CATALOG DOCUMENTATION
EMAP-ESTUARIES PROGRAM LEVEL DATABASE
1991 VIRGINIAN PROVINCE
FISH TISSUE CHEMISTRY DATA

TABLE OF CONTENTS

1. DATA SET IDENTIFICATION

1.1 Title of Catalog document

EMAP-Estuaries Program Level Database
1991 Virginian Province
Fish Tissue Chemistry Data

1.2 Authors of the Catalog entry

Charles Strobel, US EPA NHEERL-AED
Melissa Hughes, OAO Corp.

1.3 Catalog revision date

15 March 1996

1.4 Data set name

TISUCHEM

1.5 Task Group

Estuaries

1.6 Data set identification code

00035

1.7 Version

001

1.8 Requested Acknowledgment

These data were produced as part of the U.S. EPA's Environmental Monitoring and Assessment Program (EMAP). If you plan to publish these data in any way, EPA requires a standard statement for work it has supported:

"Although the data described in this article has been funded wholly or in part by the U. S. Environmental Protection Agency through its EMAP-Estuaries Program, it has not been subjected to Agency review, and therefore does not necessarily reflect the views of the Agency and no official endorsement should be inferred."

2. INVESTIGATOR INFORMATION

2.1 Principal Investigator

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2.2 Investigation Participant-Sample Collection

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2.3 Principal Investigator-Sample Processing

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3. DATA SET ABSTRACT

3.1 Abstract of the Data Set

The Tissue Chemistry data set presents the concentrations of a suite of inorganic and organic analytes from tissue samples extracted from one or more target species collected at a station. These species were selected because of their ecological and/or environmental importance. Inorganic and organic concentrations are reported by compound. Organic concentrations are also presented as major group (PCB, DDT and pesticides) totals summed from the individual congeners measured (See Data Manipulations). The concentration for each analyte is reported in mass units (wet weight).

Quality Assurance/Quality Control issues are coded. If the QA code indicates that an analyte could not be measured, the detection limit may be reported. A composite flag indicates if the sample was from an individual sample or from an homogenate of several individuals of the same species.

3.2 Keywords for the Data Set

Contaminants, DDT, fish species, fish tissue, inorganic analytes, organic analytes, PAH, PCB, Pesticides, QA Code, target species, tissue chemistry, tissue contaminants, metals

4. OBJECTIVES AND INTRODUCTION

4.1 Project Objective

The Environmental Monitoring and Assessment Program (EMAP) was designed to provide a quantitative assessment of the National extent of environmental problems by measuring status and change in selected indicators of ecological condition. EMAP provides a strategy to identify and bound the extent, magnitude, and location of environmental degradation and improvement on a regional scale.

4.2 Data Set Objective

The specific objective of this investigation was to collect information on the levels of contaminants in fish collected in the estuaries of the Virginian Province.

4.3 Data Set Background Information

Human health concerns about the levels of contaminants in fish have increased over the past decade. To address these concerns on a regional scale, EMAP-VP collected fish in 1991 for chemical analyses. Edible tissue from selected species were analyzed for PCBs, selected pesticides and metals to determine if a significant health risk existed. Because of the poor distribution of individual species across the Province, the low levels of contaminants measured, and the expense of the analyses, this indicator was measured only in 1991.

4.4 Summary of Data Set Parameters

Muscle tissue from an individual or several fish caught in trawls performed at EMAP VP sampling stations were analyzed for PCBs, selected pesticides and metals.

5. DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition

5.1.1 Sampling Objective

To collect fish samples suitable for chemical residue analyses of edible tissue. Fish were collected from one or more fish trawls performed at selected EMAP sampling stations.

5.1.2 Sample Collection Methods Summary

Standard fish trawls were performed to collect fish for species composition and relative abundance, tissue chemistry and for pathological examination. Tow duration was ten minutes with a towing speed of 2-3 knots against the prevailing current. Speed over the bottom was 1-3 knots.

