooling flow	1200 gal per hour X 2 engines X 1,333 hours/year = 8765 gal/day
Water Taxi	Propulsion Engine	18.57	1 caterpillar 220hp diesel inboard 4475 hours of operation in 3 years	20 gal per min cooling flow	1200 gal per hour X 1,492 hours/year = 4905 gal/day
Water Taxi	Propulsion Engine	90.85	2 John Deer 25hp inboard diesel engines operates 10 hours/day	20 gal per min cooling flow	1200 gal per hour X 2 engines X 10 hrs/day = 24,000 gal/day
Water Taxi	Propulsion Engine	16.59	1 90hp diesel inboard engine 20,000 hours of operation in 15 years	20 gal per min cooling flow	1200 gal per hour X 1,333 hours/year = 4382 gal/day

Appendix G.2: Percent of Vessels by Vessel Class and Discharge Type Discharging in the Harbor

Vessel Class	Vessel Subclass	Discharge	Number of Sampled Vessels without Discharge System or Process (A)	Number of Sampled Vessels with a No Discharge System (B)	Number of Sampled Vessels that DischargedOutside U.S. Waters (C)	Number of Sampled Vessels that Discharge in the Harbor [1] (D)	Total Number of Sampled Vessels (E=A+B+C+D)	Percent of Vessels with Discharge (D/E)
Fire Boat	NA	Deck Wash	0	0	0	1	1	100%
Fire Boat	NA	Engine Effluent	0	0	0	1	1	100%
Fire Boat	NA	Fire Main	0	0	0	1	1	100%
Fire Boat	NA	Generator Effluent	0	0	0	1	1	100%
Fishing	Gillnetter	Deck Wash	0	0	5	0	5	0%
Fishing	Gillnetter	Engine Effluent	0	1	0	4	5	80%
Fishing	Gillnetter	Fish Hold	0	0	1	4	5	80%
Fishing	Lobster Boat	Fish Hold	0	0	0	1	1	100%
Fishing	Longliner	Bilge	0	1	1	1	3	33%
Fishing	Longliner	Fish Hold	0	0	0	3	3	100%
Fishing	Longliner	Fish Hold Clean	0	0	0	3	3	100%
Fishing	Purse Seiner	Engine Effluent	0	3	0	2	5	40%
Fishing	Purse Seiner	Fish Hold	0	0	0	5	5	100%
Fishing	Purse Seiner	Fish Hold Clean	0	0	0	5	5	100%
Fishing	Purse Seiner	Generator Effluent	1	2	0	2	5	40%
Fishing	Shrimping	Bilge	0	0	5	5	10	50%
Fishing	Shrimping	Deck Wash	0	0	2	8	10	80%
Fishing	Shrimping	Fish Hold	0	2	0	8	10	80%
Fishing	Shrimping	Graywater	0	0	0	10	10	100%
Fishing	Tender Vessel	Fish Hold	0	0	0	3	3	100%
Fishing	Tender Vessel	Fish Hold Clean	0	0	1	2	3	67%
Fishing	Trawler	Deck Wash	0	0	2	8	10	80%
Fishing	Trawler	Fish Hold	0	2	0	8	10	80%
Fishing	Trawler	Fish Hold Clean	0	3	2	4	10	40%
Fishing	Troller	Deck Wash	2	0	3	1	6	17%

Appendix G.2: Percent of Vessels by Vessel Class and Discharge Type Discharging in the Harbor

Vessel Class	Vessel Subclass	Discharge	Number of Sampled Vessels without Discharge System or Process (A)	Number of Sampled Vessels with a No Discharge System (B)	Number of Sampled Vessels that DischargedOutside U.S. Waters (C)	Number of Sampled Vessels that Discharge in the Harbor [1] (D)	Total Number of Sampled Vessels (E=A+B+C+D)	Percent of Vessels with Discharge (D/E)
Fishing	Troller	Fish Hold	0	0	0	6	6	100%
Fishing	Troller	Fish Hold Clean	4	0	0	2	6	33%
Research	NA	Engine Effluent	0	0	0	2	2	100%
Supply Boat	NA	Deck Wash	0	0	0	1	1	100%
Tour Boat	NA	Bilge	1	0	0	2	3	67%
Tour Boat	NA	Deck Wash	1	0	0	2	3	67%
Tour Boat	NA	Engine Effluent	0	0	0	3	3	100%
Tour Boat	NA	Fire Main	0	0	0	3	3	100%
Tour Boat	NA	Generator Effluent	1	0	0	2	3	67%
Tow/Salvage	NA	Bilge	1	3	0	2	6	33%
Tow/Salvage	NA	Deck Wash	0	0	0	6	6	100%
Tow/Salvage	NA	Engine Effluent	0	1	0	5	6	83%
Tugboat	NA	Deck Wash	0	0	0	9	9	100%
Tugboat	NA	Fire Main	0	0	0	9	9	100%
Tugboat	NA	Graywater	0	3	0	6	9	67%
Tugboat	NA	Shaft Water	0	1	0	8	9	89%
Water Taxi	NA	Bilge	0	1	0	3	4	75%
Water Taxi	NA	Deck Wash	0	0	0	4	4	100%
Water Taxi	NA	Engine Effluent	0	0	0	4	4	100%
Water Taxi	NA	Generator Effluent	3	0	0	1	4	25%
Water Taxi	NA	Graywater	3	0	0	1	4	25%

(1) - The percentage of vessels discharging to the harbor were determined based on field observations of sampled vessels. As a conservative estimate, sampled vessel classes with no information available were assumed to discharge in the harbor.

Appendix G.3: Vessel Scenario Total Analyte-Specific Loading Rates

Analyte Class	Analyte	Vessel Scenario 1 Total Loading Rate Fishing Harbor	Vessel Scenario 2 Total Loading Rate Large Metropolitan Harbor	Vessel Scenario 3 Total Loading Rate Recreational Harbor	Units
Bacteria	E. Coli by MF	8,860,000,000	44,300,000,000	7,380,000,000	CFU/day
Bacteria	E. Coli by MPN	3,570,000,000	16,000,000,000	2,880,000,000	MPN/day
Bacteria	Enterococci by MF	5,000,000,000	25,000,000,000	4,170,000,000	CFU/day
Bacteria	Enterococci by MPN	1,010,000,000	891,000,000	547,000,000	MPN/day
Bacteria	Fecal Coliform by MF	27,500,000,000	81,500,000,000	20,300,000,000	CFU/day
Bacteria	Fecal Coliform by MPN	10,000,000,000	50,000,000,000	8,330,000,000	MPN/day
Bacteria	Total Coliforms by MPN	42,900,000,000	214,000,000,000	35,800,000,000	MPN/day
Classicals	Biochemical Oxygen Demand (BOD)	635	481	392	lb/day
Classicals	Chemical Oxygen Demand (COD)	1,840	1,310	1,100	lb/day
Classicals	Dissolved Oxygen	25.6	37.4	41.3	lb/day
Classicals	Hexane Extractable Material (HEM)	11.4	19.1	17.5	lb/day
Classicals	Silica Gel Treated HEM (SGT-HEM)	13.2	20.7	20.8	lb/day
Classicals	Sulfide	0.0152	0.0285	0.0203	lb/day
Classicals	Total Organic Carbon (TOC)	239	185	147	lb/day
Classicals	Total Residual Chlorine	0.403	0.730	0.565	lb/day
Classicals	Total Suspended Solids (TSS)	231	207	186	lb/day
Nutrients	Ammonia As Nitrogen (NH3-N)	8.52	6.07	5.07	lb/day
Nutrients	Nitrate/Nitrite (NO3/NO2-N)	0.127	0.203	0.102	lb/day
Nutrients	Total Kjeldahl Nitrogen (TKN)	97.8	68.5	59.0	lb/day
Nutrients	Total Phosphorus	13.8	8.91	7.74	lb/day
Metals	Aluminum, Dissolved	2.01	1.70	1.64	lb/day
Metals	Aluminum, Total	2.55	2.70	2.60	lb/day
Metals	Antimony, Dissolved	0.0000217	0.000111	0.0000470	lb/day
Metals	Antimony, Total	0.0000711	0.000348	0.000137	lb/day
Metals	Arsenic, Dissolved [1]	0.0190	0.0285	0.0256	lb/day
Metals	Arsenic, Total [1]	0.0279	0.0359	0.0315	lb/day
Metals	Barium, Dissolved	0.0326	0.0747	0.0666	lb/day
Metals	Barium, Total	0.0368	0.0895	0.0709	lb/day
Metals	Cadmium, Dissolved	0.0000294	0.0000433	0.0000306	lb/day
Metals	Cadmium, Total	0.000749	0.000657	0.000551	lb/day
Metals	Calcium, Dissolved	653	561	528	lb/day
Metals	Calcium, Total	647	566	534	lb/day
Metals	Chromium, Dissolved	0.00195	0.00447	0.00424	lb/day
Metals	Chromium, Total	0.00514	0.00890	0.00713	lb/day

Appendix G.3: Vessel Scenario Total Analyte-Specific Loading Rates

Analyte Class	Analyte	Vessel Scenario 1 Total Loading Rate Fishing Harbor	Vessel Scenario 2 Total Loading Rate Large Metropolitan Harbor	Vessel Scenario 3 Total Loading Rate Recreational Harbor	Units
Metals	Cobalt, Dissolved	0.0000745	0.000184	0.0000776	lb/day
Metals	Cobalt, Total	0.000148	0.000262	0.000108	lb/day
Metals	Copper, Dissolved	2.88	4.97	2.75	lb/day
Metals	Copper, Total	0.158	0.179	0.165	lb/day
Metals	Iron, Dissolved	0.0161	0.0465	0.0145	lb/day
Metals	Iron, Total	0.376	0.819	0.600	lb/day
Metals	Lead, Dissolved	0.00176	0.00338	0.00340	lb/day
Metals	Lead, Total	0.0108	0.0154	0.0142	lb/day
Metals	Magnesium, Dissolved	1,980	1,500	1,390	lb/day
Metals	Magnesium, Total	1,910	1,470	1,360	lb/day
Metals	Manganese, Dissolved	0.120	0.230	0.255	lb/day
Metals	Manganese, Total	0.148	0.296	0.321	lb/day
Metals	Nickel, Dissolved	0.00854	0.0140	0.0133	lb/day
Metals	Nickel, Total	0.00987	0.0165	0.0145	lb/day
Metals	Potassium, Dissolved	56.0	105	113	lb/day
Metals	Potassium, Total	56.1	105	112	lb/day
Metals	Selenium, Dissolved [1]	0.0215	0.0412	0.0443	lb/day
Metals	Selenium, Total [1]	0.0244	0.0440	0.0471	lb/day
Metals	Silver, Dissolved	0.0000276	0.0000221	0.0000138	lb/day
Metals	Silver, Total	0.0000519	0.0000415	0.0000259	lb/day
Metals	Sodium, Dissolved	1,240	2,460	2,750	lb/day
Metals	Sodium,Total	1,440	2,880	3,260	lb/day
Metals	Thallium, Dissolved	0.0000144	0.0000710	0.0000120	lb/day
Metals	Thallium,Total	0.000000157	0.000000785	0.000000131	lb/day
Metals	Vanadium, Dissolved	0.00101	0.00201	0.00227	lb/day
Metals	Vanadium,Total	0.00130	0.00269	0.00254	lb/day
Metals	Zinc, Dissolved	0.310	0.295	0.259	lb/day
Metals	Zinc, Total	0.758	0.613	0.516	lb/day
Nonylphenols	Bisphenol A	0.00000886	0.0000177	0.0000213	lb/day
Nonylphenols	Nonylphenol decaethoxylate (NP10EO)	0.00191	0.00338	0.00314	lb/day
Nonylphenols	Nonylphenol dodecaethoxylate (NP12EO)	0.00152	0.00270	0.00255	lb/day
Nonylphenols	Nonylphenol heptadecaethoxylate (NP17EO)	0.0000955	0.000170	0.000167	lb/day
Nonylphenols	Nonylphenol heptaethoxylate (NP7EO)	0.00122	0.00210	0.00177	lb/day
Nonylphenols	Nonylphenol hexadecaethoxylate (NP16EO)	0.000209	0.000362	0.000357	lb/day
Nonylphenols	Nonylphenol hexaethoxylate (NP6EO)	0.000866	0.00147	0.00117	lb/day

Appendix G.3: Vessel Scenario Total Analyte-Specific Loading Rates

Analyte Class	Analyte	Vessel Scenario 1 Total Loading Rate Fishing Harbor	Vessel Scenario 2 Total Loading Rate Large Metropolitan Harbor	Vessel Scenario 3 Total Loading Rate Recreational Harbor	Units
Nonylphenols	Nonylphenol nonaethoxylate (NP9EO)	0.00173	0.00300	0.00276	lb/day
Nonylphenols	Nonylphenol octaethoxylate (NP8EO)	0.00159	0.00269	0.00239	lb/day
Nonylphenols	Nonylphenol octodecaethoxylate (NP18EO)	0.0000505	0.0000818	0.0000832	lb/day
Nonylphenols	Nonylphenol pendecaethoxylate (NP15EO)	0.000398	0.000684	0.000675	lb/day
Nonylphenols	Nonylphenol pentaethoxylate (NP5EO)	0.000525	0.000860	0.000596	lb/day
Nonylphenols	Nonylphenol tetradecaethoxylate (NP14EO)	0.000708	0.00124	0.00121	lb/day
Nonylphenols	Nonylphenol tetraethoxylate (NP4EO)	0.000233	0.000390	0.000173	lb/day
Nonylphenols	Nonylphenol tridecaethoxylate (NP13EO)	0.00109	0.00191	0.00184	lb/day
Nonylphenols	Nonylphenol triethoxylate (NP3EO)	0.000131	0.000226	0.0000944	lb/day
Nonylphenols	Nonylphenol undecaethoxylate (NP11EO)	0.00194	0.00343	0.00321	lb/day
Nonylphenols	Octylphenol decaethoxylate (OP10EO)	0.0000690	0.000254	0.0000836	lb/day
Nonylphenols	Octylphenol dodecaethoxylate (OP12EO)	0.0000413	0.000122	0.0000383	lb/day
Nonylphenols	Octylphenol heptaethoxylate (OP7EO)	0.00000302	0.0000151	0.00000251	lb/day
Nonylphenols	Octylphenol nonaethoxylate (OP9EO)	0.0000418	0.0000808	0.0000311	lb/day
Nonylphenols	Octylphenol octaethoxylate (OP8EO)	0.0000257	0.000129	0.0000214	lb/day
Nonylphenols	Octylphenol undecaethoxylate (OP11EO)	0.0000445	0.000151	0.0000503	lb/day
Nonylphenols	Total Nonylphenol Polyethoxylates	0.0136	0.0232	0.0215	lb/day
Nonylphenols	Total Nonylphenols	0.000153	0.000122	0.0000763	lb/day
VOC	(2-Methyl-1-Propenyl)-Benzene	0.00298	0.00595	0.00714	lb/day
VOC	(E)-1-Propenyl-Benzene	0.00000135	0.00000675	0.00000540	lb/day
VOC	(E)-2-Butenal	0.00544	0.0109	0.0131	lb/day
VOC	1,2,3,4-Tetrahydro-1-Methylnaphthalene	0.00342	0.00684	0.00821	lb/day
VOC	1,2,3,4-Tetrahydro-2-Methylnaphthalene	0.00316	0.00632	0.00758	lb/day

Appendix G.3: Vessel Scenario Total Analyte-Specific Loading Rates

Analyte Class	Analyte	Vessel Scenario 1 Total Loading Rate Fishing Harbor	Vessel Scenario 2 Total Loading Rate Large Metropolitan Harbor	Vessel Scenario 3 Total Loading Rate Recreational Harbor	Units
VOC	1,2,3,4-Tetrahydro-5-Methylnaphthalene	0.0277	0.0556	0.0664	lb/day
VOC	1,2,3,4-Tetrahydro-6-Ethylnaphthalene,	0.00298	0.00597	0.00716	lb/day
VOC	1,2,3,4-Tetrahydro-6-Methylnaphthalene	0.0253	0.0512	0.0603	lb/day
VOC	1,2,3,4-Tetrahydro-6-Methylnaphthalene (01)	0.00633	0.0127	0.0152	lb/day
VOC	1,2,3,4-Tetrahydro-6-Methylnaphthalene (02)	0.00530	0.0106	0.0127	lb/day
VOC	1,2,3,4-Tetrahydronaphthalene	0.0190	0.0382	0.0456	lb/day
VOC	1,2,3,4-Tetramethyl-Benzene	0.000643	0.00429	0.00214	lb/day
VOC	1,2,3,5-Tetramethyl-Benzene	0.000947	0.00631	0.00316	lb/day
VOC	1,2,3-Trimethylbenzene	0.00309	0.0206	0.0103	lb/day
VOC	1,2,4,5-Tetramethylbenzene	0.00144	0.00963	0.00481	lb/day
VOC	1,2,4-Trimethylbenzene	0.00616	0.0281	0.0176	lb/day
VOC	1,3,5-Trimethylbenzene	0.00166	0.00819	0.00474	lb/day
VOC	1,3-Methylnaphthalene	0.00391	0.00781	0.00938	lb/day
VOC	1,7-Methylnaphthalene	0.0177	0.0353	0.0424	lb/day
VOC	1-Ethyl-2,3-Dimethyl-Benzene (01)	0.00272	0.00955	0.00735	lb/day
VOC	1-Ethyl-2,3-Dimethyl-Benzene (02)	0.000393	0.00262	0.00131	lb/day
VOC	1-Ethyl-2,4-Dimethyl-Benzene	0.00153	0.0102	0.00510	lb/day
VOC	1-Ethyl-2-Methyl-Benzene	0.00000417	0.0000208	0.0000167	lb/day
VOC	1-Ethyl-3-Methyl-Benzene	0.00327	0.00663	0.00790	lb/day
VOC	1-Ethyl-4-Methyl-Benzene	0.00644	0.0429	0.0215	lb/day
VOC	1-Methyl-2-(1-Methylethyl)-Benzene	0.00	0.00	0.00	lb/day
VOC	1-Methyl-2-(1-Methylethyl)-Benzene (01)	0.00000337	0.0000169	0.0000135	lb/day
VOC	1-Methyl-2-(1-Methylethyl)-Benzene (02)	0.0000118	0.0000589	0.0000471	lb/day
VOC	1-Methyl-3-Propyl-Benzene	0.00126	0.00836	0.00419	lb/day
VOC	1-Methyl-4-(1-Methylidene)-Cyclohexane	0.00	0.00	0.00	lb/day
VOC	1-methyl-Indan	0.00792	0.0201	0.0199	lb/day
VOC	1-Propenyl-Benzene	0.00000155	0.00000774	0.00000619	lb/day
VOC	2- Heptanone	0.0000601	0.000400	0.000200	lb/day
VOC	2,3-Dihydro-1,2-Dimethyl-1H-Indene	0.000323	0.00216	0.00108	lb/day

Appendix G.3: Vessel Scenario Total Analyte-Specific Loading Rates

Analyte Class	Analyte	Vessel Scenario 1 Total Loading Rate Fishing Harbor	Vessel Scenario 2 Total Loading Rate Large Metropolitan Harbor	Vessel Scenario 3 Total Loading Rate Recreational Harbor	Units
VOC	2,3-Dihydro-1,6-Dimethyl-1H-Indene	0.00356	0.0103	0.00906	lb/day
VOC	2,3-Dihydro-1-Methylindene	0.00518	0.0104	0.0124	lb/day
VOC	2,3-Dihydro-1-methylindene (01)	0.00290	0.00579	0.00695	lb/day
VOC	2,3-Dihydro-1-methylindene (02)	0.00614	0.0123	0.0147	lb/day
VOC	2,3-Dihydro-4,7-Dimethyl-1H-Indene	0.0000409	0.000204	0.0000409	lb/day
VOC	2,3-Dihydro-4-Methyl-1H-Indene	0.0546	0.119	0.133	lb/day
VOC	2,3-Dihydro-4-Methyl-1H-Indene (01)	0.00000480	0.0000240	0.0000192	lb/day
VOC	2,3-Dihydro-4-Methyl-1H-Indene (02)	0.00000810	0.0000405	0.0000324	lb/day
VOC	2,3-Dihydro-5,6-dimethyl-1H-Indene	0.00281	0.00562	0.00674	lb/day
VOC	2,3-Dihydro-5-methyl-1H-Indene	0.00159	0.0106	0.00530	lb/day
VOC	2,6-Dimethylnaphthalene	0.0384	0.0769	0.0923	lb/day
VOC	2-Butanone	0.0297	0.0613	0.0706	lb/day
VOC	2-Butenal	0.00340	0.00679	0.00815	lb/day
VOC	2-Ethyl-1,3,5-Trimethyl-Benzene	0.00409	0.00819	0.00982	lb/day
VOC	2-Ethyl-1,4-Dimethyl-Benzene	0.0189	0.0378	0.0454	lb/day
VOC	2-Ethyl-1-Hexanol	0.00000111	0.00000741	0.00000370	lb/day
VOC	2-Ethyltoluene	0.00541	0.0209	0.0150	lb/day
VOC	2-Hexanone	0.00262	0.00562	0.00618	lb/day
VOC	2-Methyl-2-Propenal	0.00632	0.0130	0.0150	lb/day
VOC	2-Propenyl-Benzene	0.00471	0.0314	0.0157	lb/day
VOC	3-Buten-2-one	0.00578	0.0117	0.0138	lb/day
VOC	4-Ethyl-1,2-Dimethyl-Benzene	0.00000429	0.0000214	0.0000171	lb/day
VOC	4-Heptanone	0.0000795	0.000530	0.000265	lb/day
VOC	4-Isopropyltoluene	0.000864	0.00187	0.00210	lb/day
VOC	4-Methyl-2-Pentanone	0.000900	0.00182	0.00215	lb/day
VOC	Acetaldehyde	0.0183	0.0371	0.0436	lb/day
VOC	Acetone	0.133	0.271	0.316	lb/day
VOC	Acrolein	0.00764	0.0155	0.0183	lb/day
VOC	Benzaldehyde	0.000237	0.000474	0.000569	lb/day
VOC	Benzene	0.00719	0.0208	0.0182	lb/day
VOC	Benzocycloheptatriene	0.0363	0.0726	0.0871	lb/day