All fish in the net were sorted by species and enumerated. All species considered to be rare, threatened or endangered were processed immediately and released alive. Up to thirty individuals of a species were measured (fork length) to the nearest millimeter. Crews were instructed to select the first five individuals of a specific size parameter collected of specific target species for chemical analysis (Table 1). If fewer than five individuals were collected in the standard trawl, additional trawls were performed to collect more fish solely for chemistry. Trawling was repeated for up to two hours until five individuals were collected of each target species present in the trawls.

Fish for chemical analyses were measured, tagged, individually wrapped in aluminum foil and placed, by species, in a zip-lock bag. Samples were then placed immediately on dry ice. For larger fish, the tail was first cut off prior to wrapping the fish in aluminum foil. Care was taken not to penetrate the skin in the mid-section of the fish where the actual sample would be removed from.

Table 1. Target fish species and size ranges for chemical analyses.

Common Name	Scientific Name	Primary Size Range (mm)	Secondary Size Range (mm)
Atlantic Croaker	Micropogonias undulatus	200-300	100-200
Bluefish	Pomatomus saltatrix	175-225	125-175
Channel Catfish	Ictalurus punctatus	200-300	300-400
Scup	Stenotomus chrysops	150-200	100-150
Spot	Leiostomus xanthurus	150-250	70-150
Summer Flounder	Paralichthys dentatus	350-450	65-350
Weakfish	Cynoscion regalis	300-400	45-300
White Catfish	Ameiurus catus	200-300	300-400
White Perch	Morone americana	150-250	70-150
Winter Flounder	Pleuronectes americanus	300-400	55-300

5.1.3 Beginning sampling Date

22 July 1991

5.1.4 Ending Sampling Date

13 September 1991

5.1.5 Platform

Samples were collected from 8-m (24 ft), twin-engine, Chesapeake style work boats.

5.1.6 Sampling Equipment

Fish were collected using a funnel-shaped high rise sampling trawl with a 16-meter footrope with a chain sweep. The trawl net had 5 cm mesh wings and a 2.5 cm cod end.

5.1.7 Manufacturer of Sampling Equipment

Unknown

5.1.8 Key Variables

This data set does not contain values which were measured at the time of sample collection.

5.1.9 Sampling Method Calibration

The sampling gear did not require calibration. It only needed to be inspected to ensure that the net had not been damaged during previous fish trawls.

5.1.10 Sample Collection Quality Control

The first individual collected from each species was shipped to NHEERL-AED for taxonomic verification by an expert. Collection and processing procedures were observed by senior EMAP personnel during field audits to ensure proper procedures were being followed and fish were not exposed to sources of contamination.

5.1.11 Sample Collection Method Reference

Strobel, C.J. and S.C. Schimmel. 1991. Environmental Monitoring and Assessment Program-Near Coastal Component: 1991 Virginian Province Effort Field Operations and Safety Manual. U.S. EPA NHEERL-AED, Narragansett, RI. June 1991.

5.1.12 Sample Collection Method Deviations

The trawls conducted for collection of target species for tissue samples were additional trawls and the data were not included in abundance data.

5.2 Data Preparation and Sample Processing

5.2.1. Sample Processing Objective

To measure the levels of selected contaminants in uncontaminated fish tissue samples collected at EMAP stations.

5.2.2 Sample Processing Methods Summary

Based on the funds available and the distribution of species collected, EMAP-VP provided the analytical laboratory with a list of fish to be composited and analyzed. A total of 84 composites were analyzed as described below. In addition, 40 individual fish were analyzed.

In the laboratory fish were washed in distilled water and the scales removed from those species with scales. Skin was removed ONLY for scaleless species (i.e., catfishes).

Fish were filleted using either a glass or titanium knife. A fillet includes the skin (except for catfish) and edible muscle tissue from the head to tail beginning at the mid-dorsal line and continuing down to the belly flap from the left side of each fish. Bones were carefully removed.