Appendix G.3: Vessel Scenario Total Analyte-Specific Loading Rates

Analyte Class	Analyte	Vessel Scenario 1 Total Loading Rate Fishing Harbor	Vessel Scenario 2 Total Loading Rate Large Metropolitan Harbor	Vessel Scenario 3 Total Loading Rate Recreational Harbor	Units
VOC	Benzofuran	0.00368	0.00736	0.00883	lb/day
VOC	Bromodichloromethane	0.00000416	0.0000277	0.0000139	lb/day
VOC	Butane	0.000521	0.00347	0.00174	lb/day
VOC	Butyraldehyde	0.00448	0.00917	0.0107	lb/day
VOC	Carbon disulfide	0.00000279	0.00000559	0.00000671	lb/day
VOC	Chloroform	0.00244	0.00488	0.00585	lb/day
VOC	cis-1,2-Dichloroethene	0.00000430	0.00000860	0.0000103	lb/day
VOC	Cyclohexane	0.0000660	0.000439	0.000221	lb/day
VOC	Dibromochloromethane	0.00000408	0.0000272	0.0000136	lb/day
VOC	Dimethocxymethane	0.0156	0.0130	0.0117	lb/day
VOC	Ethanol	0.0000212	0.000142	0.0000708	lb/day
VOC	Ethylbenzene	0.00230	0.0114	0.00667	lb/day
VOC	Indene	0.0000735	0.000368	0.0000941	lb/day
VOC	Isopropylbenzene	0.00132	0.00323	0.00327	lb/day
VOC	Limonene	0.00	0.00	0.00	lb/day
VOC	m,p-Xylene (Sum of Isomers)	0.00728	0.0414	0.0224	lb/day
VOC	Methyl acetate	0.00190	0.00382	0.00457	lb/day
VOC	Methyl tertiary butyl ether (MTBE)	0.00000865	0.0000564	0.0000293	lb/day
VOC	Methylcyclohexane	0.0000599	0.000398	0.000200	lb/day
VOC	Methylene chloride	0.000477	0.00104	0.00115	lb/day
VOC	n-Butylbenzene	0.000819	0.00164	0.00197	lb/day
VOC	nitro-Methane	0.00272	0.00544	0.00653	lb/day
VOC	Nonanal	0.00000183	0.00000366	0.00000440	lb/day
VOC	n-Propylbenzene	0.000644	0.00313	0.00191	lb/day
VOC	n-Valeraldehyde	0.00397	0.00819	0.00943	lb/day
VOC	O-Xylene	0.00481	0.0267	0.0145	lb/day
VOC	sec-Butylbenzene	0.00186	0.00372	0.00446	lb/day
VOC	Styrene	0.00138	0.00368	0.00340	lb/day
VOC	Sulfur dioxide	0.00739	0.0385	0.00964	lb/day
VOC	Tetrachloroethene	0.00000345	0.00000789	0.00000776	lb/day
VOC	Toluene	0.00857	0.0417	0.0254	lb/day
VOC	Trichloroethene	0.00000301	0.00000602	0.00000722	lb/day
VOC	Trichlorofluoromethane	0.00158	0.00316	0.00379	lb/day
VOC	Tridecane	0.00325	0.00649	0.00779	lb/day
VOC	Unknown VOC	0.00379	0.00907	0.00939	lb/day
VOC	Unknown VOC (01)	0.00288	0.00597	0.00681	lb/day
VOC	Unknown VOC (02)	0.00382	0.00777	0.00910	lb/day
VOC	Unknown VOC (03)	0.00347	0.00707	0.00826	lb/day
VOC	Unknown VOC (04)	0.00228	0.00483	0.00535	lb/day
VOC	Unknown VOC (05)	0.00208	0.00434	0.00490	lb/day

Appendix G.3: Vessel Scenario Total Analyte-Specific Loading Rates

Analyte Class	Analyte	Vessel Scenario 1 Total Loading Rate Fishing Harbor	Vessel Scenario 2 Total Loading Rate Large Metropolitan Harbor	Vessel Scenario 3 Total Loading Rate Recreational Harbor	Units
VOC	Vinyl acetate	0.00202	0.00407	0.00485	lb/day
SVOC	(E)-2-Tetradecene	0.000237	0.00118	0.000237	lb/day
SVOC	1,2,3,4-Tetrahydro-2,7-Dimethylnaphthalene	0.000169	0.00112	0.000562	lb/day
SVOC	1,2,3-Trichloro-(Z)-1-Propene	0.0000494	0.000330	0.000165	lb/day
SVOC	1,2,3-Trimethylbenzene (1)	0.000719	0.00479	0.00240	lb/day
SVOC	1,2,3-Trimethylbenzene (2)	0.000917	0.00611	0.00306	lb/day
SVOC	1,2,4,5-Tetramethylbenzene (1)	0.000101	0.000671	0.000336	lb/day
SVOC	1,2,4,5-Tetramethylbenzene (2)	0.0000934	0.000623	0.000311	lb/day
SVOC	1,2-Diethyl-Cyclobutane	0.00930	0.0186	0.0223	lb/day
SVOC	1,3-Dimethylnaphthalene	0.0000821	0.000411	0.0000821	lb/day
SVOC	1,3-Dimethylnaphthalene (01)	0.00527	0.0105	0.0127	lb/day
SVOC	1,4-Dimethyl-1,2,3,4-tetrahydronaphthalene	0.00780	0.0156	0.0187	lb/day
SVOC	1,4-Dimethylnaphthalene	0.00840	0.0185	0.0204	lb/day
SVOC	1,4-Dimethylnaphthalene (01)	0.00559	0.0112	0.0134	lb/day
SVOC	1,5-Dimethylnaphthalene	0.000737	0.00461	0.00203	lb/day
SVOC	1,6-Dimethylnaphthalene	0.0395	0.0792	0.0948	lb/day
SVOC	1,7,7-tri-(methyl)-bicyclo[2.2.1]heptane	0.00	0.00	0.00	lb/day
SVOC	1-Dodecanol	0.0000265	0.000177	0.0000884	lb/day
SVOC	1-Hexadecene	0.00000246	0.0000164	0.00000819	lb/day
SVOC	1-Methyl-2-Propyl-Benzene (01)	0.000758	0.00506	0.00253	lb/day
SVOC	1-Methyl-2-Propyl-Benzene (02)	0.000219	0.00146	0.000730	lb/day
SVOC	1-Methylnaphthalene	0.0358	0.0737	0.0857	lb/day
SVOC	1-Phenyl-1-Butene	0.00000119	0.00000595	0.00000476	lb/day
SVOC	2-(dodecyloxy)-Ethanol	0.0000331	0.000221	0.000110	lb/day
SVOC	2-(hexadecyloxy)-Ethanol	0.00000851	0.0000567	0.0000284	lb/day
SVOC	2-(tetradecyloxy)-Ethanol	0.0000246	0.000164	0.0000819	lb/day
SVOC	2,3-Dimethylnaphthalene	0.00688	0.0138	0.0165	lb/day
SVOC	2,4,6-Trichlorophenol	0.0000142	0.0000284	0.0000340	lb/day
SVOC	2,4-Dimethyl-Benzaldehyde	0.00000221	0.0000111	0.00000886	lb/day
SVOC	2,4-Dimethylphenol	0.00198	0.00405	0.00470	lb/day
SVOC	2,6,10,14-Tetramethyl Pentadecane	0.0124	0.0252	0.0294	lb/day
SVOC	2,6,10,14-Tetramethylhexadecae	0.00826	0.0165	0.0198	lb/day

Appendix G.3: Vessel Scenario Total Analyte-Specific Loading Rates

Analyte Class	Analyte	Vessel Scenario 1 Total Loading Rate Fishing Harbor	Vessel Scenario 2 Total Loading Rate Large Metropolitan Harbor	Vessel Scenario 3 Total Loading Rate Recreational Harbor	Units
SVOC	2,6,10,14-Tetramethylhexadecae (01)	0.000267	0.00178	0.000890	lb/day
SVOC	2,6-dimethyl-Heptadecane	0.0135	0.0270	0.0324	lb/day
SVOC	2,7-Dimethylnaphthalene	0.00967	0.0206	0.0229	lb/day
SVOC	2-Cyclopenten1-one	0.000929	0.00186	0.00223	lb/day
SVOC	2-Ethyl-Hexanoic acid	0.0947	0.631	0.316	lb/day
SVOC	2-Hydroxy-Benzaldehyde	0.0144	0.0292	0.0343	lb/day
SVOC	2-Mercaptobenzothiazole	0.00	0.00	0.00	lb/day
SVOC	2-Methyl Tridecane	0.000141	0.000942	0.000471	lb/day
SVOC	2-Methyl-Benzaldehyde	0.00607	0.0122	0.0146	lb/day
SVOC	2-Methyl-Dodecane	0.000117	0.000585	0.000117	lb/day
SVOC	2-Methylnaphthalene	0.0458	0.0957	0.110	lb/day
SVOC	2-Naphthalenecarboxaldehyde	0.00102	0.00203	0.00244	lb/day
SVOC	3,4-Dimethylphenol	0.00000104	0.00000520	0.00000416	lb/day
SVOC	3,5-Dimethyl-Benzaldehyde	0.00000135	0.00000673	0.00000538	lb/day
SVOC	3,6-Dimethylundecane	0.00000205	0.0000102	0.00000171	lb/day
SVOC	3-Methyl-Benzaldehyde	0.0129	0.0258	0.0310	lb/day
SVOC	3-Methyl-Benzaldehyde (01)	0.0145	0.0290	0.0347	lb/day
SVOC	3-Methyl-butanoic acid	0.000448	0.000299	0.000280	lb/day
SVOC	3-Methyl-Phenanthrene	0.00605	0.0121	0.0145	lb/day
SVOC	3-Methylphenol	0.000677	0.00135	0.00163	lb/day
SVOC	3-Phenyl-2-Propenal	0.000457	0.000914	0.00110	lb/day
SVOC	4,4-Dimethylbiphenyl	0.00629	0.0126	0.0151	lb/day
SVOC	4-Hydroxy-2-Butanone	0.00705	0.0141	0.0169	lb/day
SVOC	4-Methyl-1H-Benzotriazole	0.00000709	0.0000142	0.0000170	lb/day
SVOC	4-METHYL-PENTANOIC ACID	0.000299	0.000199	0.000187	lb/day
SVOC	5-Butyl-Hexadecane	0.00000158	0.00000789	0.00000131	lb/day
SVOC	5-Methyl-2-(1-methyl)-Cyclohexanol	0.00000694	0.0000462	0.0000231	lb/day
SVOC	9-Methyl-9H-Fluorene	0.00648	0.0130	0.0155	lb/day
SVOC	Acenaphthylene	0.00351	0.00707	0.00841	lb/day
SVOC	Acetophenone	0.0000444	0.000222	0.0000444	lb/day
SVOC	Benzeneacetic Acid	0.000228	0.000152	0.000142	lb/day
SVOC	Benzenepropanoic Acid	0.000251	0.000168	0.000157	lb/day
SVOC	Benzothiazole	0.0000293	0.0000712	0.0000728	lb/day
SVOC	Benzyl alcohol	0.0000464	0.000232	0.0000464	lb/day
SVOC	Biphenyl	0.00353	0.00767	0.00832	lb/day
SVOC	Bis(2-ethylhexyl) phthalate	0.00148	0.00362	0.00347	lb/day
SVOC	Caprolactam	0.0000250	0.000167	0.0000834	lb/day

Appendix G.3: Vessel Scenario Total Analyte-Specific Loading Rates

Analyte Class	Analyte	Vessel Scenario 1 Total Loading Rate Fishing Harbor	Vessel Scenario 2 Total Loading Rate Large Metropolitan Harbor	Vessel Scenario 3 Total Loading Rate Recreational Harbor	Units
SVOC	Cholesterol	0.000691	0.000461	0.000432	lb/day
SVOC	Cyclic octaatomic sulfur	0.0223	0.122	0.0366	lb/day
SVOC	Cyclodecane	0.000242	0.00121	0.000242	lb/day
SVOC	Cyclododecane	0.0000275	0.000182	0.0000903	lb/day
SVOC	Cyclotetradecane	0.0000145	0.0000967	0.0000484	lb/day
SVOC	Diethene Glycol Monododecyl Ether	0.0000273	0.000182	0.0000911	lb/day
SVOC	Dimethyl phthalate	0.0000827	0.000165	0.000199	lb/day
SVOC	Di-n-butyl phthalate	0.00182	0.00409	0.00424	lb/day
SVOC	Di-n-octyl phthalate	0.0000528	0.000344	0.000174	lb/day
SVOC	Disopropylene glycol	0.00000806	0.0000538	0.0000269	lb/day
SVOC	Dodecane	0.00000118	0.00000589	0.000000981	lb/day
SVOC	Dodecanoic acid	0.0000198	0.000132	0.0000661	lb/day
SVOC	Eicosane	0.0307	0.0638	0.0742	lb/day
SVOC	Ethanol, 2,2-oxybis-	0.000892	0.00595	0.00297	lb/day
SVOC	Ethanol, 2-Butoxy	0.00787	0.0157	0.0189	lb/day
SVOC	Fluorene	0.00374	0.00755	0.00896	lb/day
SVOC	Heneicosane	0.00918	0.0217	0.0227	lb/day
SVOC	Heptadecane	0.0548	0.111	0.131	lb/day
SVOC	Hexaethylene Glycol Monododecyl	0.0000166	0.000111	0.0000555	lb/day
SVOC	Hexaethylene Glycol Monododecyl (01)	0.00000667	0.0000444	0.0000222	lb/day
SVOC	Hexaethylene Glycol Monododecyl (02)	0.00000210	0.0000140	0.00000702	lb/day
SVOC	Hexagol	0.00000960	0.0000640	0.0000320	lb/day
SVOC	Indane	0.000785	0.00523	0.00262	lb/day
SVOC	Indole	0.00126	0.000838	0.000786	lb/day
SVOC	Isopropylbenzene-4,methyl-1	0.00	0.00	0.00	lb/day
SVOC	m-Cresol	0.0000717	0.000358	0.0000748	lb/day
SVOC	Naphthalene	0.0167	0.0395	0.0405	lb/day
SVOC	N-Butyl-Benzenesulfonamide	0.00000275	0.0000183	0.00000915	lb/day
SVOC	n-Hexadecane	0.0521	0.105	0.125	lb/day
SVOC	n-Hexadecanoic acid	0.0000140	0.0000935	0.0000468	lb/day
SVOC	Nonadecane	0.0421	0.0849	0.101	lb/day
SVOC	Nonadecane (01)	0.0130	0.0260	0.0312	lb/day
SVOC	Nonanoic Acid	0.0102	0.0205	0.0246	lb/day
SVOC	n-Pentadecane	0.0389	0.0952	0.0963	lb/day
SVOC	n-Tetradecane	0.0490	0.109	0.119	lb/day
SVOC	o-Cresol	0.00581	0.0116	0.0139	lb/day
SVOC	Octadecane	0.0118	0.0237	0.0284	lb/day

Appendix G.3: Vessel Scenario Total Analyte-Specific Loading Rates

Analyte Class	Analyte	Vessel Scenario 1 Total Loading Rate Fishing Harbor	Vessel Scenario 2 Total Loading Rate Large Metropolitan Harbor	Vessel Scenario 3 Total Loading Rate Recreational Harbor	Units
SVOC	p-Cresol	0.0175	0.0365	0.0416	lb/day
SVOC	Pentacosane	0.000243	0.00162	0.000811	lb/day
SVOC	Pentaethene Glycol Monododecyl Ether	0.00000225	0.0000150	0.00000750	lb/day
SVOC	Pentaethene Glycol Monododecyl Ether (01)	0.0000164	0.000110	0.0000548	lb/day
SVOC	Pentaethene Glycol Monododecyl Ether (02)	0.0000324	0.000216	0.000108	lb/day
SVOC	Phenanthrene	0.00319	0.00790	0.00762	lb/day
SVOC	Phenol	0.0365	0.0737	0.0853	lb/day
SVOC	Phthalic acid, isobutyl octyl ester	0.0000130	0.0000260	0.0000312	lb/day
SVOC	Pyrene	0.000119	0.000783	0.000381	lb/day
SVOC	Sulfur	0.0101	0.0510	0.0106	lb/day
SVOC	Tetraethylene glycol monododecyl ether	0.0000168	0.000112	0.0000559	lb/day
SVOC	Triethyl phosphate	0.000170	0.000130	0.000129	lb/day
SVOC	Triethylene glycol monododecyl ether	0.0000249	0.000166	0.0000830	lb/day
SVOC	Unknown SVOC	0.00970	0.0212	0.0226	lb/day
SVOC	Unknown SVOC (01)	0.00893	0.0205	0.0208	lb/day
SVOC	Unknown SVOC (02)	0.00957	0.0222	0.0220	lb/day
SVOC	Unknown SVOC (03)	0.000681	0.00327	0.000879	lb/day
SVOC	Unknown SVOC (04)	0.000637	0.00337	0.000902	lb/day
SVOC	Unknown SVOC (05)	0.000188	0.00117	0.000508	lb/day
SVOC	Unknown SVOC (06)	0.000124	0.000758	0.000315	lb/day
SVOC	Unknown SVOC (07)	0.00141	0.00940	0.00470	lb/day

(1) EPA suspects a limited number of the samples analyzed for selenium (even fewer for arsenic) for bilgewater, packing gland effluent, propulsion engine effluent, graywater and deck washdown water may be positively influenced (increased) by interference from high concentrations of major cations in the sample matrix. Although EPA suspects that the highest concentrations of dissolved arsenic (and to a lesser extent selenium) in fish hold effluent from a shrimping vessel could be slightly elevated due to cation interference; EPA believes the fish hold concentrations reasonably represent true effluent concentrations for the discharge (see Section 3.2.4.1). EPA considered these interferences when interpreting the potential for vessel discharges to pose a risk to human health, aquatic life, or the environment and determined that such cationic interference does not influence the major findings presented in the modeling analysis.

Appendix G.4: Real World Water Body Characterization Data for Model Input Parameter Development

Harbor Name	River Name	City Name	Harbor Salinity (PSU)[a]	Ocean Salinity (PSU)[b]	Harbor Volume (m^3)[c]	River Flow (m^3/day)[d]	fx	Flushing Time (days)	Scenario 1 Dilution	Scenario 2 Dilution	Scenario 3 Dilution
Auke Bay	Mendenhall River	Juneau, AK	26.1	35	3,090,000	2,900,000	0.254	0.271	5,800	4,170	4,060
Biscayne Bay	Miami River	Miami, FL	31	35	38,500,000	352,000	0.114	12.5	1,570	1,130	1,100
Cohasset Harbor	Gulf River	Boston, MA	30.8	35	1,170,000	89,800	0.121	1.59	377	270	264
Craford Bay	Eastern and Southern Branch Elizabeth River	Norfolk, VA	19.8	35	1,660,000	384,000	0.434	1.87	451	323	315
Dorchester Bay	Neponset River	Boston, MA	31.1	35	43,300,000	467,000	0.111	10.3	2,140	1,530	1,500
Eastern Channel	Indian River	Sitka, AK	30.8	35	8,500,000	210,000	0.12	4.84	893	641	625
Mobile Bay	Tensaw, Blakeley, and Mobile River	Mobile, AL	16.7	35	1,970,000,000	167,000,000	0.523	6.16	163,000	117,000	114,000
Yaquina Bay	Yaquina River	Newport, OR	29.3	35	6,880,000	2,060,000	0.163	0.544	6,440	4,630	4,510

[a] Sources: NOAA World Oceans Database (Auke Bay, Dorchester Bay, Eastern Channel, and Mobile Bay), USGS Changing Salinity Patterns in Biscayne Bay, Florida Study (Biscayne Bay), Massachusetts Department of Environmental Protection Total Maximum Daily Loads of Bacteria for Little Harbor (Cohasset Harbor), EPA EMAP Salinity Data (Craford Bay), Oregon State Temperature and Salinity of the Yaquina Bay Estuary and the Potential Range of Carcinus maenas Study (Yaquina Bay).

[b] Ocean salinity based on average ocean salinity of 35 PSU.

[c] Harbor volume was estimated based on surface areas and harbor depths estimated from NOAA Booklet Charts (http://ocsdata.ncd.noaa.gov/BookletChart/) accessed 7/28/2009.

[d] River flows were based on average annual flows estimated in the USGS NHD Plus GIS dataset. Alaska average annual rivers flows were calculated based on based USGS surface-water monthly statistics for site USGS 15052500 and USGS 15087700 available in the USGS National Water Information System.