Except for fish without scales, skin-on fillets were analyzed for contaminants because EMAP-E believes that this is how most people prepare and consume fish.

Fish were then composited to create the sample analyzed for the contaminants listed in Table 2. A composite consisted of tissue from three to five individuals of a single species collected at a station. All individuals in a composite were of a similar size, with the smallest individual being no less than 75% the length of the largest.

Fillet composites were homogenized via high-speed blender or homogenizer until no chunks remained. Homogenizer blades were constructed of titanium.

Samples for metals analyses were hot nitric acid-extracted, and analyzed via ICP, graphite furnace atomic absorption spectrometry, or cold vapor atomic absorption spectrometry (Hg).

Samples for PCB and pesticide analyses were soxhlet-extracted using methylene chloride and analyzed via GC-MS or GC-ECD.
All results are reported on a wet weight basis.

Table 2. List of analytes.

METALS (ug/g wet weight)	PCB CONGENERS (ng/g wet weight)
Ag	PCB8
Al	PCB18
As	PCB28
Cd	PCB44
Cr	PCB52
Cu	PCB66
Fe	PCB101
Hg	PCB105
Mn	PCB110/77
Ni	PCB118
Pb	PCB126
Se	PCB128
Sn	PCB138
Zn	PCB153
	PCB170
	PCB180
	PCB187
	PCB195
	PCB206
	PCB209

Table 2. List of analytes, continued

CHLORINATED PESTICIDES (ng/g wet weight)

Aldrin
Alpha-Chlordane
Trans-Nonachlor
Dieldrin
Endrin
Heptachlor
Heptachlor epoxide
Lindane (gamma-BHC)
Mirex
2,4'-DDE
4,4'-DDE
2,4'-DDD
4,4'-DDD
2,4'-DDT
4,4'-DDT

5.2.3 Sample Processing Method Calibration

NA

5.2.4 Sample Processing Quality Control

To prevent contamination, fish were washed in distilled water and filleted using either a glass or titanium knife. Homogenizer blades were constructed of titanium.

5.2.5 Sample Processing Method Reference

Not available.

5.2.6 Sample Processing Method Deviations

NA

6. DATA MANIPULATIONS

Summary values were calculated for groups of total organic concentrations. The values under a summed analyte are the sum of the values of a specific set of compounds.

6.1 Name of new or modified values

TOT_PCB, TOT_DDT, TOT_PEST

6.2 Data Manipulation Description

Total concentrations were summed for specific suites of compounds or congeners. These include totals for the following groups: PCBs (TOT_PCB), DDTs (TOT_DDT) and pesticides (TOT_PEST). The summed concentrations exclude analytes having a QA_CODE of SC-A. This code indicates that the analyte was not detected in a particular sample. Set groups of compounds were summed to have consistency across Provinces.

6.3 Data Manipulation Examples

TOT_DDT = Sum of concentrations of OPDDE, OPDDD, OPDDT, PPDDE, PPDDD and PPDDT for a station

TOT_PCB = Sum concentrations of congeners for a station: 8, 18, 28, 52, 44, 66, 101, 118, 153, 105, 138, 187, 128, 180, 170, 195, 206 and 209

TOT_PEST = Sum concentrations of the following pesticides for a station: Dieldrin, Lindane, Aldrin, Mirex, Heptachlor, Heptachlor epoxide, Alpha-chlordane, Hexachlorobenzene and Trans-Nonachlor

7. DATA DESCRIPTION

7.1 Description of Parameters

#	Parameter SAS Name	Data Type	Length	Format	Parameter Label
1	STA_NAME	Char	8	8.	The Station Identifier
2	VST_DATE	Num	8	YYMMDD6.	The Date the Sample was Collected
3	SAMPTYPE	Char	10	$10.	Organismal Derivation of Sample Material
4	SPECCODE	Char	9	$8.	EMAP Taxon Code
5	COMPOSIT	Char	3	$3.	Composite Code (Y/N)
6	NUM_CMPT	Num	8	3.	Count (#) of Organisms in Composite
7	ANALYTE	Char	8	8.	Analyte Code
8	CONC	Num	8	13.6	Concentration of Analyte (wet wt.)
9	CHMUNITS	Char	12	12.	Conc. Units (ug/g or ng/g)
10	QA_CODE	Char	15	15.	Quality Assurance Code for Data
11	DETLIMIT	Num	8	13.6	Method Detection Limit for Analyte
12	TOT_ANAL	Num	8	3.	Analytes (#) Included in Summed Conc.
13	ANAL_CAT	Char	15	15.	General Category for Group of Analytes

7.1.6 Precision to which values are reported

All concentrations are rounded to three significant figures.

7.1.7 Minimum Value in data set

ANALYTE	Minimum Value
AG	0.00231
AL	2.66000
ALDRIN	0.01890
AS	0.03530
CD	0.00121
CISCHL	0.01730
CR	0.01180
CU	0.14500
DDT_TOT	0.32600
DIELDRIN	0.03620
FE	1.49000
HEPTACHL	0.01920
HEPTAEPO	0.01910
HEXACHL	0.01700
HG	0.00286
LINDANE	0.01700
MIREX	0.01950

7.1.7 Minimum Value in data set, continued

ANALYTE	Minimum Value
NI	0.01930
OPDDD	0.01730
OPDDE	0.01730
OPDDT	0.01950
PB	0.00859
PCB101	0.01810
PCB105	0.03970
PCB118	0.01810
PCB128	0.01810
PCB138	0.27100
PCB153	0.14500
PCB170	0.01810
PCB18	0.05440
PCB180	0.03620
PCB187	0.03620
PCB195	0.01810
PCB206	0.01810
PCB209	0.01730
PCB28	0.01910
PCB44	0.04090
PCB52	0.03970
PCB66	0.01920
PCB8	0.28700
PCB_TOT	0.68800
PEST_TOT	0.07240
PPDDD	0.01860
PPDDE	0.32600
PPDDT	0.01860
SE	0.09190
SN	0.12000
TNONCHL	0.03620
ZN	1.93000

7.1.8 Maximum Value in data set

ANALYTE	Maximum Value
AG	0.03
AL	15.60
ALDRIN	0.68
AS	5.52
CD	0.08
CISCHL	63.90
CR	1.95
CU	3.11
DDT_TOT	1490.00
DIELDRIN	52.80
FE	20.30
HEPTACHL	0.23
HEPTAEPO	5.76
HEXACHL	2.01
HG	0.26
LINDANE	1.53
MIREX	1.20
NI	0.86

7.1.8 Maximum Value in data set, continued

ANALYTE	Maximum Value
OPDDD	118.00
OPDDE	100.00
OPDDT	10.90
PB	0.07
PCB101	133.00
PCB105	27.30
PCB118	80.40
PCB128	24.20
PCB138	216.00
PCB153	412.00
PCB170	70.20
PCB18	66.00
PCB180	181.00
PCB187	107.00
PCB195	46.00
PCB206	80.10
PCB209	82.30
PCB28	64.60
PCB44	79.00
PCB52	175.00
PCB66	48.60
PCB8	85.60
PCB_TOT	1180.00
PEST_TOT	156.00
PPDDD	532.00
PPDDE	707.00
PPDDT	25.80
SE	1.55
SN	0.12
TNONCHL	60.30
ZN	37.70

7.2 Data Record Example

7.2.1 Column Names for Example Records

```
STA_NAME VST_DATE SAMPTYPE SPECCODE COMPOSIT NUM_CMPT ANALYTE    CONC
CHMUNITS DETLIMIT QA_CODE TOT_ANAL  ANAL_CAT
```