Appendix G.5: Fishing Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 1 and 3	Model Scenarios 2 and 4	Model Scenarios 5 and 7	Model Scenarios 6 and 8	Units
Bacteria	E. Coli by MF	0.64	0.0777	0.288	0.0349	CFU/100 ml
Bacteria	E. Coli by MPN	0.258	0.0313	0.116	0.0141	MPN/100 ml
Bacteria	Enterococci by MF	0.361	0.0438	0.162	0.0197	CFU/100 ml
Bacteria	Enterococci by MPN	0.0733	0.0089	0.0329	0.004	MPN/100 ml
Bacteria	Fecal Coliform by MF	1.96	0.238	0.883	0.107	CFU/100 ml
Bacteria	Fecal Coliform by MPN	0.722	0.0877	0.325	0.0394	MPN/100 ml
Bacteria	Total Coliforms by MPN	3.1	0.376	1.39	0.169	MPN/100 ml
Classicals	Biochemical Oxygen Demand (BOD)	0.208	0.0252	0.0935	0.0113	mg/l
Classicals	Chemical Oxygen Demand (COD)	0.604	0.0733	0.271	0.0329	mg/l
Classicals	Dissolved Oxygen	0.00838	0.00102	0.00377	0.000457	mg/l
Classicals	Hexane Extractable Material (HEM)	0.00373	0.000452	0.00167	0.000203	mg/l
Classicals	Silica Gel Treated HEM (SGT-HEM)	0.00432	0.000525	0.00194	0.000236	mg/l
Classicals	Sulfide	0.00000497	6.03E-07	0.00000223	2.71E-07	mg/l
Classicals	Total Organic Carbon (TOC)	0.0783	0.0095	0.0352	0.00427	mg/l
Classicals	Total Residual Chlorine	0.000132	0.000016	0.0000593	0.0000072	mg/l
Classicals	Total Suspended Solids (TSS)	0.0758	0.0092	0.0341	0.00413	mg/l
Nutrients	Ammonia As Nitrogen (NH3-N)	0.00279	0.000339	0.00125	0.000152	mg/l
Nutrients	Nitrate/Nitrite (NO3/NO2-N)	0.0000415	0.00000504	0.0000187	0.00000226	mg/l
Nutrients	Total Kjeldahl Nitrogen (TKN)	0.0321	0.00389	0.0144	0.00175	mg/l
Nutrients	Total Phosphorus	0.00451	0.000547	0.00203	0.000246	mg/l
Metals	Aluminum, Dissolved	0.658	0.0798	0.296	0.0359	µg/l
Metals	Aluminum, Total	0.835	0.101	0.375	0.0455	µg/l
Metals	Antimony, Dissolved	0.00000712	8.65E-07	0.0000032	3.89E-07	µg/l
Metals	Antimony, Total	0.0000233	0.00000283	0.0000105	0.00000127	µg/l
Metals	Arsenic, Dissolved [1]	0.00624	0.000758	0.00281	0.00034	µg/l
Metals	Arsenic, Total [1]	0.00913	0.00111	0.0041	0.000498	µg/l
Metals	Barium, Dissolved	0.0107	0.0013	0.0048	0.000582	µg/l
Metals	Barium, Total	0.0121	0.00146	0.00542	0.000658	µg/l
Metals	Cadmium, Dissolved	0.00000963	0.00000117	0.00000433	5.25E-07	µg/l
Metals	Cadmium, Total	0.000246	0.0000298	0.00011	0.0000134	µg/l
Metals	Calcium, Dissolved	214	26	96.2	11.7	µg/l
Metals	Calcium, Total	212	25.7	95.3	11.6	µg/l
Metals	Chromium, Dissolved	0.000639	0.0000775	0.000287	0.0000348	µg/l
Metals	Chromium, Total	0.00168	0.000204	0.000757	0.0000919	µg/l
Metals	Cobalt, Dissolved	0.0000244	0.00000296	0.000011	0.00000133	µg/l
Metals	Cobalt, Total	0.0000484	0.00000588	0.0000218	0.00000264	µg/l
Metals	Copper, Dissolved	0.942	0.114	0.423	0.0514	µg/l
Metals	Copper, Total	0.0518	0.00629	0.0233	0.00283	µg/l
Metals	Iron, Dissolved	0.00528	0.000641	0.00237	0.000288	µg/l
Metals	Iron, Total	0.123	0.015	0.0554	0.00672	µg/l

Appendix G.5: Fishing Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 1 and 3	Model Scenarios 2 and 4	Model Scenarios 5 and 7	Model Scenarios 6 and 8	Units
Metals	Lead, Dissolved	0.000578	0.0000701	0.00026	0.0000315	µg/l
Metals	Lead, Total	0.00353	0.000429	0.00159	0.000193	µg/l
Metals	Magnesium, Dissolved	649	78.8	292	35.4	µg/l
Metals	Magnesium, Total	625	75.9	281	34.1	µg/l
Metals	Manganese, Dissolved	0.0392	0.00476	0.0176	0.00214	µg/l
Metals	Manganese, Total	0.0485	0.00588	0.0218	0.00264	µg/l
Metals	Nickel, Dissolved	0.0028	0.00034	0.00126	0.000153	µg/l
Metals	Nickel, Total	0.00323	0.000392	0.00145	0.000176	µg/l
Metals	Potassium, Dissolved	18.3	2.23	8.24	1	µg/l
Metals	Potassium, Total	18.4	2.23	8.26	1	µg/l
Metals	Selenium, Dissolved [1]	0.00704	0.000854	0.00316	0.000384	µg/l
Metals	Selenium, Total [1]	0.00801	0.000972	0.0036	0.000437	µg/l
Metals	Silver, Dissolved	0.00000904	0.0000011	0.00000406	4.93E-07	µg/l
Metals	Silver, Total	0.000017	0.00000206	0.00000764	9.27E-07	µg/l
Metals	Sodium, Dissolved	405	49.1	182	22.1	µg/l
Metals	Sodium,Total	473	57.4	213	25.8	µg/l
Metals	Thallium, Dissolved	0.00000472	5.73E-07	0.00000212	2.58E-07	µg/l
Metals	Thallium,Total	5.14E-08	6.24E-09	2.31E-08	2.81E-09	µg/l
Metals	Vanadium, Dissolved	0.000331	0.0000402	0.000149	0.0000181	µg/l
Metals	Vanadium,Total	0.000425	0.0000516	0.000191	0.0000232	µg/l
Metals	Zinc, Dissolved	0.101	0.0123	0.0456	0.00553	µg/l
Metals	Zinc, Total	0.248	0.0301	0.112	0.0135	µg/l
Nonylphenols	Bisphenol A	0.0000029	3.52E-07	0.00000131	1.58E-07	µg/l
Nonylphenols	Nonylphenol decaethoxylate (NP10EO)	0.000627	0.0000761	0.000282	0.0000342	µg/l
Nonylphenols	Nonylphenol dodecaethoxylate (NP12EO)	0.000499	0.0000605	0.000224	0.0000272	µg/l
Nonylphenols	Nonylphenol heptadecaethoxylate (NP17EO)	0.0000313	0.0000038	0.0000141	0.00000171	µg/l
Nonylphenols	Nonylphenol heptaethoxylate (NP7EO)	0.000401	0.0000486	0.00018	0.0000218	µg/l
Nonylphenols	Nonylphenol hexadecaethoxylate (NP16EO)	0.0000684	0.0000083	0.0000307	0.00000373	µg/l
Nonylphenols	Nonylphenol hexaethoxylate (NP6EO)	0.000284	0.0000344	0.000127	0.0000155	µg/l
Nonylphenols	Nonylphenol nonaethoxylate (NP9EO)	0.000566	0.0000687	0.000254	0.0000309	µg/l
Nonylphenols	Nonylphenol octaethoxylate (NP8EO)	0.000521	0.0000632	0.000234	0.0000284	µg/l
Nonylphenols	Nonylphenol octodecaethoxylate (NP18EO)	0.0000165	0.00000201	0.00000743	9.02E-07	µg/l
Nonylphenols	Nonylphenol pendecaethoxylate (NP15EO)	0.00013	0.0000158	0.0000586	0.00000711	µg/l
Nonylphenols	Nonylphenol pentaethoxylate (NP5EO)	0.000172	0.0000209	0.0000773	0.00000938	µg/l
Nonylphenols	Nonylphenol tetradecaethoxylate (NP14EO)	0.000232	0.0000282	0.000104	0.0000127	µg/l
Nonylphenols	Nonylphenol tetraethoxylate (NP4EO)	0.0000763	0.00000926	0.0000343	0.00000416	µg/l
Nonylphenols	Nonylphenol tridecaethoxylate (NP13EO)	0.000356	0.0000432	0.00016	0.0000194	µg/l
Nonylphenols	Nonylphenol triethoxylate (NP3EO)	0.000043	0.00000522	0.0000193	0.00000235	µg/l
Nonylphenols	Nonylphenol undecaethoxylate (NP11EO)	0.000637	0.0000774	0.000286	0.0000348	µg/l
Nonylphenols	Octylphenol decaethoxylate (OP10EO)	0.0000226	0.00000275	0.0000102	0.00000123	µg/l

Appendix G.5: Fishing Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 1 and 3	Model Scenarios 2 and 4	Model Scenarios 5 and 7	Model Scenarios 6 and 8	Units
Nonylphenols	Octylphenol dodecaethoxylate (OP12EO)	0.0000135	0.00000164	0.00000608	7.38E-07	µg/l
Nonylphenols	Octylphenol heptaethoxylate (OP7EO)	0.000000989	0.00000012	4.44E-07	5.39E-08	µg/l
Nonylphenols	Octylphenol nonaethoxylate (OP9EO)	0.0000137	0.00000166	0.00000615	7.47E-07	µg/l
Nonylphenols	Octylphenol octaethoxylate (OP8EO)	0.00000843	0.00000102	0.00000379	0.00000046	µg/l
Nonylphenols	Octylphenol undecaethoxylate (OP11EO)	0.0000146	0.00000177	0.00000655	7.95E-07	µg/l
Nonylphenols	Total Nonylphenol Polyethoxylates	0.00445	0.000541	0.002	0.000243	µg/l
Nonylphenols	Total Nonylphenols	0.00005	0.00000607	0.0000225	0.00000273	µg/l
VOC	(2-Methyl-1-Propenyl)-Benzene	0.000975	0.000118	0.000438	0.0000532	µg/l
VOC	(E)-1-Propenyl-Benzene	0.000000442	5.37E-08	1.99E-07	2.41E-08	µg/l
VOC	(E)-2-Butenal	0.00178	0.000217	0.000802	0.0000973	µg/l
VOC	1,2,3,4-Tetrahydro-1-Methylnaphthalene	0.00112	0.000136	0.000504	0.0000612	µg/l
VOC	1,2,3,4-Tetrahydro-2-Methylnaphthalene	0.00103	0.000126	0.000465	0.0000565	µg/l
VOC	1,2,3,4-Tetrahydro-5-Methylnaphthalene	0.00908	0.0011	0.00408	0.000495	µg/l
VOC	1,2,3,4-Tetrahydro-6-Ethylnaphthalene,	0.000977	0.000119	0.000439	0.0000533	µg/l
VOC	1,2,3,4-Tetrahydro-6-Methylnaphthalene	0.00828	0.001	0.00372	0.000451	µg/l
VOC	1,2,3,4-Tetrahydro-6-Methylnaphthalene (01)	0.00208	0.000252	0.000933	0.000113	µg/l
VOC	1,2,3,4-Tetrahydro-6-Methylnaphthalene (02)	0.00174	0.000211	0.00078	0.0000947	µg/l
VOC	1,2,3,4-Tetrahydronaphthalene	0.00623	0.000756	0.0028	0.00034	µg/l
VOC	1,2,3,4-Tetramethyl-Benzene	0.000211	0.0000256	0.0000947	0.0000115	µg/l
VOC	1,2,3,5-Tetramethyl-Benzene	0.00031	0.0000376	0.000139	0.0000169	µg/l
VOC	1,2,3-Trimethylbenzene	0.00101	0.000123	0.000455	0.0000552	µg/l
VOC	1,2,4,5-Tetramethylbenzene	0.000473	0.0000574	0.000213	0.0000258	µg/l
VOC	1,2,4-Trimethylbenzene	0.00202	0.000245	0.000907	0.00011	µg/l
VOC	1,3,5-Trimethylbenzene	0.000545	0.0000662	0.000245	0.0000297	µg/l
VOC	1,3-Methylnaphthalene	0.00128	0.000155	0.000575	0.0000698	µg/l
VOC	1,7-Methylnaphthalene	0.00579	0.000703	0.0026	0.000316	µg/l
VOC	1-Ethyl-2,3-Dimethyl-Benzene (01)	0.000892	0.000108	0.000401	0.0000487	µg/l
VOC	1-Ethyl-2,3-Dimethyl-Benzene (02)	0.000129	0.0000156	0.0000579	0.00000703	µg/l
VOC	1-Ethyl-2,4-Dimethyl-Benzene	0.000501	0.0000608	0.000225	0.0000273	µg/l
VOC	1-Ethyl-2-Methyl-Benzene	0.00000137	1.66E-07	6.14E-07	7.45E-08	µg/l
VOC	1-Ethyl-3-Methyl-Benzene	0.00107	0.00013	0.000482	0.0000585	µg/l
VOC	1-Ethyl-4-Methyl-Benzene	0.00211	0.000256	0.000949	0.000115	µg/l
VOC	1-Methyl-2-(1-Methylethyl)-Benzene	0	0	0	0	µg/l
VOC	1-Methyl-2-(1-Methylethyl)-Benzene (01)	0.00000111	1.34E-07	4.97E-07	6.03E-08	µg/l
VOC	1-Methyl-2-(1-Methylethyl)-Benzene (02)	0.00000386	4.69E-07	0.00000174	2.11E-07	µg/l
VOC	1-Methyl-3-Propyl-Benzene	0.000411	0.0000499	0.000185	0.0000224	µg/l
VOC	1-Methyl-4-(1-Methylidene)-Cyclohexane	0	0	0	0	µg/l
VOC	1-methyl-Indan	0.0026	0.000315	0.00117	0.000142	µg/l
VOC	1-Propenyl-Benzene	0.000000507	6.16E-08	2.28E-07	2.77E-08	µg/l
VOC	2- Heptanone	0.0000197	0.00000239	0.00000885	0.00000107	µg/l
VOC	2,3-Dihydro-1,2-Dimethyl-1H-Indene	0.000106	0.0000129	0.0000476	0.00000578	µg/l

Appendix G.5: Fishing Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 1 and 3	Model Scenarios 2 and 4	Model Scenarios 5 and 7	Model Scenarios 6 and 8	Units
VOC	2,3-Dihydro-1,6-Dimethyl-1H-Indene	0.00117	0.000141	0.000524	0.0000636	µg/l
VOC	2,3-Dihydro-1-Methylindene	0.0017	0.000206	0.000763	0.0000926	µg/l
VOC	2,3-Dihydro-1-methylindene (01)	0.000949	0.000115	0.000426	0.0000518	µg/l
VOC	2,3-Dihydro-1-methylindene (02)	0.00201	0.000244	0.000904	0.00011	µg/l
VOC	2,3-Dihydro-4,7-Dimethyl-1H-Indene	0.0000134	0.00000163	0.00000602	7.31E-07	µg/l
VOC	2,3-Dihydro-4-Methyl-1H-Indene	0.0179	0.00217	0.00804	0.000975	µg/l
VOC	2,3-Dihydro-4-Methyl-1H-Indene (01)	0.00000157	1.91E-07	7.07E-07	8.58E-08	µg/l
VOC	2,3-Dihydro-4-Methyl-1H-Indene (02)	0.00000265	3.22E-07	0.00000119	1.45E-07	µg/l
VOC	2,3-Dihydro-5,6-dimethyl-1H-Indene	0.00092	0.000112	0.000413	0.0000502	µg/l
VOC	2,3-Dihydro-5-methyl-1H-Indene	0.000521	0.0000632	0.000234	0.0000284	µg/l
VOC	2,6-Dimethylnaphthalene	0.0126	0.00153	0.00566	0.000687	µg/l
VOC	2-Butanone	0.00974	0.00118	0.00438	0.000531	µg/l
VOC	2-Butenal	0.00111	0.000135	0.0005	0.0000607	µg/l
VOC	2-Ethyl-1,3,5-Trimethyl-Benzene	0.00134	0.000163	0.000603	0.0000732	µg/l
VOC	2-Ethyl-1,4-Dimethyl-Benzene	0.0062	0.000753	0.00279	0.000338	µg/l
VOC	2-Ethyl-1-Hexanol	0.000000364	4.42E-08	1.64E-07	1.99E-08	µg/l
VOC	2-Ethyltoluene	0.00177	0.000215	0.000797	0.0000968	µg/l
VOC	2-Hexanone	0.000857	0.000104	0.000385	0.0000468	µg/l
VOC	2-Methyl-2-Propenal	0.00207	0.000251	0.000931	0.000113	µg/l
VOC	2-Propenyl-Benzene	0.00154	0.000187	0.000693	0.0000842	µg/l
VOC	3-Buten-2-one	0.00189	0.00023	0.000851	0.000103	µg/l
VOC	4-Ethyl-1,2-Dimethyl-Benzene	0.0000014	0.00000017	6.31E-07	7.66E-08	µg/l
VOC	4-Heptanone	0.000026	0.00000316	0.0000117	0.00000142	µg/l
VOC	4-Isopropyltoluene	0.000283	0.0000344	0.000127	0.0000155	µg/l
VOC	4-Methyl-2-Pentanone	0.000295	0.0000358	0.000132	0.0000161	µg/l
VOC	Acetaldehyde	0.00599	0.000727	0.00269	0.000327	µg/l
VOC	Acetone	0.0435	0.00528	0.0195	0.00237	µg/l
VOC	Acrolein	0.0025	0.000304	0.00113	0.000137	µg/l
VOC	Benzaldehyde	0.0000777	0.00000943	0.0000349	0.00000424	µg/l
VOC	Benzene	0.00236	0.000286	0.00106	0.000129	µg/l
VOC	Benzocycloheptatriene	0.0119	0.00144	0.00534	0.000648	µg/l
VOC	Benzofuran	0.00121	0.000146	0.000542	0.0000658	µg/l
VOC	Bromodichloromethane	0.00000136	1.65E-07	6.12E-07	7.43E-08	µg/l
VOC	Butane	0.000171	0.0000207	0.0000768	0.00000932	µg/l
VOC	Butyraldehyde	0.00147	0.000178	0.00066	0.0000801	µg/l
VOC	Carbon disulfide	0.000000916	1.11E-07	4.12E-07	0.00000005	µg/l
VOC	Chloroform	0.000799	0.000097	0.000359	0.0000436	µg/l
VOC	cis-1,2-Dichloroethene	0.00000141	1.71E-07	6.33E-07	7.68E-08	µg/l
VOC	Cyclohexane	0.0000216	0.00000263	0.00000973	0.00000118	µg/l
VOC	Dibromochloromethane	0.00000134	1.62E-07	6.01E-07	7.29E-08	µg/l
VOC	Dimethocxymethane	0.00512	0.000621	0.0023	0.000279	µg/l
VOC	Ethanol	0.00000696	8.45E-07	0.00000313	0.00000038	µg/l
VOC	Ethylbenzene	0.000754	0.0000916	0.000339	0.0000411	µg/l

Appendix G.5: Fishing Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 1 and 3	Model Scenarios 2 and 4	Model Scenarios 5 and 7	Model Scenarios 6 and 8	Units
VOC	Indene	0.0000241	0.00000292	0.0000108	0.00000131	µg/l
VOC	Isopropylbenzene	0.000431	0.0000523	0.000194	0.0000235	µg/l
VOC	Limonene	0	0	0	0	µg/l
VOC	m,p-Xylene (Sum of Isomers)	0.00239	0.00029	0.00107	0.00013	µg/l
VOC	Methyl acetate	0.000624	0.0000757	0.00028	0.000034	µg/l
VOC	Methyl tertiary butyl ether (MTBE)	0.00000283	3.44E-07	0.00000127	1.55E-07	µg/l
VOC	Methylcyclohexane	0.0000196	0.00000238	0.00000883	0.00000107	µg/l
VOC	Methylene chloride	0.000156	0.000019	0.0000703	0.00000853	µg/l
VOC	n-Butylbenzene	0.000268	0.0000326	0.000121	0.0000146	µg/l
VOC	nitro-Methane	0.000891	0.000108	0.000401	0.0000486	µg/l
VOC	Nonanal	0.0000006	7.28E-08	0.00000027	3.27E-08	µg/l
VOC	n-Propylbenzene	0.000211	0.0000256	0.0000949	0.0000115	µg/l
VOC	n-Valeraldehyde	0.0013	0.000158	0.000585	0.000071	µg/l
VOC	O-Xylene	0.00158	0.000191	0.000708	0.000086	µg/l
VOC	sec-Butylbenzene	0.000609	0.0000739	0.000274	0.0000332	µg/l
VOC	Styrene	0.000451	0.0000548	0.000203	0.0000246	µg/l
VOC	Sulfur dioxide	0.00242	0.000294	0.00109	0.000132	µg/l
VOC	Tetrachloroethene	0.00000113	1.37E-07	5.08E-07	6.17E-08	µg/l
VOC	Toluene	0.00281	0.000341	0.00126	0.000153	µg/l
VOC	Trichloroethene	0.000000986	0.00000012	4.43E-07	5.38E-08	µg/l
VOC	Trichlorofluoromethane	0.000518	0.0000628	0.000233	0.0000282	µg/l
VOC	Tridecane	0.00106	0.000129	0.000478	0.000058	µg/l
VOC	Unknown VOC	0.00124	0.000151	0.000558	0.0000677	µg/l
VOC	Unknown VOC (01)	0.000943	0.000114	0.000424	0.0000515	µg/l
VOC	Unknown VOC (02)	0.00125	0.000152	0.000562	0.0000682	µg/l
VOC	Unknown VOC (03)	0.00114	0.000138	0.000511	0.000062	µg/l
VOC	Unknown VOC (04)	0.000748	0.0000908	0.000336	0.0000408	µg/l
VOC	Unknown VOC (05)	0.000681	0.0000827	0.000306	0.0000372	µg/l
VOC	Vinyl acetate	0.000663	0.0000805	0.000298	0.0000362	µg/l
SVOC	(E)-2-Tetradecene	0.0000776	0.00000942	0.0000349	0.00000423	µg/l
SVOC	1,2,3,4-Tetrahydro-2,7-Dimethylnaphthalene	0.0000553	0.00000671	0.0000248	0.00000302	µg/l
SVOC	1,2,3-Trichloro-(Z)-1-Propene	0.0000162	0.00000197	0.00000728	8.84E-07	µg/l
SVOC	1,2,3-Trimethylbenzene (1)	0.000236	0.0000286	0.000106	0.0000129	µg/l
SVOC	1,2,3-Trimethylbenzene (2)	0.0003	0.0000365	0.000135	0.0000164	µg/l
SVOC	1,2,4,5-Tetramethylbenzene (1)	0.000033	0.00000401	0.0000148	0.0000018	µg/l
SVOC	1,2,4,5-Tetramethylbenzene (2)	0.0000306	0.00000372	0.0000138	0.00000167	µg/l
SVOC	1,2-Diethyl-Cyclobutane	0.00305	0.00037	0.00137	0.000166	µg/l
SVOC	1,3-Dimethylnaphthalene	0.0000269	0.00000327	0.0000121	0.00000147	µg/l
SVOC	1,3-Dimethylnaphthalene (01)	0.00173	0.00021	0.000777	0.0000943	µg/l
SVOC	1,4-Dimethyl-1,2,3,4-tetrahydronaphthalene	0.00256	0.00031	0.00115	0.000139	µg/l
SVOC	1,4-Dimethylnaphthalene	0.00275	0.000334	0.00124	0.00015	µg/l
SVOC	1,4-Dimethylnaphthalene (01)	0.00183	0.000222	0.000823	0.0000999	µg/l