7.2.2 Example Data Records

```
VA91-261 910803   FISH     PARADENT      Y       5       AG          .
ug/g   0.002830  CH-A      .       METAL

VA91-261 910803   FISH     PARADENT      Y       5       AL          .
ug/g   2.130000  CH-A      .       METAL

VA91-261 910803   FISH     PARADENT      Y       5       ALDRIN      .
ng/g   0.089400  CH-A      .       PESTICIDE

VA91-261 910803   FISH     PARADENT      Y       5       AS        0.662000
ug/g   .                  .       METAL
```

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude

-77 Degrees 19 Minutes 30.00 Decimal Seconds

8.2 Maximum Longitude

-70 Degrees 01 Minutes 00.00 Decimal Seconds

8.3 Minimum Latitude

36 Degrees 56 Minutes 24.60 Decimal Seconds

8.4 Maximum Latitude

42 Degrees 08 Minutes 00.00 Decimal Seconds

8.5 Name of area or region

Virginian Province

Stations were located in estuaries along the East Coast of the United States from Cape Cod, Massachusetts, to Cape Henry, Virginia, at the mouth of the Chesapeake Bay. The area includes the District of Columbia and the states of Virginia, Maryland, Delaware, Pennsylvania, New Jersey, New York, Connecticut, Rhode Island and Massachusetts.

9.0 QUALITY CONTROL AND QUALITY ASSURANCE

9.1 Measurement Quality Objectives

Measurement Quality Objectives (MQOs) for the 1991 Virginian Province fish chemistry analyses were defined in the 1991 Virginian Province Quality Assurance Project Plan (Valente and Schoenherr, 1991). This plan required each laboratory to analyze the following quality control (QC) samples along with every batch or "set" of samples: laboratory reagent blank, calibration check standards, matrix spike/matrix spike duplicate, and Laboratory Control Material (LCM). Results for these QC samples had to fall within certain pre-established control limits for the analysis of a batch of samples to be considered acceptable.

9.2 Quality Assurance/Control Methods

9.2.1 Inorganic Analyses

For the 1991 Virginian Province analysis of major and trace elements, the laboratory generally met the pre-established acceptability criteria (control limits) for the QC samples (e.g., calibration check samples, laboratory reagent blanks, matrix spikes, and Laboratory Control Materials). The control limits for inorganic analytes is ± 20% of the CRM certified value. These criteria were generally met (Table 3). The average percent recovery for Pb (DOLT) was slightly high; however, the value for the DORM CRM was within the acceptable range and the confidence intervals around the DOLT certified value were rather large.

A problem was noted by the laboratory in analysis of selected samples for mercury. The laboratory analyzed 84 composite samples and 40 individual fish. The analytical laboratory experienced a mercury-contamination

problem with their freeze-drier, resulting in contamination of all 40 individual-fish samples. As a result, these data had to be deleted from the database. However, EMAP-VP's assessment has focused on the composite samples, and none of these were contaminated.

With the removal of the above-mentioned Hg data from the database, the only flags applied are the "A" and "B" codes.

9.2.2 Organic Analyses

Due to a miscommunication within the analytical laboratory, EMAP QA protocols were not followed during the analysis of EMAP-VP 1991 fish tissue samples for organic analytes. However, sufficient data are available for the analysis of the quality of those samples. First, prior to beginning the processing of EMAP samples, the laboratory participated in a performance evaluation. Based on 11 separate analyses of SRM 1974 (Organics in Mussel Tissue), it was determined that the laboratory was sufficiently proficient to begin analyzing EMAP samples. The results of this performance evaluation are listed in Table 4. Second, matrix spiked samples were analyzed with each batch, and these results fall well within EMAP's control limits (Table 5). Third, during the same time period when the laboratory was processing EMAP samples, they were also processing samples for NOAA's NS&T Program. SRM 1974 was used as the laboratory control material for those samples, and was analyzed with each analytical batch. The laboratory has provided EMAP with those results, which fall within EMAP control limits. Fourth, the QA protocols the lab followed for EMAP samples require the analysis of duplicate samples with each batch. Those results were provided to EMAP and showed excellent precision, with a maximum Relative Percent Difference for an analyte in a given set generally being less than 10%.

The only flags applied are the "A" and "B" codes.

Table 3. Summary results for CRMs DOLT and DORM (Dogfish liver and muscle tissue, respectively) used as a set control for the 1991 Virginian Province fish tissue inorganic analyses.

Element		Average1	Stdv2	C.V.3	Min.4	Max.5
As	DOLT	101.2	2.5	2.5	98.0	104.0
	DORM	99.3	2.5	2.5	94.9	101.7
Cd	DOLT	83.3	8.2	9.8	69.6	90.9
	DORM	93.0	10.4	11.2	81.4	104.7
Cr	DOLT	118.8	15.2	12.8	102.5	137.5
	DORM	106.3	8.8	8.3	97.5	117.5
Cu	DOLT	91.4	9.1	10.0	81.7	107.2
	DORM	79.4	5.3	6.7	75.7	88.9
Fe	DOLT	98.9	1.8	1.8	96.2	101.3
	DORM	105.7	11.9	11.2	95.4	125.0
Hg	DOLT	NA	NA	NA	NA	NA
	DORM	91.9	4.9	5.3	86.5	100.3
Ni	DOLT	103.8	52.9	50.9	50.0	188.5
	DORM	89.0	13.5	15.2	76.7	111.7
Pb	DOLT	130.4	25.7	19.7	92.7	164.7
	DORM	89.5	35.3	39.5	55.0	142.5
Se	DOLT	102.1	2.9	2.8	99.7	107.4

	DORM	102.8	4.6	4.4	96.9	108.0
Zn	DOLT	101.7	2.7	2.7	98.0	105.7
	DORM	100.7	3.9	3.8	96.2	106.6

1 Average percent recovery relative to the CRM certified value.
2 Standard deviation of the percent recovery values.
3 Coefficient of variation of the percent recovery values.
4 Minimum percent recovery for analysis sets
5 Maximum percent recovery for analysis sets

Table 4. Performance evaluation results for analysis of organic contaminants in tissue. Average reported values are based on 11 separate analyses of SRM 1974 (Organics in Mussel Tissue) performed on different days.

Analyte	Average reported value	NIST non-certified value1	Percent difference
alpha-chlordane	21.2	25	-15%
trans-nonachlor	17.7	17.7	0%
Dieldrin	11.3	11.3	0%
2,4'-DDE	M2	5.8	NA
4,4'-DDE	41.4	46	-10%
2,4'-DDD	5.8	13	-55%
4,4'-DDD	46.5	65	-28%
2,4'-DDT	5.0	5.0	0%
4,4'-DDT	3.6	3.6	0%
PCB 18	20.9	20.9	0%
PCB 28	85.2	65	31%
PCB 44	72.4	72.4	0%
PCB 52	113.7	113.7	0%
PCB 66	98.7	105	-6%
PCB 101	127.0	116	9%
PCB 105	46.9	48	-2%
PCB 118	115.9	115	1%
PCB 128	17.3	17	2%
PCB 138	122.2	121	1%
PCB 153	153.9	153	1%
PCB 180	13.3	13.3	0%
PCB 187	27.2	29	-6.2%

1 NIST non-certified values are adjusted based on the 95% confidence intervals presented in the certificate of analysis for SRM 1974. Reported values falling within these confidence intervals are listed as having a percent difference of 0%.

2 Matrix interference, no peak was found for 2,4'-DDE

Table 5. Results of laboratory-fortified matrix spikes analyzed with each batch of fish tissue organic samples analyzed (n=10). Values are percent recovery of the spike.