Appendix G.5: Fishing Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 1 and 3	Model Scenarios 2 and 4	Model Scenarios 5 and 7	Model Scenarios 6 and 8	Units
SVOC	1,5-Dimethylnaphthalene	0.000241	0.0000293	0.000109	0.0000132	µg/l
SVOC	1,6-Dimethylnaphthalene	0.013	0.00157	0.00582	0.000707	µg/l
SVOC	1,7,7-tri-(methyl)-bicyclo[2.2.1]heptane	0	0	0	0	µg/l
SVOC	1-Dodecanol	0.00000869	0.00000105	0.0000039	4.74E-07	µg/l
SVOC	1-Hexadecene	0.000000805	9.77E-08	3.62E-07	4.39E-08	µg/l
SVOC	1-Methyl-2-Propyl-Benzene (01)	0.000249	0.0000302	0.000112	0.0000136	µg/l
SVOC	1-Methyl-2-Propyl-Benzene (02)	0.0000718	0.00000871	0.0000323	0.00000392	µg/l
SVOC	1-Methylnaphthalene	0.0117	0.00142	0.00527	0.00064	µg/l
SVOC	1-Phenyl-1-Butene	0.00000039	4.73E-08	1.75E-07	2.13E-08	µg/l
SVOC	2-(dodecyloxy)-Ethanol	0.0000109	0.00000132	0.00000488	5.92E-07	µg/l
SVOC	2-(hexadecyloxy)-Ethanol	0.00000279	3.38E-07	0.00000125	1.52E-07	µg/l
SVOC	2-(tetradecyloxy)-Ethanol	0.00000805	9.77E-07	0.00000362	4.39E-07	µg/l
SVOC	2,3-Dimethylnaphthalene	0.00225	0.000274	0.00101	0.000123	µg/l
SVOC	2,4,6-Trichlorophenol	0.00000465	5.64E-07	0.00000209	2.53E-07	µg/l
SVOC	2,4-Dimethyl-Benzaldehyde	0.000000726	8.81E-08	3.26E-07	3.96E-08	µg/l
SVOC	2,4-Dimethylphenol	0.000648	0.0000787	0.000291	0.0000354	µg/l
SVOC	2,6,10,14-Tetramethyl Pentadecane	0.00405	0.000492	0.00182	0.000221	µg/l
SVOC	2,6,10,14-Tetramethylhexadecae	0.00271	0.000329	0.00122	0.000148	µg/l
SVOC	2,6,10,14-Tetramethylhexadecae (01)	0.0000875	0.0000106	0.0000393	0.00000477	µg/l
SVOC	2,6-dimethyl-Heptadecane	0.00442	0.000536	0.00199	0.000241	µg/l
SVOC	2,7-Dimethylnaphthalene	0.00317	0.000385	0.00142	0.000173	µg/l
SVOC	2-Cyclopenten1-one	0.000304	0.0000369	0.000137	0.0000166	µg/l
SVOC	2-Ethyl-Hexanoic acid	0.031	0.00376	0.0139	0.00169	µg/l
SVOC	2-Hydroxy-Benzaldehyde	0.00471	0.000572	0.00212	0.000257	µg/l
SVOC	2-Mercaptobenzothiazole	0	0	0	0	µg/l
SVOC	2-Methyl Tridecane	0.0000463	0.00000562	0.0000208	0.00000253	µg/l
SVOC	2-Methyl-Benzaldehyde	0.00199	0.000241	0.000894	0.000109	µg/l
SVOC	2-Methyl-Dodecane	0.0000384	0.00000466	0.0000172	0.00000209	µg/l
SVOC	2-Methylnaphthalene	0.015	0.00182	0.00675	0.000819	µg/l
SVOC	2-Naphthalenecarboxaldehyde	0.000333	0.0000404	0.00015	0.0000182	µg/l
SVOC	3,4-Dimethylphenol	0.000000341	4.14E-08	1.53E-07	1.86E-08	µg/l
SVOC	3,5-Dimethyl-Benzaldehyde	0.000000441	5.35E-08	1.98E-07	2.4E-08	µg/l
SVOC	3,6-Dimethylundecane	0.000000671	8.15E-08	3.02E-07	3.66E-08	µg/l
SVOC	3-Methyl-Benzaldehyde	0.00423	0.000513	0.0019	0.000231	µg/l
SVOC	3-Methyl-Benzaldehyde (01)	0.00474	0.000576	0.00213	0.000259	µg/l
SVOC	3-Methyl-butanoic acid	0.000147	0.0000178	0.000066	0.00000801	µg/l
SVOC	3-Methyl-Phenanthrene	0.00198	0.000241	0.000892	0.000108	µg/l
SVOC	3-Methylphenol	0.000222	0.0000269	0.0000997	0.0000121	µg/l
SVOC	3-Phenyl-2-Propenal	0.00015	0.0000182	0.0000673	0.00000817	µg/l
SVOC	4,4-Dimethylbiphenyl	0.00206	0.00025	0.000927	0.000113	µg/l
SVOC	4-Hydroxy-2-Butanone	0.00231	0.00028	0.00104	0.000126	µg/l
SVOC	4-Methyl-1H-Benzotriazole	0.00000232	2.82E-07	0.00000104	1.27E-07	µg/l
SVOC	4-METHYL-PENTANOIC ACID	0.0000978	0.0000119	0.000044	0.00000534	µg/l

Appendix G.5: Fishing Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 1 and 3	Model Scenarios 2 and 4	Model Scenarios 5 and 7	Model Scenarios 6 and 8	Units
SVOC	5-Butyl-Hexadecane	0.000000517	6.27E-08	2.32E-07	2.82E-08	µg/l
SVOC	5-Methyl-2-(1-methyl)-Cyclohexanol	0.00000227	2.76E-07	0.00000102	1.24E-07	µg/l
SVOC	9-Methyl-9H-Fluorene	0.00212	0.000258	0.000954	0.000116	µg/l
SVOC	Acenaphthylene	0.00115	0.00014	0.000517	0.0000628	µg/l
SVOC	Acetophenone	0.0000146	0.00000177	0.00000655	7.94E-07	µg/l
SVOC	Benzeneacetic Acid	0.0000747	0.00000906	0.0000336	0.00000407	µg/l
SVOC	Benzenepropanoic Acid	0.0000824	0.00001	0.000037	0.00000449	µg/l
SVOC	Benzothiazole	0.0000096	0.00000116	0.00000431	5.24E-07	µg/l
SVOC	Benzyl alcohol	0.0000152	0.00000185	0.00000684	0.00000083	µg/l
SVOC	Biphenyl	0.00116	0.00014	0.000519	0.000063	µg/l
SVOC	Bis(2-ethylhexyl) phthalate	0.000485	0.0000588	0.000218	0.0000264	µg/l
SVOC	Caprolactam	0.0000082	9.95E-07	0.00000368	4.47E-07	µg/l
SVOC	Cholesterol	0.000227	0.0000275	0.000102	0.0000124	µg/l
SVOC	Cyclic octaatomic sulfur	0.0073	0.000886	0.00328	0.000398	µg/l
SVOC	Cyclodecane	0.0000795	0.00000964	0.0000357	0.00000433	µg/l
SVOC	Cyclododecane	0.00000901	0.00000109	0.00000405	4.91E-07	µg/l
SVOC	Cyclotetradecane	0.00000475	5.77E-07	0.00000214	2.59E-07	µg/l
SVOC	Diethene Glycol Monododecyl Ether	0.00000896	0.00000109	0.00000403	4.89E-07	µg/l
SVOC	Dimethyl phthalate	0.0000271	0.00000329	0.0000122	0.00000148	µg/l
SVOC	Di-n-butyl phthalate	0.000596	0.0000723	0.000268	0.0000325	µg/l
SVOC	Di-n-octyl phthalate	0.0000173	0.0000021	0.00000778	9.44E-07	µg/l
SVOC	Disopropylene glycol	0.00000264	3.21E-07	0.00000119	1.44E-07	µg/l
SVOC	Dodecane	0.000000386	4.68E-08	1.73E-07	2.1E-08	µg/l
SVOC	Dodecanoic acid	0.0000065	7.89E-07	0.00000292	3.55E-07	µg/l
SVOC	Eicosane	0.0101	0.00122	0.00453	0.000549	µg/l
SVOC	Ethanol, 2,2-oxybis-	0.000292	0.0000355	0.000131	0.0000159	µg/l
SVOC	Ethanol, 2-Butoxy	0.00258	0.000313	0.00116	0.000141	µg/l
SVOC	Fluorene	0.00123	0.000149	0.000552	0.0000669	µg/l
SVOC	Heneicosane	0.00301	0.000365	0.00135	0.000164	µg/l
SVOC	Heptadecane	0.0179	0.00218	0.00806	0.000979	µg/l
SVOC	Hexaethylene Glycol Monododecyl	0.00000545	6.62E-07	0.00000245	2.97E-07	µg/l
SVOC	Hexaethylene Glycol Monododecyl (01)	0.00000218	2.65E-07	9.82E-07	1.19E-07	µg/l
SVOC	Hexaethylene Glycol Monododecyl (02)	0.00000069	8.37E-08	0.00000031	3.76E-08	µg/l
SVOC	Hexagol	0.00000315	3.82E-07	0.00000141	1.72E-07	µg/l
SVOC	Indane	0.000257	0.0000312	0.000116	0.000014	µg/l
SVOC	Indole	0.000412	0.00005	0.000185	0.0000225	µg/l
SVOC	Isopropylbenzene-4,methyl-1	0	0	0	0	µg/l
SVOC	m-Cresol	0.0000235	0.00000285	0.0000106	0.00000128	µg/l
SVOC	Naphthalene	0.00547	0.000663	0.00246	0.000298	µg/l
SVOC	N-Butyl-Benzenesulfonamide	0.0000009	1.09E-07	4.04E-07	4.91E-08	µg/l
SVOC	n-Hexadecane	0.0171	0.00207	0.00768	0.000932	µg/l
SVOC	n-Hexadecanoic acid	0.0000046	5.58E-07	0.00000207	2.51E-07	µg/l
SVOC	Nonadecane	0.0138	0.00168	0.0062	0.000753	µg/l

Appendix G.5: Fishing Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 1 and 3	Model Scenarios 2 and 4	Model Scenarios 5 and 7	Model Scenarios 6 and 8	Units
SVOC	Nonadecane (01)	0.00425	0.000516	0.00191	0.000232	µg/l
SVOC	Nonanoic Acid	0.00335	0.000407	0.00151	0.000183	µg/l
SVOC	n-Pentadecane	0.0127	0.00155	0.00573	0.000695	µg/l
SVOC	n-Tetradecane	0.0161	0.00195	0.00722	0.000876	µg/l
SVOC	o-Cresol	0.0019	0.000231	0.000856	0.000104	µg/l
SVOC	Octadecane	0.00388	0.000471	0.00174	0.000211	µg/l
SVOC	p-Cresol	0.00573	0.000696	0.00258	0.000313	µg/l
SVOC	Pentacosane	0.0000797	0.00000968	0.0000358	0.00000435	µg/l
SVOC	Pentaethene Glycol Monododecyl Ether	0.000000738	8.95E-08	3.31E-07	4.02E-08	µg/l
SVOC	Pentaethene Glycol Monododecyl Ether (01)	0.00000539	6.54E-07	0.00000242	2.94E-07	µg/l
SVOC	Pentaethene Glycol Monododecyl Ether (02)	0.0000106	0.00000129	0.00000477	5.79E-07	µg/l
SVOC	Phenanthrene	0.00105	0.000127	0.00047	0.0000571	µg/l
SVOC	Phenol	0.0119	0.00145	0.00537	0.000652	µg/l
SVOC	Phthalic acid, isobutyl octyl ester	0.00000426	5.17E-07	0.00000192	2.32E-07	µg/l
SVOC	Pyrene	0.0000391	0.00000474	0.0000176	0.00000213	µg/l
SVOC	Sulfur	0.00332	0.000403	0.00149	0.000181	µg/l
SVOC	Tetraethylene glycol monododecyl ether	0.00000549	6.67E-07	0.00000247	0.0000003	µg/l
SVOC	Triethyl phosphate	0.0000557	0.00000676	0.000025	0.00000304	µg/l
SVOC	Triethylene glycol monododecyl ether	0.00000816	0.00000099	0.00000367	4.45E-07	µg/l
SVOC	Unknown SVOC	0.00318	0.000386	0.00143	0.000173	µg/l
SVOC	Unknown SVOC (01)	0.00293	0.000355	0.00132	0.00016	µg/l
SVOC	Unknown SVOC (02)	0.00313	0.00038	0.00141	0.000171	µg/l
SVOC	Unknown SVOC (03)	0.000223	0.0000271	0.0001	0.0000122	µg/l
SVOC	Unknown SVOC (04)	0.000209	0.0000253	0.0000938	0.0000114	µg/l
SVOC	Unknown SVOC (05)	0.0000616	0.00000747	0.0000277	0.00000336	µg/l
SVOC	Unknown SVOC (06)	0.0000407	0.00000494	0.0000183	0.00000222	µg/l
SVOC	Unknown SVOC (07)	0.000462	0.0000561	0.000208	0.0000252	µg/l

(1) EPA suspects a limited number of the samples analyzed for selenium (even fewer for arsenic) for bilgewater, packing gland effluent, propulsion engine effluent, graywater and deck washdown water may be positively influenced (increased) by interference from high concentrations of major cations in the sample matrix. Although EPA suspects that the highest concentrations of dissolved arsenic (and to a lesser extent selenium) in fish hold effluent from a shrimping vessel could be slightly elevated due to cation interference; EPA believes the fish hold concentrations reasonably represent true effluent concentrations for the discharge (see Section 3.2.4.1). EPA considered these interferences when interpreting the potential for vessel discharges to pose a risk to human health, aquatic life, or the environment and determined that such cationic interference does not influence the major findings presented in the modeling analysis.

Appendix G.6: Metropolitan Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 9 and 11	Model Scenarios 10 an 12	Model Scenarios 13 and 15	Model Scenarios 14 and 16	Units
Bacteria	E. Coli by MF	3.2	0.388	1.44	0.175	CFU/100 ml
Bacteria	E. Coli by MPN	1.15	0.14	0.518	0.0629	MPN/100 ml
Bacteria	Enterococci by MF	1.81	0.219	0.812	0.0985	CFU/100 ml
Bacteria	Enterococci by MPN	0.0643	0.00781	0.0289	0.00351	MPN/100 ml
Bacteria	Fecal Coliform by MF	5.89	0.715	2.65	0.321	CFU/100 ml
Bacteria	Fecal Coliform by MPN	3.61	0.438	1.62	0.197	MPN/100 ml
Bacteria	Total Coliforms by MPN	15.5	1.88	6.96	0.845	MPN/100 ml
Classicals	Biochemical Oxygen Demand (BOD)	0.158	0.0191	0.0709	0.0086	mg/l
Classicals	Chemical Oxygen Demand (COD)	0.43	0.0522	0.193	0.0235	mg/l
Classicals	Dissolved Oxygen	0.0122	0.00149	0.0055	0.000668	mg/l
Classicals	Hexane Extractable Material (HEM)	0.00626	0.00076	0.00281	0.000341	mg/l
Classicals	Silica Gel Treated HEM (SGT-HEM)	0.0068	0.000825	0.00305	0.000371	mg/l
Classicals	Sulfide	0.00000934	0.00000113	0.0000042	0.00000051	mg/l
Classicals	Total Organic Carbon (TOC)	0.0606	0.00735	0.0272	0.0033	mg/l
Classicals	Total Residual Chlorine	0.000239	0.000029	0.000108	0.0000131	mg/l
Classicals	Total Suspended Solids (TSS)	0.0678	0.00823	0.0305	0.0037	mg/l
Nutrients	Ammonia As Nitrogen (NH3-N)	0.00199	0.000241	0.000894	0.000109	mg/l
Nutrients	Nitrate/Nitrite (NO3/NO2-N)	0.0000664	0.00000806	0.0000298	0.00000362	mg/l
Nutrients	Total Kjeldahl Nitrogen (TKN)	0.0224	0.00272	0.0101	0.00122	mg/l
Nutrients	Total Phosphorus	0.00292	0.000354	0.00131	0.000159	mg/l
Metals	Aluminum, Dissolved	0.556	0.0675	0.25	0.0304	µg/l
Metals	Aluminum, Total	0.885	0.107	0.398	0.0483	µg/l
Metals	Antimony, Dissolved	0.0000364	0.00000442	0.0000163	0.00000198	µg/l
Metals	Antimony, Total	0.000114	0.0000138	0.0000512	0.00000622	µg/l
Metals	Arsenic, Dissolved [1]	0.00933	0.00113	0.00419	0.000509	µg/l
Metals	Arsenic, Total [1]	0.0118	0.00143	0.00528	0.000641	µg/l
Metals	Barium, Dissolved	0.0245	0.00297	0.011	0.00133	µg/l
Metals	Barium, Total	0.0293	0.00356	0.0132	0.0016	µg/l
Metals	Cadmium, Dissolved	0.0000142	0.00000172	0.00000637	7.74E-07	µg/l
Metals	Cadmium, Total	0.000215	0.0000261	0.0000968	0.0000118	µg/l
Metals	Calcium, Dissolved	184	22.3	82.7	10	µg/l
Metals	Calcium, Total	185	22.5	83.3	10.1	µg/l
Metals	Chromium, Dissolved	0.00147	0.000178	0.000659	0.00008	µg/l
Metals	Chromium, Total	0.00292	0.000354	0.00131	0.000159	µg/l
Metals	Cobalt, Dissolved	0.0000603	0.00000732	0.0000271	0.00000329	µg/l
Metals	Cobalt, Total	0.0000859	0.0000104	0.0000386	0.00000468	µg/l
Metals	Copper, Dissolved	1.63	0.198	0.733	0.0889	µg/l
Metals	Copper, Total	0.0586	0.00712	0.0264	0.0032	µg/l
Metals	Iron, Dissolved	0.0152	0.00185	0.00685	0.000831	µg/l
Metals	Iron, Total	0.268	0.0326	0.121	0.0146	µg/l

Appendix G.6: Metropolitan Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 9 and 11	Model Scenarios 10 an 12	Model Scenarios 13 and 15	Model Scenarios 14 and 16	Units
Metals	Lead, Dissolved	0.00111	0.000134	0.000497	0.0000604	µg/l
Metals	Lead, Total	0.00506	0.000614	0.00227	0.000276	µg/l
Metals	Magnesium, Dissolved	493	59.8	221	26.9	µg/l
Metals	Magnesium, Total	483	58.6	217	26.3	µg/l
Metals	Manganese, Dissolved	0.0755	0.00916	0.0339	0.00412	µg/l
Metals	Manganese, Total	0.097	0.0118	0.0436	0.00529	µg/l
Metals	Nickel, Dissolved	0.00459	0.000557	0.00206	0.00025	µg/l
Metals	Nickel, Total	0.00541	0.000657	0.00243	0.000295	µg/l
Metals	Potassium, Dissolved	34.5	4.19	15.5	1.88	µg/l
Metals	Potassium, Total	34.3	4.17	15.4	1.87	µg/l
Metals	Selenium, Dissolved [1]	0.0135	0.00164	0.00606	0.000736	µg/l
Metals	Selenium, Total [1]	0.0144	0.00175	0.00648	0.000787	µg/l
Metals	Silver, Dissolved	0.00000723	8.78E-07	0.00000325	3.94E-07	µg/l
Metals	Silver, Total	0.0000136	0.00000165	0.00000611	7.42E-07	µg/l
Metals	Sodium, Dissolved	806	97.8	362	44	µg/l
Metals	Sodium,Total	944	115	424	51.5	µg/l
Metals	Thallium, Dissolved	0.0000233	0.00000282	0.0000105	0.00000127	µg/l
Metals	Thallium,Total	2.57E-07	3.12E-08	1.16E-07	1.4E-08	µg/l
Metals	Vanadium, Dissolved	0.000658	0.0000799	0.000296	0.0000359	µg/l
Metals	Vanadium,Total	0.000882	0.000107	0.000397	0.0000481	µg/l
Metals	Zinc, Dissolved	0.0968	0.0117	0.0435	0.00528	µg/l
Metals	Zinc, Total	0.201	0.0244	0.0903	0.011	µg/l
Nonylphenols	Bisphenol A	0.00000581	7.05E-07	0.00000261	3.17E-07	µg/l
Nonylphenols	Nonylphenol decaethoxylate (NP10EO)	0.00111	0.000134	0.000497	0.0000604	µg/l
Nonylphenols	Nonylphenol dodecaethoxylate (NP12EO)	0.000885	0.000107	0.000398	0.0000483	µg/l
Nonylphenols	Nonylphenol heptadecaethoxylate (NP17EO)	0.0000557	0.00000675	0.000025	0.00000304	µg/l
Nonylphenols	Nonylphenol heptaethoxylate (NP7EO)	0.000689	0.0000837	0.00031	0.0000376	µg/l
Nonylphenols	Nonylphenol hexadecaethoxylate (NP16EO)	0.000119	0.0000144	0.0000534	0.00000648	µg/l
Nonylphenols	Nonylphenol hexaethoxylate (NP6EO)	0.00048	0.0000583	0.000216	0.0000262	µg/l
Nonylphenols	Nonylphenol nonaethoxylate (NP9EO)	0.000983	0.000119	0.000442	0.0000536	µg/l
Nonylphenols	Nonylphenol octaethoxylate (NP8EO)	0.000882	0.000107	0.000397	0.0000481	µg/l
Nonylphenols	Nonylphenol octodecaethoxylate (NP18EO)	0.0000268	0.00000325	0.000012	0.00000146	µg/l
Nonylphenols	Nonylphenol pendecaethoxylate (NP15EO)	0.000224	0.0000272	0.000101	0.0000122	µg/l
Nonylphenols	Nonylphenol pentaethoxylate (NP5EO)	0.000282	0.0000342	0.000127	0.0000154	µg/l
Nonylphenols	Nonylphenol tetradecaethoxylate (NP14EO)	0.000406	0.0000493	0.000182	0.0000221	µg/l
Nonylphenols	Nonylphenol tetraethoxylate (NP4EO)	0.000128	0.0000155	0.0000575	0.00000698	µg/l
Nonylphenols	Nonylphenol tridecaethoxylate (NP13EO)	0.000627	0.0000762	0.000282	0.0000342	µg/l
Nonylphenols	Nonylphenol triethoxylate (NP3EO)	0.000074	0.00000898	0.0000332	0.00000403	µg/l
Nonylphenols	Nonylphenol undecaethoxylate (NP11EO)	0.00112	0.000136	0.000505	0.0000613	µg/l
Nonylphenols	Octylphenol decaethoxylate (OP10EO)	0.0000832	0.0000101	0.0000374	0.00000454	µg/l
Nonylphenols	Octylphenol dodecaethoxylate (OP12EO)	0.00004	0.00000485	0.000018	0.00000218	µg/l

Appendix G.6: Metropolitan Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 9 and 11	Model Scenarios 10 an 12	Model Scenarios 13 and 15	Model Scenarios 14 and 16	Units
Nonylphenols	Octylphenol heptaethoxylate (OP7EO)	0.00000494	0.0000006	0.00000222	0.00000027	µg/l
Nonylphenols	Octylphenol nonaethoxylate (OP9EO)	0.0000265	0.00000321	0.0000119	0.00000144	µg/l
Nonylphenols	Octylphenol octaethoxylate (OP8EO)	0.0000422	0.00000512	0.000019	0.0000023	µg/l
Nonylphenols	Octylphenol undecaethoxylate (OP11EO)	0.0000494	0.000006	0.0000222	0.0000027	µg/l
Nonylphenols	Total Nonylphenol Polyethoxylates	0.0076	0.000923	0.00342	0.000415	µg/l
Nonylphenols	Total Nonylphenols	0.00004	0.00000486	0.000018	0.00000218	µg/l
VOC	(2-Methyl-1-Propenyl)-Benzene	0.00195	0.000237	0.000877	0.000106	µg/l
VOC	(E)-1-Propenyl-Benzene	0.00000221	2.68E-07	9.94E-07	1.21E-07	µg/l
VOC	(E)-2-Butenal	0.00357	0.000433	0.0016	0.000195	µg/l
VOC	1,2,3,4-Tetrahydro-1-Methylnaphthalene	0.00224	0.000272	0.00101	0.000122	µg/l
VOC	1,2,3,4-Tetrahydro-2-Methylnaphthalene	0.00207	0.000251	0.00093	0.000113	µg/l
VOC	1,2,3,4-Tetrahydro-5-Methylnaphthalene	0.0182	0.00221	0.00819	0.000994	µg/l
VOC	1,2,3,4-Tetrahydro-6-Ethylnaphthalene,	0.00195	0.000237	0.000879	0.000107	µg/l
VOC	1,2,3,4-Tetrahydro-6-Methylnaphthalene	0.0168	0.00204	0.00754	0.000915	µg/l
VOC	1,2,3,4-Tetrahydro-6-Methylnaphthalene (01)	0.00415	0.000504	0.00187	0.000226	µg/l
VOC	1,2,3,4-Tetrahydro-6-Methylnaphthalene (02)	0.00347	0.000422	0.00156	0.000189	µg/l
VOC	1,2,3,4-Tetrahydronaphthalene	0.0125	0.00152	0.00562	0.000682	µg/l
VOC	1,2,3,4-Tetramethyl-Benzene	0.0014	0.000171	0.000631	0.0000766	µg/l
VOC	1,2,3,5-Tetramethyl-Benzene	0.00207	0.000251	0.000929	0.000113	µg/l
VOC	1,2,3-Trimethylbenzene	0.00675	0.000819	0.00303	0.000368	µg/l
VOC	1,2,4,5-Tetramethylbenzene	0.00315	0.000383	0.00142	0.000172	µg/l
VOC	1,2,4-Trimethylbenzene	0.0092	0.00112	0.00413	0.000502	µg/l
VOC	1,3,5-Trimethylbenzene	0.00268	0.000326	0.00121	0.000146	µg/l
VOC	1,3-Methylnaphthalene	0.00256	0.000311	0.00115	0.00014	µg/l
VOC	1,7-Methylnaphthalene	0.0116	0.00141	0.00521	0.000632	µg/l
VOC	1-Ethyl-2,3-Dimethyl-Benzene (01)	0.00313	0.00038	0.00141	0.000171	µg/l
VOC	1-Ethyl-2,3-Dimethyl-Benzene (02)	0.000859	0.000104	0.000386	0.0000469	µg/l
VOC	1-Ethyl-2,4-Dimethyl-Benzene	0.00334	0.000405	0.0015	0.000182	µg/l
VOC	1-Ethyl-2-Methyl-Benzene	0.00000683	8.29E-07	0.00000307	3.72E-07	µg/l
VOC	1-Ethyl-3-Methyl-Benzene	0.00217	0.000264	0.000977	0.000119	µg/l
VOC	1-Ethyl-4-Methyl-Benzene	0.0141	0.00171	0.00632	0.000768	µg/l
VOC	1-Methyl-2-(1-Methylethyl)-Benzene	0	0	0	0	µg/l
VOC	1-Methyl-2-(1-Methylethyl)-Benzene (01)	0.00000553	6.71E-07	0.00000248	3.01E-07	µg/l
VOC	1-Methyl-2-(1-Methylethyl)-Benzene (02)	0.0000193	0.00000234	0.00000868	0.00000105	µg/l
VOC	1-Methyl-3-Propyl-Benzene	0.00274	0.000333	0.00123	0.000149	µg/l
VOC	1-Methyl-4-(1-Methylidene)-Cyclohexane	0	0	0	0	µg/l
VOC	1-methyl-Indan	0.00657	0.000798	0.00296	0.000359	µg/l
VOC	1-Propenyl-Benzene	0.00000254	3.08E-07	0.00000114	1.38E-07	µg/l
VOC	2- Heptanone	0.000131	0.0000159	0.000059	0.00000716	µg/l
VOC	2,3-Dihydro-1,2-Dimethyl-1H-Indene	0.000706	0.0000858	0.000318	0.0000385	µg/l
VOC	2,3-Dihydro-1,6-Dimethyl-1H-Indene	0.00338	0.00041	0.00152	0.000184	µg/l
VOC	2,3-Dihydro-1-Methylindene	0.0034	0.000413	0.00153	0.000186	µg/l

Appendix G.6: Metropolitan Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 9 and 11	Model Scenarios 10 an 12	Model Scenarios 13 and 15	Model Scenarios 14 and 16	Units
VOC	2,3-Dihydro-1-methylindene (01)	0.0019	0.00023	0.000853	0.000104	µg/l
VOC	2,3-Dihydro-1-methylindene (02)	0.00402	0.000489	0.00181	0.00022	µg/l
VOC	2,3-Dihydro-4,7-Dimethyl-1H-Indene	0.000067	0.00000813	0.0000301	0.00000365	µg/l
VOC	2,3-Dihydro-4-Methyl-1H-Indene	0.0391	0.00475	0.0176	0.00213	µg/l
VOC	2,3-Dihydro-4-Methyl-1H-Indene (01)	0.00000787	9.55E-07	0.00000354	4.29E-07	µg/l
VOC	2,3-Dihydro-4-Methyl-1H-Indene (02)	0.0000133	0.00000161	0.00000596	7.24E-07	µg/l
VOC	2,3-Dihydro-5,6-dimethyl-1H-Indene	0.00184	0.000223	0.000827	0.0001	µg/l
VOC	2,3-Dihydro-5-methyl-1H-Indene	0.00347	0.000422	0.00156	0.000189	µg/l
VOC	2,6-Dimethylnaphthalene	0.0252	0.00306	0.0113	0.00137	µg/l
VOC	2-Butanone	0.0201	0.00244	0.00903	0.0011	µg/l
VOC	2-Butenal	0.00223	0.00027	0.001	0.000121	µg/l
VOC	2-Ethyl-1,3,5-Trimethyl-Benzene	0.00268	0.000326	0.00121	0.000146	µg/l
VOC	2-Ethyl-1,4-Dimethyl-Benzene	0.0124	0.00151	0.00557	0.000677	µg/l
VOC	2-Ethyl-1-Hexanol	0.00000243	2.95E-07	0.00000109	1.32E-07	µg/l
VOC	2-Ethyltoluene	0.00686	0.000832	0.00308	0.000374	µg/l
VOC	2-Hexanone	0.00184	0.000223	0.000827	0.0001	µg/l
VOC	2-Methyl-2-Propenal	0.00427	0.000519	0.00192	0.000233	µg/l
VOC	2-Propenyl-Benzene	0.0103	0.00125	0.00462	0.000561	µg/l
VOC	3-Buten-2-one	0.00384	0.000466	0.00173	0.00021	µg/l
VOC	4-Ethyl-1,2-Dimethyl-Benzene	0.00000702	8.52E-07	0.00000316	3.83E-07	µg/l
VOC	4-Heptanone	0.000174	0.0000211	0.000078	0.00000947	µg/l
VOC	4-Isopropyltoluene	0.000612	0.0000743	0.000275	0.0000334	µg/l
VOC	4-Methyl-2-Pentanone	0.000597	0.0000725	0.000268	0.0000326	µg/l
VOC	Acetaldehyde	0.0122	0.00148	0.00546	0.000663	µg/l
VOC	Acetone	0.0889	0.0108	0.04	0.00485	µg/l
VOC	Acrolein	0.00508	0.000617	0.00228	0.000277	µg/l
VOC	Benzaldehyde	0.000155	0.0000189	0.0000698	0.00000847	µg/l
VOC	Benzene	0.00681	0.000826	0.00306	0.000371	µg/l
VOC	Benzocycloheptatriene	0.0238	0.00289	0.0107	0.0013	µg/l
VOC	Benzofuran	0.00241	0.000293	0.00108	0.000132	µg/l
VOC	Bromodichloromethane	0.00000908	0.0000011	0.00000408	4.96E-07	µg/l
VOC	Butane	0.00114	0.000138	0.000512	0.0000621	µg/l
VOC	Butyraldehyde	0.003	0.000365	0.00135	0.000164	µg/l
VOC	Carbon disulfide	0.00000183	2.22E-07	8.23E-07	9.99E-08	µg/l
VOC	Chloroform	0.0016	0.000194	0.000718	0.0000872	µg/l
VOC	cis-1,2-Dichloroethene	0.00000282	3.42E-07	0.00000127	1.54E-07	µg/l
VOC	Cyclohexane	0.000144	0.0000175	0.0000646	0.00000785	µg/l
VOC	Dibromochloromethane	0.00000891	0.00000108	0.00000401	4.86E-07	µg/l
VOC	Dimethocxymethane	0.00427	0.000518	0.00192	0.000233	µg/l
VOC	Ethanol	0.0000464	0.00000563	0.0000209	0.00000253	µg/l
VOC	Ethylbenzene	0.00375	0.000455	0.00168	0.000204	µg/l
VOC	Indene	0.00012	0.0000146	0.0000541	0.00000657	µg/l
VOC	Isopropylbenzene	0.00106	0.000129	0.000476	0.0000578	µg/l

Appendix G.6: Metropolitan Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 9 and 11	Model Scenarios 10 an 12	Model Scenarios 13 and 15	Model Scenarios 14 and 16	Units
VOC	Limonene	0	0	0	0	µg/l
VOC	m,p-Xylene (Sum of Isomers)	0.0136	0.00165	0.0061	0.00074	µg/l
VOC	Methyl acetate	0.00125	0.000152	0.000562	0.0000682	µg/l
VOC	Methyl tertiary butyl ether (MTBE)	0.0000185	0.00000224	0.00000831	0.00000101	µg/l
VOC	Methylcyclohexane	0.000131	0.0000158	0.0000587	0.00000712	µg/l
VOC	Methylene chloride	0.00034	0.0000413	0.000153	0.0000185	µg/l
VOC	n-Butylbenzene	0.000537	0.0000651	0.000241	0.0000293	µg/l
VOC	nitro-Methane	0.00178	0.000216	0.000801	0.0000972	µg/l
VOC	Nonanal	0.0000012	1.46E-07	5.39E-07	6.55E-08	µg/l
VOC	n-Propylbenzene	0.00103	0.000125	0.000461	0.000056	µg/l
VOC	n-Valeraldehyde	0.00268	0.000326	0.00121	0.000146	µg/l
VOC	O-Xylene	0.00876	0.00106	0.00394	0.000478	µg/l
VOC	sec-Butylbenzene	0.00122	0.000148	0.000548	0.0000666	µg/l
VOC	Styrene	0.00121	0.000146	0.000542	0.0000658	µg/l
VOC	Sulfur dioxide	0.0126	0.00153	0.00568	0.000689	µg/l
VOC	Tetrachloroethene	0.00000259	3.14E-07	0.00000116	1.41E-07	µg/l
VOC	Toluene	0.0137	0.00166	0.00614	0.000746	µg/l
VOC	Trichloroethene	0.00000197	2.39E-07	8.86E-07	1.08E-07	µg/l
VOC	Trichlorofluoromethane	0.00104	0.000126	0.000465	0.0000565	µg/l
VOC	Tridecane	0.00213	0.000258	0.000956	0.000116	µg/l
VOC	Unknown VOC	0.00297	0.000361	0.00134	0.000162	µg/l
VOC	Unknown VOC (01)	0.00196	0.000237	0.000879	0.000107	µg/l
VOC	Unknown VOC (02)	0.00255	0.000309	0.00114	0.000139	µg/l
VOC	Unknown VOC (03)	0.00232	0.000281	0.00104	0.000126	µg/l
VOC	Unknown VOC (04)	0.00158	0.000192	0.000711	0.0000863	µg/l
VOC	Unknown VOC (05)	0.00142	0.000173	0.000639	0.0000775	µg/l
VOC	Vinyl acetate	0.00133	0.000162	0.000599	0.0000727	µg/l
SVOC	(E)-2-Tetradecene	0.000388	0.0000471	0.000174	0.0000212	µg/l
SVOC	1,2,3,4-Tetrahydro-2,7-Dimethylnaphthalene	0.000368	0.0000447	0.000166	0.0000201	µg/l
SVOC	1,2,3-Trichloro-(Z)-1-Propene	0.000108	0.0000131	0.0000485	0.00000589	µg/l
SVOC	1,2,3-Trimethylbenzene (1)	0.00157	0.00019	0.000705	0.0000856	µg/l
SVOC	1,2,3-Trimethylbenzene (2)	0.002	0.000243	0.0009	0.000109	µg/l
SVOC	1,2,4,5-Tetramethylbenzene (1)	0.00022	0.0000267	0.0000989	0.000012	µg/l
SVOC	1,2,4,5-Tetramethylbenzene (2)	0.000204	0.0000248	0.0000917	0.0000111	µg/l
SVOC	1,2-Diethyl-Cyclobutane	0.0061	0.00074	0.00274	0.000333	µg/l
SVOC	1,3-Dimethylnaphthalene	0.000135	0.0000163	0.0000605	0.00000734	µg/l
SVOC	1,3-Dimethylnaphthalene (01)	0.00346	0.000419	0.00155	0.000189	µg/l
SVOC	1,4-Dimethyl-1,2,3,4-tetrahydronaphthalene	0.00511	0.00062	0.0023	0.000279	µg/l
SVOC	1,4-Dimethylnaphthalene	0.00606	0.000735	0.00272	0.00033	µg/l
SVOC	1,4-Dimethylnaphthalene (01)	0.00366	0.000445	0.00165	0.0002	µg/l
SVOC	1,5-Dimethylnaphthalene	0.00151	0.000183	0.000678	0.0000823	µg/l
SVOC	1,6-Dimethylnaphthalene	0.026	0.00315	0.0117	0.00142	µg/l

Appendix G.6: Metropolitan Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 9 and 11	Model Scenarios 10 an 12	Model Scenarios 13 and 15	Model Scenarios 14 and 16	Units
SVOC	1,7,7-tri-(methyl)-bicyclo[2.2.1]heptane	0	0	0	0	µg/l
SVOC	1-Dodecanol	0.0000579	0.00000703	0.000026	0.00000316	µg/l
SVOC	1-Hexadecene	0.00000537	6.52E-07	0.00000241	2.93E-07	µg/l
SVOC	1-Methyl-2-Propyl-Benzene (01)	0.00166	0.000201	0.000745	0.0000904	µg/l
SVOC	1-Methyl-2-Propyl-Benzene (02)	0.000478	0.0000581	0.000215	0.0000261	µg/l
SVOC	1-Methylnaphthalene	0.0242	0.00293	0.0109	0.00132	µg/l
SVOC	1-Phenyl-1-Butene	0.00000195	2.37E-07	8.77E-07	1.06E-07	µg/l
SVOC	2-(dodecyloxy)-Ethanol	0.0000724	0.00000879	0.0000325	0.00000395	µg/l
SVOC	2-(hexadecyloxy)-Ethanol	0.0000186	0.00000226	0.00000835	0.00000101	µg/l
SVOC	2-(tetradecyloxy)-Ethanol	0.0000536	0.00000651	0.0000241	0.00000293	µg/l
SVOC	2,3-Dimethylnaphthalene	0.00451	0.000547	0.00203	0.000246	µg/l
SVOC	2,4,6-Trichlorophenol	0.00000929	0.00000113	0.00000418	5.07E-07	µg/l
SVOC	2,4-Dimethyl-Benzaldehyde	0.00000363	0.00000044	0.00000163	1.98E-07	µg/l
SVOC	2,4-Dimethylphenol	0.00133	0.000161	0.000597	0.0000724	µg/l
SVOC	2,6,10,14-Tetramethyl Pentadecane	0.00827	0.001	0.00372	0.000451	µg/l
SVOC	2,6,10,14-Tetramethylhexadecae	0.00542	0.000657	0.00243	0.000295	µg/l
SVOC	2,6,10,14-Tetramethylhexadecae (01)	0.000583	0.0000708	0.000262	0.0000318	µg/l
SVOC	2,6-dimethyl-Heptadecane	0.00884	0.00107	0.00397	0.000482	µg/l
SVOC	2,7-Dimethylnaphthalene	0.00675	0.000819	0.00303	0.000368	µg/l
SVOC	2-Cyclopenten1-one	0.000609	0.0000739	0.000274	0.0000332	µg/l
SVOC	2-Ethyl-Hexanoic acid	0.207	0.0251	0.0929	0.0113	µg/l
SVOC	2-Hydroxy-Benzaldehyde	0.00957	0.00116	0.0043	0.000522	µg/l
SVOC	2-Mercaptobenzothiazole	0	0	0	0	µg/l
SVOC	2-Methyl Tridecane	0.000309	0.0000375	0.000139	0.0000168	µg/l
SVOC	2-Methyl-Benzaldehyde	0.00399	0.000484	0.00179	0.000218	µg/l
SVOC	2-Methyl-Dodecane	0.000192	0.0000233	0.0000862	0.0000105	µg/l
SVOC	2-Methylnaphthalene	0.0313	0.0038	0.0141	0.00171	µg/l
SVOC	2-Naphthalenecarboxaldehyde	0.000666	0.0000808	0.000299	0.0000363	µg/l
SVOC	3,4-Dimethylphenol	0.0000017	2.07E-07	7.66E-07	9.29E-08	µg/l
SVOC	3,5-Dimethyl-Benzaldehyde	0.0000022	2.68E-07	9.91E-07	0.00000012	µg/l
SVOC	3,6-Dimethylundecane	0.00000336	4.07E-07	0.00000151	1.83E-07	µg/l
SVOC	3-Methyl-Benzaldehyde	0.00846	0.00103	0.0038	0.000462	µg/l
SVOC	3-Methyl-Benzaldehyde (01)	0.00949	0.00115	0.00426	0.000518	µg/l
SVOC	3-Methyl-butanoic acid	0.0000978	0.0000119	0.000044	0.00000534	µg/l
SVOC	3-Methyl-Phenanthrene	0.00397	0.000482	0.00178	0.000216	µg/l
SVOC	3-Methylphenol	0.000444	0.0000539	0.000199	0.0000242	µg/l
SVOC	3-Phenyl-2-Propenal	0.0003	0.0000364	0.000135	0.0000163	µg/l
SVOC	4,4-Dimethylbiphenyl	0.00412	0.000501	0.00185	0.000225	µg/l
SVOC	4-Hydroxy-2-Butanone	0.00462	0.00056	0.00208	0.000252	µg/l
SVOC	4-Methyl-1H-Benzotriazole	0.00000465	5.64E-07	0.00000209	2.54E-07	µg/l
SVOC	4-METHYL-PENTANOIC ACID	0.0000652	0.00000792	0.0000293	0.00000356	µg/l
SVOC	5-Butyl-Hexadecane	0.00000258	3.14E-07	0.00000116	1.41E-07	µg/l
SVOC	5-Methyl-2-(1-methyl)-Cyclohexanol	0.0000152	0.00000184	0.00000681	8.27E-07	µg/l