Analyte	Average1	Stdv2	C.V.3	Min.4	Max.5
aldrin	95.2	10.9	11.5	83	114
alpha-chlordane	100.2	10.9	10.9	82	112
trans-nonachlor	99.3	12.1	12.2	80	117
Dieldrin	95.2	14.0	14.6	71	118
2,4'-DDE	94.4	9.6	10.2	84	112
4,4'-DDE	99.1	10.5	10.6	86	118
2,4'-DDD	101.6	9.3	9.2	87	112
4,4'-DDD	98.7	12.7	12.9	76	118
2,4'-DDT	101.9	12.5	12.3	79	120
4,4'-DDT	100.5	15.2	15.1	74	118
Total PCBs	99.8	7.7	7.7	87	114

1 Average percent recovery relative to the concentration of the spike.
2 Standard deviation of the percent recovery values.
3 Coefficient of variation of the percent recovery values.
4 Minimum percent recovery for analysis sets
5 Maximum percent recovery for analysis sets

9.3 Actual Measurement Quality

The laboratory generally met the pre-established acceptability criteria (control limits) for the QC samples (e.g., calibration check samples, laboratory reagent blanks, matrix spikes and LCMs). The control limits for inorganic analytes is +20% of the CRM certified value. These criteria were generally met. The average percent recovery for Pb (DOLT) was slightly high; however, the value for the DORM CRM was within the acceptable range and the confidence intervals around the DOLT certified value were rather large.

A problem was noted by the laboratory in analysis of selected samples for mercury. The laboratory analyzed 84 composite samples and 40 individual fish. The analytical laboratory experienced a mercury-contamination problem with their freeze-drier, resulting in contamination of all 40 individual-fish samples. As a result, these data had to be deleted from the database. However, EMAP-VP's assessment was focused on the composite samples, and none of these were contaminated.

With the removal of the above-mentioned Hg data from the database, the only flags applied are listed below:

9.2.3 Data Qualifier Codes

Two data qualifier codes or "flags" are used in the 1991 Virginian Province fish chemistry dataset:

SC-A CODE

The "SC-A" code indicates that an analyte was not detected. When the "SC-A" code is used, the concentration field is left blank and the detection limit for the analyte in that particular sample is reported under the variable "MDL" (method detection limit).

SC-B CODE

It is sometimes possible for a laboratory to detect an analyte and report its concentration at a level which is below the calculated method detection limit for the sample. In these situations, the analyst is confident that the analyte was present in the sample, but there is a high degree of uncertainty in the reported concentration. The "SC-B" code is used to flag reported values which are below the calculated method detection limit for the sample. Such values are considered estimates only and should be used with discretion.

9.4 Sources of Error

None

10. DATA ACCESS

10.1 Data Access Procedures

Data can be downloaded from the WWW server.

10.2 Data Access Restrictions

10.3 Data Access Contact Persons

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10.4 Data Set Format

Data can be downloaded in several formats from the web application and web site.

10.5 Information Concerning Anonymous FTP

Not accessible

10.6 Information Concerning WWW

Data can be downloaded from the WWW server.

10.7 EMAP CD-ROM Containing the Data Set

Data not available on CD-ROM.

11. REFERENCES

Holland, A.F., ed. 1990. Near Coastal Program Plan for 1990: Estuaries. EPA 600/4-90/033. U.S. EPA, NHEERL-AED, Office of Research and Development, Narragansett, RI. November 1990.

Strobel, C.J. and S.C. Schimmel. 1991. Environmental Monitoring and Assessment Program-Near Coastal Component: 1991 Virginian Province Effort Field Operations and Safety Manual. U.S. EPA, NHEERL-AED, Narragansett, RI. June 1991.

Valente, R. and J. Schoenherr. 1991. Environmental Monitoring and Assessment Program-Near Coastal Virginian Province: Quality Assurance Project Plan. U.S. EPA NHEERL-AED, Narragansett, RI. July 1991.

12. TABLE OF ACRONYMS

13. PERSONNEL INFORMATION

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