Appendix G.6: Metropolitan Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 9 and 11	Model Scenarios 10 an 12	Model Scenarios 13 and 15	Model Scenarios 14 and 16	Units
SVOC	9-Methyl-9H-Fluorene	0.00424	0.000515	0.00191	0.000231	µg/l
SVOC	Acenaphthylene	0.00232	0.000281	0.00104	0.000126	µg/l
SVOC	Acetophenone	0.0000728	0.00000884	0.0000327	0.00000397	µg/l
SVOC	Benzeneacetic Acid	0.0000498	0.00000604	0.0000224	0.00000272	µg/l
SVOC	Benzenepropanoic Acid	0.0000549	0.00000667	0.0000247	0.000003	µg/l
SVOC	Benzothiazole	0.0000233	0.00000283	0.0000105	0.00000127	µg/l
SVOC	Benzyl alcohol	0.0000761	0.00000923	0.0000342	0.00000415	µg/l
SVOC	Biphenyl	0.00251	0.000305	0.00113	0.000137	µg/l
SVOC	Bis(2-ethylhexyl) phthalate	0.00119	0.000144	0.000534	0.0000648	µg/l
SVOC	Caprolactam	0.0000546	0.00000663	0.0000246	0.00000298	µg/l
SVOC	Cholesterol	0.000151	0.0000183	0.0000679	0.00000824	µg/l
SVOC	Cyclic octaatomic sulfur	0.0399	0.00484	0.0179	0.00217	µg/l
SVOC	Cyclodecane	0.000397	0.0000482	0.000179	0.0000217	µg/l
SVOC	Cyclododecane	0.0000598	0.00000725	0.0000269	0.00000326	µg/l
SVOC	Cyclotetradecane	0.0000317	0.00000385	0.0000142	0.00000173	µg/l
SVOC	Diethene Glycol Monododecyl Ether	0.0000597	0.00000725	0.0000268	0.00000326	µg/l
SVOC	Dimethyl phthalate	0.0000542	0.00000658	0.0000244	0.00000296	µg/l
SVOC	Di-n-butyl phthalate	0.00134	0.000163	0.000603	0.0000732	µg/l
SVOC	Di-n-octyl phthalate	0.000113	0.0000137	0.0000506	0.00000614	µg/l
SVOC	Disopropylene glycol	0.0000176	0.00000214	0.00000792	9.61E-07	µg/l
SVOC	Dodecane	0.00000193	2.34E-07	8.67E-07	1.05E-07	µg/l
SVOC	Dodecanoic acid	0.0000433	0.00000526	0.0000195	0.00000236	µg/l
SVOC	Eicosane	0.0209	0.00254	0.0094	0.00114	µg/l
SVOC	Ethanol, 2,2-oxybis-	0.00195	0.000236	0.000876	0.000106	µg/l
SVOC	Ethanol, 2-Butoxy	0.00516	0.000626	0.00232	0.000282	µg/l
SVOC	Fluorene	0.00247	0.0003	0.00111	0.000135	µg/l
SVOC	Heneicosane	0.00712	0.000864	0.0032	0.000388	µg/l
SVOC	Heptadecane	0.0362	0.0044	0.0163	0.00198	µg/l
SVOC	Hexaethylene Glycol Monododecyl	0.0000363	0.00000441	0.0000163	0.00000198	µg/l
SVOC	Hexaethylene Glycol Monododecyl (01)	0.0000146	0.00000177	0.00000655	7.94E-07	µg/l
SVOC	Hexaethylene Glycol Monododecyl (02)	0.0000046	5.58E-07	0.00000207	2.51E-07	µg/l
SVOC	Hexagol	0.000021	0.00000255	0.00000943	0.00000114	µg/l
SVOC	Indane	0.00171	0.000208	0.00077	0.0000935	µg/l
SVOC	Indole	0.000275	0.0000333	0.000123	0.000015	µg/l
SVOC	Isopropylbenzene-4,methyl-1	0	0	0	0	µg/l
SVOC	m-Cresol	0.000117	0.0000143	0.0000528	0.00000641	µg/l
SVOC	Naphthalene	0.0129	0.00157	0.00581	0.000706	µg/l
SVOC	N-Butyl-Benzenesulfonamide	0.000006	7.28E-07	0.0000027	3.27E-07	µg/l
SVOC	n-Hexadecane	0.0346	0.0042	0.0155	0.00189	µg/l
SVOC	n-Hexadecanoic acid	0.0000307	0.00000372	0.0000138	0.00000167	µg/l
SVOC	Nonadecane	0.0278	0.00338	0.0125	0.00152	µg/l
SVOC	Nonadecane (01)	0.00851	0.00103	0.00382	0.000464	µg/l
SVOC	Nonanoic Acid	0.00671	0.000814	0.00301	0.000366	µg/l

Appendix G.6: Metropolitan Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 9 and 11	Model Scenarios 10 an 12	Model Scenarios 13 and 15	Model Scenarios 14 and 16	Units
SVOC	n-Pentadecane	0.0312	0.00379	0.014	0.0017	µg/l
SVOC	n-Tetradecane	0.0357	0.00433	0.016	0.00195	µg/l
SVOC	o-Cresol	0.00381	0.000462	0.00171	0.000208	µg/l
SVOC	Octadecane	0.00775	0.000941	0.00348	0.000423	µg/l
SVOC	p-Cresol	0.012	0.00145	0.00537	0.000652	µg/l
SVOC	Pentacosane	0.000532	0.0000645	0.000239	0.000029	µg/l
SVOC	Pentaethene Glycol Monododecyl Ether	0.00000492	5.97E-07	0.00000221	2.68E-07	µg/l
SVOC	Pentaethene Glycol Monododecyl Ether (01)	0.0000359	0.00000436	0.0000161	0.00000196	µg/l
SVOC	Pentaethene Glycol Monododecyl Ether (02)	0.0000707	0.00000859	0.0000318	0.00000386	µg/l
SVOC	Phenanthrene	0.00259	0.000314	0.00116	0.000141	µg/l
SVOC	Phenol	0.0241	0.00293	0.0109	0.00132	µg/l
SVOC	Phthalic acid, isobutyl octyl ester	0.00000852	0.00000103	0.00000383	4.65E-07	µg/l
SVOC	Pyrene	0.000257	0.0000311	0.000115	0.000014	µg/l
SVOC	Sulfur	0.0167	0.00203	0.00751	0.000911	µg/l
SVOC	Tetraethylene glycol monododecyl ether	0.0000366	0.00000444	0.0000165	0.000002	µg/l
SVOC	Triethyl phosphate	0.0000427	0.00000518	0.0000192	0.00000233	µg/l
SVOC	Triethylene glycol monododecyl ether	0.0000544	0.0000066	0.0000244	0.00000297	µg/l
SVOC	Unknown SVOC	0.00695	0.000844	0.00312	0.000379	µg/l
SVOC	Unknown SVOC (01)	0.00672	0.000816	0.00302	0.000367	µg/l
SVOC	Unknown SVOC (02)	0.00727	0.000883	0.00327	0.000397	µg/l
SVOC	Unknown SVOC (03)	0.00107	0.00013	0.000481	0.0000584	µg/l
SVOC	Unknown SVOC (04)	0.00111	0.000134	0.000497	0.0000603	µg/l
SVOC	Unknown SVOC (05)	0.000383	0.0000465	0.000172	0.0000209	µg/l
SVOC	Unknown SVOC (06)	0.000248	0.0000301	0.000112	0.0000135	µg/l
SVOC	Unknown SVOC (07)	0.00308	0.000374	0.00138	0.000168	µg/l

(1) EPA suspects a limited number of the samples analyzed for selenium (even fewer for arsenic) for bilgewater, packing gland effluent, propulsion engine effluent, graywater and deck washdown water may be positively influenced (increased) by interference from high concentrations of major cations in the sample matrix. Although EPA suspects that the highest concentrations of dissolved arsenic (and to a lesser extent selenium) in fish hold effluent from a shrimping vessel could be slightly elevated due to cation interference; EPA believes the fish hold concentrations reasonably represent true effluent concentrations for the discharge (see Section 3.2.4.1). EPA considered these interferences when interpreting the potential for vessel discharges to pose a risk to human health, aquatic life, or the environment and determined that such cationic interference does not influence the major findings presented in the modeling analysis.

Appendix G.7: Recreational Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 17 and 19	Model Scenarios 18 and 20	Model Scenarios 21 and 23	Model Scenarios 22 and 24	Units
Bacteria	E. Coli by MF	0.533	0.0647	0.24	0.0291	CFU/100 ml
Bacteria	E. Coli by MPN	0.208	0.0252	0.0935	0.0113	MPN/100 ml
Bacteria	Enterococci by MF	0.301	0.0365	0.135	0.0164	CFU/100 ml
Bacteria	Enterococci by MPN	0.0395	0.0048	0.0178	0.00216	MPN/100 ml
Bacteria	Fecal Coliform by MF	1.47	0.178	0.659	0.0799	CFU/100 ml
Bacteria	Fecal Coliform by MPN	0.602	0.0731	0.271	0.0328	MPN/100 ml
Bacteria	Total Coliforms by MPN	2.59	0.314	1.16	0.141	MPN/100 ml
Classicals	Biochemical Oxygen Demand (BOD)	0.129	0.0156	0.0578	0.00701	mg/l
Classicals	Chemical Oxygen Demand (COD)	0.361	0.0438	0.162	0.0197	mg/l
Classicals	Dissolved Oxygen	0.0135	0.00164	0.00609	0.000739	mg/l
Classicals	Hexane Extractable Material (HEM)	0.00573	0.000695	0.00257	0.000312	mg/l
Classicals	Silica Gel Treated HEM (SGT-HEM)	0.00682	0.000828	0.00307	0.000372	mg/l
Classicals	Sulfide	6.67E-06	8.09E-07	0.000003	3.64E-07	mg/l
Classicals	Total Organic Carbon (TOC)	0.0483	0.00586	0.0217	0.00263	mg/l
Classicals	Total Residual Chlorine	0.000185	0.0000225	0.0000832	0.0000101	mg/l
Classicals	Total Suspended Solids (TSS)	0.061	0.00741	0.0274	0.00333	mg/l
Nutrients	Ammonia As Nitrogen (NH3-N)	0.00166	0.000202	0.000747	0.0000907	mg/l
Nutrients	Nitrate/Nitrite (NO3/NO2-N)	0.0000333	4.04E-06	0.000015	1.82E-06	mg/l
Nutrients	Total Kjeldahl Nitrogen (TKN)	0.0193	0.00235	0.00868	0.00105	mg/l
Nutrients	Total Phosphorus	0.00254	0.000308	0.00114	0.000138	mg/l
Metals	Aluminum, Dissolved	0.539	0.0654	0.242	0.0294	µg/l
Metals	Aluminum, Total	0.852	0.103	0.383	0.0465	µg/l
Metals	Antimony, Dissolved	0.0000154	1.87E-06	6.92E-06	8.41E-07	µg/l
Metals	Antimony, Total	0.0000448	5.44E-06	0.0000201	2.44E-06	µg/l
Metals	Arsenic, Dissolved [1]	0.0084	0.00102	0.00378	0.000458	µg/l
Metals	Arsenic, Total [1]	0.0103	0.00125	0.00465	0.000564	µg/l
Metals	Barium, Dissolved	0.0218	0.00265	0.00981	0.00119	µg/l
Metals	Barium, Total	0.0232	0.00282	0.0104	0.00127	µg/l
Metals	Cadmium, Dissolved	0.00001	1.22E-06	4.51E-06	5.47E-07	µg/l
Metals	Cadmium, Total	0.000181	0.0000219	0.0000812	9.85E-06	µg/l
Metals	Calcium, Dissolved	173	21	77.7	9.43	µg/l
Metals	Calcium, Total	175	21.3	78.7	9.55	µg/l
Metals	Chromium, Dissolved	0.00139	0.000169	0.000625	0.0000758	µg/l
Metals	Chromium, Total	0.00234	0.000284	0.00105	0.000128	µg/l
Metals	Cobalt, Dissolved	0.0000254	3.09E-06	0.0000114	1.39E-06	µg/l
Metals	Cobalt, Total	0.0000352	4.28E-06	0.0000158	1.92E-06	µg/l
Metals	Copper, Dissolved	0.902	0.109	0.405	0.0492	µg/l
Metals	Copper, Total	0.0542	0.00658	0.0244	0.00296	µg/l
Metals	Iron, Dissolved	0.00474	0.000576	0.00213	0.000259	µg/l
Metals	Iron, Total	0.197	0.0239	0.0884	0.0107	µg/l
Metals	Lead, Dissolved	0.00112	0.000135	0.000501	0.0000608	µg/l
Metals	Lead, Total	0.00465	0.000564	0.00209	0.000253	µg/l
Metals	Magnesium, Dissolved	456	55.3	205	24.8	µg/l
Metals	Magnesium, Total	447	54.3	201	24.4	µg/l
Metals	Manganese, Dissolved	0.0835	0.0101	0.0375	0.00456	µg/l
Metals	Manganese, Total	0.105	0.0128	0.0473	0.00574	µg/l
Metals	Nickel, Dissolved	0.00437	0.000531	0.00197	0.000239	µg/l

Appendix G.7: Recreational Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 17 and 19	Model Scenarios 18 and 20	Model Scenarios 21 and 23	Model Scenarios 22 and 24	Units
Metals	Nickel, Total	0.00475	0.000577	0.00214	0.000259	µg/l
Metals	Potassium, Dissolved	37	4.49	16.6	2.02	µg/l
Metals	Potassium, Total	36.9	4.47	16.6	2.01	µg/l
Metals	Selenium, Dissolved [1]	0.0145	0.00176	0.00652	0.000792	µg/l
Metals	Selenium, Total [1]	0.0154	0.00187	0.00694	0.000842	µg/l
Metals	Silver, Dissolved	4.52E-06	5.49E-07	2.03E-06	2.47E-07	µg/l
Metals	Silver, Total	0.0000085	1.03E-06	3.82E-06	4.64E-07	µg/l
Metals	Sodium, Dissolved	902	110	406	49.2	µg/l
Metals	Sodium,Total	1070	130	480	58.3	µg/l
Metals	Thallium, Dissolved	3.93E-06	4.78E-07	1.77E-06	2.15E-07	µg/l
Metals	Thallium,Total	4.29E-08	5.2E-09	1.93E-08	2.34E-09	µg/l
Metals	Vanadium, Dissolved	0.000742	0.0000901	0.000334	0.0000405	µg/l
Metals	Vanadium,Total	0.000833	0.000101	0.000375	0.0000455	µg/l
Metals	Zinc, Dissolved	0.085	0.0103	0.0382	0.00464	µg/l
Metals	Zinc, Total	0.169	0.0205	0.0759	0.00922	µg/l
Nonylphenols	Bisphenol A	6.97E-06	8.46E-07	3.13E-06	3.8E-07	µg/l
Nonylphenols	Nonylphenol decaethoxylate (NP10EO)	0.00103	0.000125	0.000462	0.0000561	µg/l
Nonylphenols	Nonylphenol dodecaethoxylate (NP12EO)	0.000837	0.000102	0.000376	0.0000456	µg/l
Nonylphenols	Nonylphenol heptadecaethoxylate (NP17EO)	0.0000548	6.65E-06	0.0000246	2.99E-06	µg/l
Nonylphenols	Nonylphenol heptaethoxylate (NP7EO)	0.00058	0.0000704	0.000261	0.0000316	µg/l
Nonylphenols	Nonylphenol hexadecaethoxylate (NP16EO)	0.000117	0.0000142	0.0000525	6.38E-06	µg/l
Nonylphenols	Nonylphenol hexaethoxylate (NP6EO)	0.000383	0.0000464	0.000172	0.0000209	µg/l
Nonylphenols	Nonylphenol nonaethoxylate (NP9EO)	0.000906	0.00011	0.000407	0.0000494	µg/l
Nonylphenols	Nonylphenol octaethoxylate (NP8EO)	0.000784	0.0000951	0.000352	0.0000428	µg/l
Nonylphenols	Nonylphenol octodecaethoxylate (NP18EO)	0.0000273	3.31E-06	0.0000123	1.49E-06	µg/l
Nonylphenols	Nonylphenol pendecaethoxylate (NP15EO)	0.000221	0.0000269	0.0000994	0.0000121	µg/l
Nonylphenols	Nonylphenol pentaethoxylate (NP5EO)	0.000195	0.0000237	0.0000878	0.0000107	µg/l
Nonylphenols	Nonylphenol tetradecaethoxylate (NP14EO)	0.000398	0.0000482	0.000179	0.0000217	µg/l
Nonylphenols	Nonylphenol tetraethoxylate (NP4EO)	0.0000567	6.88E-06	0.0000255	3.09E-06	µg/l
Nonylphenols	Nonylphenol tridecaethoxylate (NP13EO)	0.000604	0.0000733	0.000271	0.0000329	µg/l
Nonylphenols	Nonylphenol triethoxylate (NP3EO)	0.0000309	3.75E-06	0.0000139	1.69E-06	µg/l
Nonylphenols	Nonylphenol undecaethoxylate (NP11EO)	0.00105	0.000128	0.000473	0.0000574	µg/l
Nonylphenols	Octylphenol decaethoxylate (OP10EO)	0.0000274	3.32E-06	0.0000123	1.49E-06	µg/l
Nonylphenols	Octylphenol dodecaethoxylate (OP12EO)	0.0000125	1.52E-06	5.64E-06	6.84E-07	µg/l
Nonylphenols	Octylphenol heptaethoxylate (OP7EO)	8.24E-07	0.0000001	3.7E-07	4.49E-08	µg/l
Nonylphenols	Octylphenol nonaethoxylate (OP9EO)	0.0000102	1.24E-06	4.58E-06	5.56E-07	µg/l
Nonylphenols	Octylphenol octaethoxylate (OP8EO)	7.03E-06	8.53E-07	3.16E-06	3.83E-07	µg/l
Nonylphenols	Octylphenol undecaethoxylate (OP11EO)	0.0000165	0.000002	7.41E-06	8.99E-07	µg/l
Nonylphenols	Total Nonylphenol Polyethoxylates	0.00705	0.000856	0.00317	0.000385	µg/l
Nonylphenols	Total Nonylphenols	0.000025	3.03E-06	0.0000112	1.36E-06	µg/l
VOC	(2-Methyl-1-Propenyl)-Benzene	0.00234	0.000284	0.00105	0.000128	µg/l
VOC	(E)-1-Propenyl-Benzene	1.77E-06	2.15E-07	7.95E-07	9.65E-08	µg/l
VOC	(E)-2-Butenal	0.00428	0.00052	0.00192	0.000234	µg/l
VOC	1,2,3,4-Tetrahydro-1-Methylnaphthalene	0.00269	0.000327	0.00121	0.000147	µg/l
VOC	1,2,3,4-Tetrahydro-2-Methylnaphthalene	0.00248	0.000302	0.00112	0.000136	µg/l
VOC	1,2,3,4-Tetrahydro-5-Methylnaphthalene	0.0218	0.00264	0.00978	0.00119	µg/l
VOC	1,2,3,4-Tetrahydro-6-Ethylnaphthalene,	0.00235	0.000285	0.00105	0.000128	µg/l
VOC	1,2,3,4-Tetrahydro-6-Methylnaphthalene	0.0198	0.0024	0.00888	0.00108	µg/l
VOC	1,2,3,4-Tetrahydro-6-Methylnaphthalene (01)	0.00498	0.000605	0.00224	0.000272	µg/l

Appendix G.7: Recreational Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 17 and 19	Model Scenarios 18 and 20	Model Scenarios 21 and 23	Model Scenarios 22 and 24	Units
VOC	1,2,3,4-Tetrahydro-6-Methylnaphthalene (02)	0.00417	0.000506	0.00187	0.000227	µg/l
VOC	1,2,3,4-Tetrahydronaphthalene	0.0149	0.00181	0.00671	0.000814	µg/l
VOC	1,2,3,4-Tetramethyl-Benzene	0.000702	0.0000853	0.000316	0.0000383	µg/l
VOC	1,2,3,5-Tetramethyl-Benzene	0.00103	0.000125	0.000465	0.0000564	µg/l
VOC	1,2,3-Trimethylbenzene	0.00338	0.00041	0.00152	0.000184	µg/l
VOC	1,2,4,5-Tetramethylbenzene	0.00158	0.000191	0.000709	0.000086	µg/l
VOC	1,2,4-Trimethylbenzene	0.00577	0.0007	0.00259	0.000315	µg/l
VOC	1,3,5-Trimethylbenzene	0.00155	0.000189	0.000698	0.0000848	µg/l
VOC	1,3-Methylnaphthalene	0.00307	0.000373	0.00138	0.000168	µg/l
VOC	1,7-Methylnaphthalene	0.0139	0.00169	0.00625	0.000758	µg/l
VOC	1-Ethyl-2,3-Dimethyl-Benzene (01)	0.00241	0.000293	0.00108	0.000131	µg/l
VOC	1-Ethyl-2,3-Dimethyl-Benzene (02)	0.000429	0.0000521	0.000193	0.0000234	µg/l
VOC	1-Ethyl-2,4-Dimethyl-Benzene	0.00167	0.000203	0.000751	0.0000912	µg/l
VOC	1-Ethyl-2-Methyl-Benzene	5.46E-06	6.63E-07	2.45E-06	2.98E-07	µg/l
VOC	1-Ethyl-3-Methyl-Benzene	0.00259	0.000314	0.00116	0.000141	µg/l
VOC	1-Ethyl-4-Methyl-Benzene	0.00704	0.000855	0.00317	0.000384	µg/l
VOC	1-Methyl-2-(1-Methylethyl)-Benzene	0	0	0	0	µg/l
VOC	1-Methyl-2-(1-Methylethyl)-Benzene (01)	4.42E-06	5.37E-07	1.99E-06	2.41E-07	µg/l
VOC	1-Methyl-2-(1-Methylethyl)-Benzene (02)	0.0000154	1.88E-06	6.94E-06	8.43E-07	µg/l
VOC	1-Methyl-3-Propyl-Benzene	0.00137	0.000167	0.000617	0.0000749	µg/l
VOC	1-Methyl-4-(1-Methylidene)-Cyclohexane	0	0	0	0	µg/l
VOC	1-methyl-Indan	0.00651	0.00079	0.00292	0.000355	µg/l
VOC	1-Propenyl-Benzene	2.03E-06	2.46E-07	9.12E-07	1.11E-07	µg/l
VOC	2- Heptanone	0.0000656	7.96E-06	0.0000295	3.58E-06	µg/l
VOC	2,3-Dihydro-1,2-Dimethyl-1H-Indene	0.000353	0.0000429	0.000159	0.0000193	µg/l
VOC	2,3-Dihydro-1,6-Dimethyl-1H-Indene	0.00297	0.00036	0.00133	0.000162	µg/l
VOC	2,3-Dihydro-1-Methylindene	0.00408	0.000495	0.00183	0.000223	µg/l
VOC	2,3-Dihydro-1-methylindene (01)	0.00228	0.000276	0.00102	0.000124	µg/l
VOC	2,3-Dihydro-1-methylindene (02)	0.00483	0.000586	0.00217	0.000263	µg/l
VOC	2,3-Dihydro-4,7-Dimethyl-1H-Indene	0.0000134	1.63E-06	6.02E-06	7.31E-07	µg/l
VOC	2,3-Dihydro-4-Methyl-1H-Indene	0.0436	0.00529	0.0196	0.00238	µg/l
VOC	2,3-Dihydro-4-Methyl-1H-Indene (01)	6.29E-06	7.64E-07	2.83E-06	3.43E-07	µg/l
VOC	2,3-Dihydro-4-Methyl-1H-Indene (02)	0.0000106	1.29E-06	4.77E-06	5.79E-07	µg/l
VOC	2,3-Dihydro-5,6-dimethyl-1H-Indene	0.00221	0.000268	0.000992	0.00012	µg/l
VOC	2,3-Dihydro-5-methyl-1H-Indene	0.00174	0.000211	0.00078	0.0000947	µg/l
VOC	2,6-Dimethylnaphthalene	0.0302	0.00367	0.0136	0.00165	µg/l
VOC	2-Butanone	0.0231	0.00281	0.0104	0.00126	µg/l
VOC	2-Butenal	0.00267	0.000324	0.0012	0.000146	µg/l
VOC	2-Ethyl-1,3,5-Trimethyl-Benzene	0.00322	0.000391	0.00145	0.000176	µg/l
VOC	2-Ethyl-1,4-Dimethyl-Benzene	0.0149	0.00181	0.00669	0.000812	µg/l
VOC	2-Ethyl-1-Hexanol	1.21E-06	1.47E-07	5.45E-07	6.62E-08	µg/l
VOC	2-Ethyltoluene	0.00492	0.000597	0.00221	0.000268	µg/l
VOC	2-Hexanone	0.00202	0.000246	0.00091	0.00011	µg/l
VOC	2-Methyl-2-Propenal	0.00492	0.000597	0.00221	0.000268	µg/l
VOC	2-Propenyl-Benzene	0.00514	0.000624	0.00231	0.000281	µg/l
VOC	3-Buten-2-one	0.00452	0.000548	0.00203	0.000246	µg/l
VOC	4-Ethyl-1,2-Dimethyl-Benzene	5.62E-06	6.82E-07	2.52E-06	3.06E-07	µg/l
VOC	4-Heptanone	0.0000868	0.0000105	0.000039	4.74E-06	µg/l
VOC	4-Isopropyltoluene	0.000689	0.0000836	0.000309	0.0000376	µg/l

Appendix G.7: Recreational Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 17 and 19	Model Scenarios 18 and 20	Model Scenarios 21 and 23	Model Scenarios 22 and 24	Units
VOC	4-Methyl-2-Pentanone	0.000705	0.0000855	0.000317	0.0000384	µg/l
VOC	Acetaldehyde	0.0143	0.00173	0.00642	0.00078	µg/l
VOC	Acetone	0.103	0.0126	0.0465	0.00564	µg/l
VOC	Acrolein	0.00598	0.000726	0.00269	0.000326	µg/l
VOC	Benzaldehyde	0.000186	0.0000226	0.0000838	0.0000102	µg/l
VOC	Benzene	0.00596	0.000723	0.00268	0.000325	µg/l
VOC	Benzocycloheptatriene	0.0285	0.00346	0.0128	0.00156	µg/l
VOC	Benzofuran	0.00289	0.000351	0.0013	0.000158	µg/l
VOC	Bromodichloromethane	4.54E-06	5.51E-07	2.04E-06	2.48E-07	µg/l
VOC	Butane	0.000569	0.0000691	0.000256	0.0000311	µg/l
VOC	Butyraldehyde	0.00349	0.000424	0.00157	0.00019	µg/l
VOC	Carbon disulfide	0.0000022	2.67E-07	9.88E-07	1.2E-07	µg/l
VOC	Chloroform	0.00192	0.000233	0.000862	0.000105	µg/l
VOC	cis-1,2-Dichloroethene	3.38E-06	4.1E-07	1.52E-06	1.84E-07	µg/l
VOC	Cyclohexane	0.0000723	8.78E-06	0.0000325	3.95E-06	µg/l
VOC	Dibromochloromethane	4.46E-06	5.41E-07	0.000002	2.43E-07	µg/l
VOC	Dimethocxymethane	0.00384	0.000466	0.00173	0.000209	µg/l
VOC	Ethanol	0.0000232	2.82E-06	0.0000104	1.27E-06	µg/l
VOC	Ethylbenzene	0.00219	0.000265	0.000982	0.000119	µg/l
VOC	Indene	0.0000308	3.74E-06	0.0000139	1.68E-06	µg/l
VOC	Isopropylbenzene	0.00107	0.00013	0.000482	0.0000585	µg/l
VOC	Limonene	0	0	0	0	µg/l
VOC	m,p-Xylene (Sum of Isomers)	0.00733	0.00089	0.0033	0.0004	µg/l
VOC	Methyl acetate	0.0015	0.000182	0.000672	0.0000816	µg/l
VOC	Methyl tertiary butyl ether (MTBE)	9.62E-06	1.17E-06	4.32E-06	5.25E-07	µg/l
VOC	Methylcyclohexane	0.0000656	7.97E-06	0.0000295	3.58E-06	µg/l
VOC	Methylene chloride	0.000376	0.0000456	0.000169	0.0000205	µg/l
VOC	n-Butylbenzene	0.000644	0.0000782	0.000289	0.0000351	µg/l
VOC	nitro-Methane	0.00214	0.00026	0.000961	0.000117	µg/l
VOC	Nonanal	1.44E-06	1.75E-07	6.47E-07	7.86E-08	µg/l
VOC	n-Propylbenzene	0.000626	0.000076	0.000281	0.0000341	µg/l
VOC	n-Valeraldehyde	0.00309	0.000375	0.00139	0.000169	µg/l
VOC	O-Xylene	0.00476	0.000578	0.00214	0.00026	µg/l
VOC	sec-Butylbenzene	0.00146	0.000177	0.000657	0.0000797	µg/l
VOC	Styrene	0.00112	0.000135	0.000501	0.0000608	µg/l
VOC	Sulfur dioxide	0.00316	0.000383	0.00142	0.000172	µg/l
VOC	Tetrachloroethene	2.54E-06	3.09E-07	1.14E-06	1.39E-07	µg/l
VOC	Toluene	0.00832	0.00101	0.00374	0.000454	µg/l
VOC	Trichloroethene	2.37E-06	2.87E-07	1.06E-06	1.29E-07	µg/l
VOC	Trichlorofluoromethane	0.00124	0.000151	0.000558	0.0000678	µg/l
VOC	Tridecane	0.00255	0.00031	0.00115	0.000139	µg/l
VOC	Unknown VOC	0.00308	0.000373	0.00138	0.000168	µg/l
VOC	Unknown VOC (01)	0.00223	0.000271	0.001	0.000122	µg/l
VOC	Unknown VOC (02)	0.00298	0.000362	0.00134	0.000163	µg/l
VOC	Unknown VOC (03)	0.00271	0.000328	0.00122	0.000148	µg/l
VOC	Unknown VOC (04)	0.00175	0.000213	0.000788	0.0000957	µg/l
VOC	Unknown VOC (05)	0.00161	0.000195	0.000722	0.0000877	µg/l
VOC	Vinyl acetate	0.00159	0.000193	0.000714	0.0000867	µg/l
SVOC	(E)-2-Tetradecene	0.0000776	9.42E-06	0.0000349	4.23E-06	µg/l

Appendix G.7: Recreational Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 17 and 19	Model Scenarios 18 and 20	Model Scenarios 21 and 23	Model Scenarios 22 and 24	Units
SVOC	1,2,3,4-Tetrahydro-2,7-Dimethylnaphthalene	0.000184	0.0000224	0.0000828	0.0000101	µg/l
SVOC	1,2,3-Trichloro-(Z)-1-Propene	0.000054	6.55E-06	0.0000243	2.95E-06	µg/l
SVOC	1,2,3-Trimethylbenzene (1)	0.000786	0.0000954	0.000353	0.0000429	µg/l
SVOC	1,2,3-Trimethylbenzene (2)	0.001	0.000122	0.00045	0.0000546	µg/l
SVOC	1,2,4,5-Tetramethylbenzene (1)	0.00011	0.0000134	0.0000494	0.000006	µg/l
SVOC	1,2,4,5-Tetramethylbenzene (2)	0.000102	0.0000124	0.0000459	5.57E-06	µg/l
SVOC	1,2-Diethyl-Cyclobutane	0.00731	0.000888	0.00329	0.000399	µg/l
SVOC	1,3-Dimethylnaphthalene	0.0000269	3.27E-06	0.0000121	1.47E-06	µg/l
SVOC	1,3-Dimethylnaphthalene (01)	0.00415	0.000503	0.00186	0.000226	µg/l
SVOC	1,4-Dimethyl-1,2,3,4-tetrahydronaphthalene	0.00613	0.000745	0.00276	0.000335	µg/l
SVOC	1,4-Dimethylnaphthalene	0.00668	0.000811	0.003	0.000364	µg/l
SVOC	1,4-Dimethylnaphthalene (01)	0.0044	0.000533	0.00198	0.00024	µg/l
SVOC	1,5-Dimethylnaphthalene	0.000664	0.0000806	0.000298	0.0000362	µg/l
SVOC	1,6-Dimethylnaphthalene	0.0311	0.00377	0.014	0.00169	µg/l
SVOC	1,7,7-tri-(methyl)-bicyclo[2.2.1]heptane	0	0	0	0	µg/l
SVOC	1-Dodecanol	0.000029	3.51E-06	0.000013	1.58E-06	µg/l
SVOC	1-Hexadecene	2.68E-06	3.26E-07	1.21E-06	1.46E-07	µg/l
SVOC	1-Methyl-2-Propyl-Benzene (01)	0.000828	0.000101	0.000372	0.0000452	µg/l
SVOC	1-Methyl-2-Propyl-Benzene (02)	0.000239	0.000029	0.000108	0.0000131	µg/l
SVOC	1-Methylnaphthalene	0.0281	0.00341	0.0126	0.00153	µg/l
SVOC	1-Phenyl-1-Butene	1.56E-06	1.89E-07	7.01E-07	8.51E-08	µg/l
SVOC	2-(dodecyloxy)-Ethanol	0.0000362	4.39E-06	0.0000163	1.97E-06	µg/l
SVOC	2-(hexadecyloxy)-Ethanol	9.29E-06	1.13E-06	4.18E-06	5.07E-07	µg/l
SVOC	2-(tetradecyloxy)-Ethanol	0.0000268	3.26E-06	0.0000121	1.46E-06	µg/l
SVOC	2,3-Dimethylnaphthalene	0.00541	0.000657	0.00243	0.000295	µg/l
SVOC	2,4,6-Trichlorophenol	0.0000112	1.35E-06	5.01E-06	6.08E-07	µg/l
SVOC	2,4-Dimethyl-Benzaldehyde	0.0000029	3.52E-07	0.0000013	1.58E-07	µg/l
SVOC	2,4-Dimethylphenol	0.00154	0.000187	0.000693	0.0000841	µg/l
SVOC	2,6,10,14-Tetramethyl Pentadecane	0.00965	0.00117	0.00434	0.000526	µg/l
SVOC	2,6,10,14-Tetramethylhexadecae	0.0065	0.000789	0.00292	0.000355	µg/l
SVOC	2,6,10,14-Tetramethylhexadecae (01)	0.000292	0.0000354	0.000131	0.0000159	µg/l
SVOC	2,6-dimethyl-Heptadecane	0.0106	0.00129	0.00477	0.000578	µg/l
SVOC	2,7-Dimethylnaphthalene	0.0075	0.000911	0.00337	0.000409	µg/l
SVOC	2-Cyclopenten1-one	0.00073	0.0000886	0.000328	0.0000398	µg/l
SVOC	2-Ethyl-Hexanoic acid	0.103	0.0125	0.0465	0.00564	µg/l
SVOC	2-Hydroxy-Benzaldehyde	0.0112	0.00136	0.00505	0.000613	µg/l
SVOC	2-Mercaptobenzothiazole	0	0	0	0	µg/l
SVOC	2-Methyl Tridecane	0.000154	0.0000187	0.0000694	8.42E-06	µg/l
SVOC	2-Methyl-Benzaldehyde	0.00478	0.00058	0.00215	0.000261	µg/l
SVOC	2-Methyl-Dodecane	0.0000384	4.66E-06	0.0000172	2.09E-06	µg/l
SVOC	2-Methylnaphthalene	0.036	0.00437	0.0162	0.00196	µg/l
SVOC	2-Naphthalenecarboxaldehyde	0.000799	0.0000969	0.000359	0.0000436	µg/l
SVOC	3,4-Dimethylphenol	1.36E-06	1.65E-07	6.12E-07	7.43E-08	µg/l
SVOC	3,5-Dimethyl-Benzaldehyde	1.76E-06	2.14E-07	7.92E-07	9.62E-08	µg/l
SVOC	3,6-Dimethylundecane	5.59E-07	6.79E-08	2.51E-07	3.05E-08	µg/l
SVOC	3-Methyl-Benzaldehyde	0.0102	0.00123	0.00456	0.000554	µg/l
SVOC	3-Methyl-Benzaldehyde (01)	0.0114	0.00138	0.00512	0.000621	µg/l
SVOC	3-Methyl-butanoic acid	0.0000917	0.0000111	0.0000412	0.000005	µg/l
SVOC	3-Methyl-Phenanthrene	0.00476	0.000578	0.00214	0.00026	µg/l

Appendix G.7: Recreational Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 17 and 19	Model Scenarios 18 and 20	Model Scenarios 21 and 23	Model Scenarios 22 and 24	Units
SVOC	3-Methylphenol	0.000532	0.0000646	0.000239	0.000029	µg/l
SVOC	3-Phenyl-2-Propenal	0.000359	0.0000436	0.000162	0.0000196	µg/l
SVOC	4,4-Dimethylbiphenyl	0.00495	0.000601	0.00222	0.00027	µg/l
SVOC	4-Hydroxy-2-Butanone	0.00554	0.000673	0.00249	0.000302	µg/l
SVOC	4-Methyl-1H-Benzotriazole	5.58E-06	6.77E-07	2.51E-06	3.04E-07	µg/l
SVOC	4-METHYL-PENTANOIC ACID	0.0000611	7.42E-06	0.0000275	3.34E-06	µg/l
SVOC	5-Butyl-Hexadecane	4.31E-07	5.23E-08	1.94E-07	2.35E-08	µg/l
SVOC	5-Methyl-2-(1-methyl)-Cyclohexanol	7.58E-06	9.2E-07	3.41E-06	4.13E-07	µg/l
SVOC	9-Methyl-9H-Fluorene	0.00509	0.000618	0.00229	0.000278	µg/l
SVOC	Acenaphthylene	0.00275	0.000334	0.00124	0.00015	µg/l
SVOC	Acetophenone	0.0000146	1.77E-06	6.55E-06	7.94E-07	µg/l
SVOC	Benzeneacetic Acid	0.0000467	5.66E-06	0.000021	2.55E-06	µg/l
SVOC	Benzenepropanoic Acid	0.0000515	6.25E-06	0.0000231	2.81E-06	µg/l
SVOC	Benzothiazole	0.0000239	0.0000029	0.0000107	0.0000013	µg/l
SVOC	Benzyl alcohol	0.0000152	1.85E-06	6.84E-06	8.3E-07	µg/l
SVOC	Biphenyl	0.00273	0.000331	0.00122	0.000149	µg/l
SVOC	Bis(2-ethylhexyl) phthalate	0.00114	0.000138	0.000511	0.000062	µg/l
SVOC	Caprolactam	0.0000273	3.32E-06	0.0000123	1.49E-06	µg/l
SVOC	Cholesterol	0.000142	0.0000172	0.0000636	7.72E-06	µg/l
SVOC	Cyclic octaatomic sulfur	0.012	0.00146	0.00539	0.000654	µg/l
SVOC	Cyclodecane	0.0000795	9.64E-06	0.0000357	4.33E-06	µg/l
SVOC	Cyclododecane	0.0000296	3.59E-06	0.0000133	1.61E-06	µg/l
SVOC	Cyclotetradecane	0.0000158	1.92E-06	7.12E-06	8.64E-07	µg/l
SVOC	Diethene Glycol Monododecyl Ether	0.0000299	3.62E-06	0.0000134	1.63E-06	µg/l
SVOC	Dimethyl phthalate	0.0000651	0.0000079	0.0000292	3.55E-06	µg/l
SVOC	Di-n-butyl phthalate	0.00139	0.000168	0.000624	0.0000757	µg/l
SVOC	Di-n-octyl phthalate	0.0000571	6.94E-06	0.0000257	3.12E-06	µg/l
SVOC	Disopropylene glycol	8.81E-06	1.07E-06	3.96E-06	4.8E-07	µg/l
SVOC	Dodecane	3.21E-07	3.9E-08	1.44E-07	1.75E-08	µg/l
SVOC	Dodecanoic acid	0.0000217	2.63E-06	9.74E-06	1.18E-06	µg/l
SVOC	Eicosane	0.0243	0.00295	0.0109	0.00133	µg/l
SVOC	Ethanol, 2,2-oxybis-	0.000974	0.000118	0.000438	0.0000531	µg/l
SVOC	Ethanol, 2-Butoxy	0.00619	0.000752	0.00278	0.000338	µg/l
SVOC	Fluorene	0.00294	0.000356	0.00132	0.00016	µg/l
SVOC	Heneicosane	0.00744	0.000903	0.00334	0.000406	µg/l
SVOC	Heptadecane	0.0429	0.00521	0.0193	0.00234	µg/l
SVOC	Hexaethylene Glycol Monododecyl	0.0000182	2.21E-06	8.17E-06	9.91E-07	µg/l
SVOC	Hexaethylene Glycol Monododecyl (01)	7.28E-06	8.84E-07	3.27E-06	3.97E-07	µg/l
SVOC	Hexaethylene Glycol Monododecyl (02)	0.0000023	2.79E-07	1.03E-06	1.25E-07	µg/l
SVOC	Hexagol	0.0000105	1.27E-06	4.71E-06	5.72E-07	µg/l
SVOC	Indane	0.000858	0.000104	0.000386	0.0000468	µg/l
SVOC	Indole	0.000257	0.0000313	0.000116	0.000014	µg/l
SVOC	Isopropylbenzene-4,methyl-1	0	0	0	0	µg/l
SVOC	m-Cresol	0.0000245	2.98E-06	0.000011	1.34E-06	µg/l
SVOC	Naphthalene	0.0133	0.00161	0.00596	0.000723	µg/l
SVOC	N-Butyl-Benzenesulfonamide	0.000003	3.64E-07	1.35E-06	1.64E-07	µg/l
SVOC	n-Hexadecane	0.0408	0.00495	0.0183	0.00223	µg/l
SVOC	n-Hexadecanoic acid	0.0000153	1.86E-06	6.89E-06	8.36E-07	µg/l
SVOC	Nonadecane	0.033	0.00401	0.0148	0.0018	µg/l

Appendix G.7: Recreational Harbor Vessel Scenarios Instantaneous Concentration in the Hypothetical Harbor

Class	Analyte	Model Scenarios 17 and 19	Model Scenarios 18 and 20	Model Scenarios 21 and 23	Model Scenarios 22 and 24	Units
SVOC	Nonadecane (01)	0.0102	0.00124	0.00459	0.000557	µg/l
SVOC	Nonanoic Acid	0.00805	0.000977	0.00362	0.000439	µg/l
SVOC	n-Pentadecane	0.0316	0.00383	0.0142	0.00172	µg/l
SVOC	n-Tetradecane	0.039	0.00474	0.0175	0.00213	µg/l
SVOC	o-Cresol	0.00457	0.000555	0.00205	0.000249	µg/l
SVOC	Octadecane	0.0093	0.00113	0.00418	0.000508	µg/l
SVOC	p-Cresol	0.0136	0.00165	0.00612	0.000743	µg/l
SVOC	Pentacosane	0.000266	0.0000323	0.000119	0.0000145	µg/l
SVOC	Pentaethene Glycol Monododecyl Ether	2.46E-06	2.98E-07	0.0000011	1.34E-07	µg/l
SVOC	Pentaethene Glycol Monododecyl Ether (01)	0.000018	2.18E-06	8.07E-06	9.8E-07	µg/l
SVOC	Pentaethene Glycol Monododecyl Ether (02)	0.0000354	4.29E-06	0.0000159	1.93E-06	µg/l
SVOC	Phenanthrene	0.0025	0.000303	0.00112	0.000136	µg/l
SVOC	Phenol	0.0279	0.00339	0.0126	0.00152	µg/l
SVOC	Phthalic acid, isobutyl octyl ester	0.0000102	1.24E-06	0.0000046	5.58E-07	µg/l
SVOC	Pyrene	0.000125	0.0000151	0.0000561	6.81E-06	µg/l
SVOC	Sulfur	0.00346	0.00042	0.00156	0.000189	µg/l
SVOC	Tetraethylene glycol monododecyl ether	0.0000183	2.22E-06	8.23E-06	9.99E-07	µg/l
SVOC	Triethyl phosphate	0.0000422	5.13E-06	0.000019	0.0000023	µg/l
SVOC	Triethylene glycol monododecyl ether	0.0000272	0.0000033	0.0000122	1.48E-06	µg/l
SVOC	Unknown SVOC	0.00742	0.0009	0.00333	0.000405	µg/l
SVOC	Unknown SVOC (01)	0.00681	0.000826	0.00306	0.000371	µg/l
SVOC	Unknown SVOC (02)	0.0072	0.000874	0.00324	0.000393	µg/l
SVOC	Unknown SVOC (03)	0.000288	0.0000349	0.000129	0.0000157	µg/l
SVOC	Unknown SVOC (04)	0.000295	0.0000359	0.000133	0.0000161	µg/l
SVOC	Unknown SVOC (05)	0.000166	0.0000202	0.0000748	9.08E-06	µg/l
SVOC	Unknown SVOC (06)	0.000103	0.0000125	0.0000464	5.63E-06	µg/l
SVOC	Unknown SVOC (07)	0.00154	0.000187	0.000692	0.000084	µg/l

(1) EPA suspects a limited number of the samples analyzed for selenium (even fewer for arsenic) for bilgewater, packing gland effluent, propulsion engine effluent, graywater and deck washdown water may be positively influenced (increased) by interference from high concentrations of major cations in the sample matrix. Although EPA suspects that the highest concentrations of dissolved arsenic (and to a lesser extent selenium) in fish hold effluent from a shrimping vessel could be slightly elevated due to cation interference; EPA believes the fish hold concentrations reasonably represent true effluent concentrations for the discharge (see Section 3.2.4.1). EPA considered these interferences when interpreting the potential for vessel discharges to pose a risk to human health, aquatic life, or the environment and determined that such cationic interference does not influence the major findings presented in the modeling analysis.

Appendix H
Responsiveness Summary

EPA received 24 separate comment letters from 23 different commenters. These included 19 trade associations (Alaska Longline Fishermen's Association, Alaska Trollers Association, American Coatings Association, American Waterways Operators, Boat U.S., California Wetfish Producers Association, two comments from Conference of Professional Operators for Response Towing (C-PORT), Garden State Seafood Association, National Association of Charterboats, National Marine Manufacturers Association, Offshore Marine Service Association, Passenger Vessel Association, Recreational Fishing Alliance – South Carolina Chapter, Sefood Producers Coop, Southeast Alaska Fishermen's Alliance, United Cook Inlet Drift Association (UCIDA), the United Fishermen of Alaska, and West Coast Seafood Processors Association), 4 vessel operators or businesses (3 in Alaska or the Pacific Northwest, 1 in New Jersey) and 1 state agency (Alaska Department of Environmental Conservation). EPA considered the comments received in finalizing the Report and thanks these commenters for providing us with their feedback on the report. We have summarized significant or reoccurring comments below.

COMMENT:
Some commenters noted that EPA did not sample a sufficient number of vessels.

RESPONSE:
EPA believes that the dataset used to characterize discharges from nonrecreational vessels less than 79 feet in length and all commercial fishing vessels regardless of length is from a representative cross-section of vessels and is adequate to evaluate the vessel population. In conducting this study, EPA worked with 14 trade associations and 27 individual companies to obtain information regarding the shipboard processes, equipment, materials, and operations that contribute to the discharges, as well as the discharge rates, duration, frequency, and location.

EPA collected samples of nine vessel discharges from a total of 61 vessels (one to four discharges sampled per vessel) in nine vessel classes to characterize discharge pollutant concentrations and flow. These vessels were located in 15 different towns/cities in nine separate states, representing several of the major regions of the United States.

In preparing the Report to Congress, EPA used all of the technically appropriate data provided by industry and collected from EPA's vessel sampling program. EPA released the pre publication version of the draft report to congress to the public on March 2, 2010 (announced in the March 8th Federal Register Notice (75 FR 10477)) and solicited comment on all aspects of the report as well as specific comment on the existence of additional data or data sources. As previously discussed, EPA received 24 separate comment letters from 23 different commenters, including 19 trade associations, 4 vessel operators or businesses, and 1 state agency. EPA evaluated the comments and information received and revised the draft report to incorporate additional technically appropriate information. EPA believes that the final report is based on adequate EPA-gathered and industry-supplied data, which includes primary sampling data and an extensive review of existing peer-reviewed literature and other government reports.

COMMENT:
Several commenters questioned the representativeness of the sampled vessels, particularly for commercial fishing vessels.

RESPONSE:
EPA believes that the dataset used to characterize discharges from nonrecreational vessels less than 79 feet in length and all commercial fishing vessels regardless of length, including sampling data from 61 vessels, is from a representative cross-section of vessels and is adequate for the purposes of this national, screening-level evaluation. EPA sampled vessels from each of the nine most common vessel classes and sampled more commercial fishing vessels (33 vessels) than any other vessel class due to the large number of fishing vessels in the P.L. 110-299 study universe. EPA notes that additional sampling to characterize the less common vessel classes/types and discharges would not influence the major findings of this study as the total discharge volume from these vessels are an insignificant portion of discharges from the total industry population. Given that EPA has limited data with which to base this study, EPA's approach is reasonable.

In response to comments, EPA further evaluated the representativeness of the sampled commercial fishing vessels by comparing their size, class, and geographic distribution to those of the overall industry population.

Size. The following table compares the size distribution of the sampled vessels to the total industry population.

	Percentage of Vessels	
Vessel Length	**Sampled Commercial Fishing Vessel Population**	**Overall Commercial Fishing Vessel Population***
Less than 26 feet	0%	10%
26 to 50 feet	52%	70%
50 to 79 feet	39%	16%
79 feet or more	9%	4%

* – Size distribution of those vessels that reported vessel length in the U.S. Coast Guard MISLE Database, 2009.

Commenters noted, and EPA concurs, that the sampled commercial fishing vessel population does not represent discharges from vessels less than 26 feet in length. EPA observed that these small vessels typically store their catch in coolers (which do not have a discharge) rather than in refrigerated seawater or ice holding tanks, as allowed by their relatively short fishing voyages. EPA attempted to interview small commercial fishing vessel captains to obtain information on fishing operations and discharges; however, none of the contacted vessel captains volunteered their vessels to remain at the pier long enough for EPA to collect information or to sample their holding tanks (if any), but rather offloaded their catch within a few minutes (e.g., physically transferred bushels of crabs or lobsters from the cooler to the dock) and immediately returned to the fishing grounds.

For the remaining categories of vessel length, the sampled vessel population reasonably agrees with the overall vessel population, albeit somewhat more heavily weighted toward the largest of commercial fishing vessels (i.e., 50 feet or more) as compared to the overall vessel population. Again, due to the time required to collect the necessary data, captains of larger vessels were more willing to participate in the study because they had more time shoreside during large offloads than the captains of smaller vessels.

In summary, with the exception of the smallest commercial fishing vessels, EPA believes that the sampled vessel population is a representative cross-section of vessels and is adequate to evaluate the vessel population for the purpose of this study. With respect to small vessels, as a conservative estimate, EPA assumed vessel discharge characteristics for small vessels similar to those of larger vessels.

Class. The following table compares the distribution by vessel class for the sampled fishing vessel types to the total industry population.

Vessel Class	**Percentage of Vessels**	
	Sampled Commercial Fishing Vessel Population	**Overall Commercial Fishing Vessel Population***
Gillnetter	15%	9%
Pot/Trap	3%[1]	27%
Longliner	9%	6%
Seiner	15%	2%
Shrimper/Scalloper/Dredge	18%	23%
Tender	9%	<1%
Trawler	12%	12%
Troller/Hook and Line	18%	19%

* – Vessel class distribution of those vessels that reported vessel subtype in the U.S. Coast Guard MISLE Database, 2009.

EPA's sampled commercial fishing vessel population includes vessels in all of the fishing vessel classes. Furthermore, the percentage of sampled vessels by class is similar to or greater than the percentage of the overall vessel population by class for all vessel classes except for Pot/Trap vessels. Pot/Trap vessels include many of the smallest commercial vessels that are not represented by EPA's sampled vessel population as discussed above, and in general have flow-through seawater holding tanks used to keep crabs and lobsters alive until reaching the seafood processing facility. As such, discharges from seafood holding tanks on Pot/Trap vessels are generally seawater. EPA also notes that it sampled a much larger percentage of seiners than the overall vessel population (15% of vessels sampled versus only 2% of the overall vessel population). EPA sampled all vessels

[1] EPA did sample a lobster hold tank on a 63-foot trawler.

(where the permission of the captains was granted) that arrived at the docks at the seafood processors while the EPA sampling crew was at the docks. Sampling in Sitka, AK occurred at the start of the salmon fishing season, resulting in a preponderance of Seiners at the docks of seafood processers.

In summary, with the possible exception of Pot/Trap vessels, EPA believes that the sampled vessel population is a representative cross-section of vessels and is adequate to evaluate the vessel population for the purpose of this study. With respect to Seiners, fish hold effluent analyte concentrations from these vessels were neither the lowest nor the highest among the fish hold effluent discharged by the sampled vessel population. Therefore, EPA believes that any overrepresentation of Seiner fish hold effluent in EPA's analyses of vessel discharges would provide neither a high nor low bias to EPA's findings or conclusions.

Geographic Distribution. EPA sampled commercial fishing vessels in the following regions: Alaska (21 vessels); Gulf Coast (6 vessels); and New England (6 vessels). According to the National Marine Fisheries Service[2], in 2008 Alaska had nearly 55% of U.S. domestic commercial landings; the Gulf Coast had approximately 15% of U.S. domestic commercial landings; and New England had just over 7% of U.S. domestic commercial landings. Combined, these three areas represent approximately 77% of U.S. domestic commercial landings in 2008. Among the remaining geographic regions that EPA was unable to sample, the Pacific Coast (excluding Alaska) has the greatest landings in 2008 at 13%; commercials fishing vessels in this region are expected to be similar to those in Alaska. Finally, many of other remaining geographic regions that EPA was unable to sample, such as Chesapeake, Middle Atlantic, Great Lakes, and Hawaii, are likely dominated by small fishing vessels that may not have fish hold effluent discharges. Therefore, EPA believes that the geographic distribution of the sampled vessel population is a representative cross-section of vessels and is adequate to evaluate the vessel population for the purpose of this study.

COMMENT:
Some commenters noted that the assumptions used for estimating discharge volumes for the screening-level water quality model (Chapter 4 of the Report to Congress) resulted in higher estimates of volumes discharged. For example, commenters noted that some commercial fishing vessels do not clean their hulls daily or empty their holds daily.

RESPONSE:
Based on review and analysis of the comments, EPA ran a supplemental model run with the adjusted model assumptions presented in the table below and recalculated the associated discharge flows and loads. EPA performed this supplemental model run using the revised values to assess the impacts on the model results. EPA observed no significant change in model results based on the revised values. EPA revised Chapter 4 to describe this supplemental model run and to present the findings.

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[2] National Marine Fisheries Service (NMFS). 2009. Fisheries of the United States 2008. NMFS Fisheries Statistics Division. Silver Spring, MD.

Revised Model Assumptions

Vessel Class	Vessel Subclass	Discharge	Old Assumption	New Assumption
Fishing	Gillnetter	Fish Hold	Offloads daily	Offloads once per five days
Fishing	Longliner	Fish Hold	Offloads once per two days	Offloads once per five days
Fishing	Toller	Fish Hold Clean	Offloads daily	Offloads once per seven days
Fishing	Toller	Fish Hold	Offloads daily	Offloads once per seven days
Fishing	Toller	Fish Hold	840 ft^3 fish hold	595 ft^3 fish hold
Fishing	Toller	Fish Hold	5.5 tons of ice per offload	2 tons of ice per offload
Fishing	Toller	Deck Wash	125 gallons per deck wash	50 gallons per deck wash
Fishing	Shrimping	Bilge Water	150 gallons per minute bilge pump rate	20 gallons per minute bilge pump rate
Tour Boat	NA	Bilge Water	14.3 gallons per day	5 gallons per day

COMMENT:
Many commenters noted that some vessels do not have discharge types discussed in the report, for example, towing vessels do not have fish hold waste.

RESPONSE:
EPA agrees with this statement and believes that this point is clear in the report when describing discharge types. Furthermore, in its model, EPA estimates certain discharge types to occur from only some vessels.

COMMENT:
Some commenters noted that too few vessels, or too few vessels of a certain vessel type were sampled. For example, one commenter stated that EPA should have sampled charter fishing vessels. Others stated that EPA should have sampled different types of vessels than those selected.

RESPONSE:
See above response to comment regarding the sufficiency of the number of vessels sampled. Charter fishing vessels are often manufactured or used primarily for pleasure, or leased, rented or chartered to a person for the pleasure of that person. Many are not inspected by the US Coast Guard. Charter fishing vessels which are not inspected are exempted form NPDES permitting requirements by the Clean Boating Act (P.L. 110-288). Other charter fishing vessels are inspected by the US Coast Guard. These inspected, non-recreational vessels are not exempted from NPDES by the Clean Boating Act and are study vessels. Charter fishing vessels were not one of the most common vessels seen by EPA in its sampling program and the opportunity to sample charter fishing vessels did not present itself during the course of EPA's sampling.

COMMENT:
Some commenters noted that the MISLE database is not a completely accurate database for estimating vessel numbers or vessel location.

RESPONSE:
EPA agrees that use of the database may result in shortcomings. For example, the database under- or overcounts certain categories of vessels due to gaps in documentation or reporting requirements, differences in how the categories are defined, or missing information. Additionally, while a vessel may list New Orleans as its hailing port, it may rarely, if ever, operate in waters in and around New Orleans. However, based on its research, EPA concluded that the MISLE database was the best source of information for estimating the numbers and locations of study vessels. Several commenters pointed EPA to other databases. EPA reviewed these sources of information, and qualified the data in Chapter 1 of the report where appropriate.

Specifically, commenters raised concerns regarding estimates provided for two particular categories of vessels – passenger vessels and tank and freight barges – for which they believed MISLE misrepresents the number of active vessels less than 79 feet in length. EPA reviewed the MISLE database records and used additional information to further qualify the estimates presented in the report. For example, EPA revised the report to (1) detail the various types of vessels included in each category where the category definition differed from the types of vessels mentioned by commenters; (2) emphasize and further clarify limitations and potential shortcomings of the analyses; and (3) where possible, present ranges rather than unique estimates for the number of in-scope vessels.

In general, while EPA agrees that information provided by the MISLE database is uncertain, subject to potential errors and omissions, or potentially outdated, the Agency believes that this source still provides the most complete data available on vessel characteristics, particularly for smaller undocumented vessels which are of key concern in this study. EPA consulted with U.S. Coast Guard personnel on the estimates presented in the report and compared numbers obtained from MISLE with those presented in other sources, when such sources are available. No other public database provides the same breadth of information, however, from which to develop estimates of the number or characteristics of study vessels.

COMMENT:
Several commenters recommended that EPA analyze data on a regional basis, particularly for discharges from commercial fishing vessels.

RESPONSE:
Based on public comments received on EPA's Draft version of this report, EPA conducted a regional analysis of vessel fish hold discharges. While the preliminary analysis does suggest potential regional differences, issues with small sample size and an unbalanced distribution of vessels across regions suggest that additional sampling would be required to make a definitive determination. This regional analysis, which also includes additional analyses to determine the degree to which regional differences were an artifact of differences in vessel type (fishing method), or discharge type (refrigerated water vs. ice vs. ice slurry) are now included as a new subsection within the fish hold discharge section in Chapter 3 of the report.

COMMENT:
Some commenters noted that EPA should distinguish between different types of fish hold effluent in the analytical results. For example, one commenter stated that the Agency needed to more clearly distinguish between the discharge of refrigerated seawater and sea ice or sea ice slurry. Other commenters noted that EPA needed to more clearly distinguish between fish hold discharge and fish hold cleaning discharge.

RESPONSE:
In response to the first comment (distinguishing results between types of discharge (refrigerated vs. sea ice or sea ice slurry), EPA conducted additional screening analyses. EPA conducted an analysis comparing potential differences between refrigerated seawater, sea ice, or sea ice slurry. Differences in the type of fish hold discharge were separately investigated both for all 26 vessels included in this study and for the 20 vessels from Alaska. In both instances, there were no statistically significant differences between fish hold discharges between vessels as a function of whether the discharge was refrigerated seawater, ice, or ice slurry. These analyses are discussed within the regional analysis section within the fish hold discharge section in Chapter 3 of the Report.

EPA disagrees with the second comment because the data presented in the report clearly indicate few, if any, distinguishable differences between results obtained for fish hold and fish hold cleaning discharge, and where those differences occur, EPA discusses them in text.

COMMENT:
One commenter noted that the report is not conducted on recreational vessels and that the report needs to be clearer to this effect. Other commenters noted that the potential cumulative environmental impacts from all study vessels should be compared to the potential cumulative environmental impacts from all recreational vessels.

RESPONSE:
EPA believes the report is clear that the vast majority of samples are from vessels which were not in recreational service. However, two vessels sampled were recreational vessels, while discharges from several others were fundamentally similar to those which may originate from recreational vessels (e.g., engine effluent from certain towing vessels).

For purposes of this study, EPA does not believe that the cumulative impact of study vessels should be compared to those of recreational vessels, as an analysis of this kind is beyond the original congressional charge and beyond the original scope of the study design.

COMMENT:
Some commenters noted that EPA should examine the impacts of invasive species from recreational vessels, or what would happen if EPA were to prohibit practices designed to reduce the transport of invasive species (e.g., anti-foulant hull coatings). A commenter

noted that EPA should add additional references to the impact of invasive species caused by boating, specifically in the absence of cuprous oxide anti-foulant hull coatings.

RESPONSE:
EPA and EPA scientists, among others have conducted numerous studies on the impacts of invasive species. EPA further discusses the impacts of invasive species in regulatory documents such as the fact sheet and other supporting documents for its recently issued Vessel General Permit. EPA agrees with the commenter that the risks of increasing the likelihood of invasive species being transported needs to be weighed against any regulatory limits placed on discharges. However, this report does not make recommendations regarding regulatory limits or best management practices.

COMMENT:
Two commenters noted that EPA needed to further research and clarify its statements regarding anti-foulant paints.

RESPONSE:
One commenter noted that the issue of invasive species was inadequately discussed in relationship to the regulation of anti-foulant coatings (AFCs). As discussed in the previous response, the focus of the study was not on invasive species. Additionally, based on comments regarding AFCs, EPA removed one sentence: "On the other hand, improvements to water quality, including improvements associated with AFC restrictions and BMPs may allow native ecosystems to recover from acute and chronic impacts and become more resistant to invasions of non-native species" attributed to Johnson and Gonzalez (2006), which appeared to be speculative.

Additional test data for copper AFC leaching rates were provided to EPA by the Antifouling Coatings Work Group (AFWG) of the American Coatings Association (ACA) during the public comment period. EPA added a footnote in Section 3.2.8 acknowledging receipt of additional test data for copper AFC leaching rates, and noted that this data substantially agrees with EPA's "best estimate" of copper AFC leaching rate used for water quality modeling.

One commenter noted that statements regarding the regulation of AFCs in other countries were misleading and/or incorrect. Upon review, EPA found that the regulation of AFCs in Europe and other countries are dynamic and evolving. Therefore, EPA elected to remove the text in question, which appeared to be outdated.

COMMENT:
One commenter noted that EPA needs to clarify in the executive summary that the National Recommended Water Quality Criteria (NRWQC) benchmarks used are conservative in nature.

RESPONSE:
EPA disagrees and feels the information provided in Chapter 3 on the NRWQC benchmarks is clear. This level of detail is not appropriate for discussion in a short executive summary.

COMMENT:
Some commenters stated that they believed the release or leaching of metals or other biocides from hull coatings did not constitute a discharge.

RESPONSE:
EPA disagrees, and would consider these releases as discharges from the vessel. EPA has consistently determined that the release of metals or leaching of metals or other biocides constitutes the addition of pollutants from a point source to waters of the United States, i.e., a discharge. (See EPA's 2008 Vessel General Permit or Uniform National Discharge Standards (UNDS) Phase I rule and CWA section 502). The CWA definition of "point source" includes "vessel or other floating craft."

COMMENT:
One commenter noted that EPA should clearly distinguish between commercial fishing vessels and charter fishing vessels. The commenter also noted that charter fishing vessels are more similar to recreational vessels than many of their commercial fishing counterparts.

RESPONSE:
The charter fishing vessels discussed by these commenters may fall under the definition of recreational vessel as defined in the Clean Boating Act of 2008. Charter fishing vessels are often manufactured or used primarily for pleasure, or leased, rented, or chartered to a person for the pleasure of that person. Many are not inspected by the US Coast Guard. Charter fishing vessels which are not inspected are exempted form NPDES permitting requirements by the Clean Boating Act (P.L. 110-288). Other charter fishing vessels are inspected by the US Coast Guard. These inspected, non-recreational vessels are not exempted from NPDES by the Clean Boating Act, and are study vessels,. EPA did not sample any charter fishing vessels as part of the sampling program.

In addition to sampling two recreational vessels, EPA studied several recreational vessels used for non-recreational purposes as part of the study (some tow/salvage boats and research vessels). Vessel discharges such as engine effluent are likely fundamentally similar to the engine effluent between the two vessel classes, provided they are similar engine types and maintained in a similar manner.

COMMENT:
Several commenters noted that they recommended Congress continue to extend the P.L. 110-299 moratorium or that Congress devise an alternate regulatory program. For example, several commenters noted that commercial fishing vessels less than 79 feet should be regulated similarly to those under the Clean Boating Act of 2008 (P.L. 110-288). Other commenters requested exemptions from NPDES permitting or any permit EPA may promulgate under the NPDES permitting program for smaller commercial fishing vessels.

RESPONSE:
On July 30, 2010, President Obama signed Senate Bill S. 3372 to extend an existing moratorium from July 31, 2010 to December 18, 2013. This moratorium exempts all incidental discharges except ballast water from commercial fishing vessels and non-recreational vessels less than 79 feet from having to obtain an NPDES permit.

EPA notes that this is not the proper forum for requesting that the Agency grant exemptions to certain classes of vessels from the NPDES program. Please see discussion in the 2008 VGP Fact Sheet for additional information about why EPA now regulates certain vessel discharges and for additional information on Congressional legislation that did grant permanent exemptions to certain types of vessels.

COMMENT:
One commenter requested an extension of time to review the report and provide further comments.

RESPONSE:
Due to the short time granted to EPA to conduct the study, EPA believes it would be inappropriate to grant any extensions to review the report as the Agency wants the final report to be available for congressional decision makers and others as soon as possible.

Appendix I
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