

US EPA ARCHIVE DOCUMENT

CATALOG DOCUMENTATION  
NATIONAL COASTAL ASSESSMENT DATABASE  
NORTHEAST REGION 2000-2006  
SEDIMENT ANALYTE CONCENTRATION DATA

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1. DATASET IDENTIFICATION
    - 1.1 Title of Catalog document  
National Coastal Assessment Database  
Northeast Region 2000-2006  
Sediment Analyte Concentration Data
    - 1.2 Authors of the Catalog entry  
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Harry Buffum, Raytheon
    - 1.3 Catalog revision date  
June 2010
    - 1.4 Dataset name  
Sediment Analyte Concentrations
    - 1.5 Task Group  
National Coastal Assessment-Northeast
    - 1.6 Dataset identification code  
005
    - 1.7 Version  
001
    - 1.8 Requested Acknowledgment  
EMAP requests that all individuals who download EMAP data acknowledge the source of these data in any reports, papers, or presentations. If you publish these data, please include a statement similar to: "Some or all of the data described in this article were produced by the U. S. Environmental Protection Agency through its Environmental Monitoring and Assessment Program (EMAP)".
  2. INVESTIGATOR INFORMATION
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## 2.2 Sample Collection Investigators

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## 3. DATASET ABSTRACT

### 3.1 Abstract of the Dataset

The Sediment Chemistry data report the concentrations of chemical contaminants in sediment samples collected in Northeast estuaries sampled during the summer of 2000-06. Sediment concentrations are reported for 77 chemical constituents, including metals, polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and pesticides. One record is presented per analyte. For concentration values smaller than the MDL (non-detects), the result is reported as zero, the method detection limit (MDL) is listed, and the record is flagged; thereby giving the data user options for alternative treatment of non-detects (see Section 4.3). Note that in 2000-01 consistent methods were not followed by all analytical laboratories in two respects: (1) in the digestion method used to analyze metals, and (2) in the MDL values used for most chemical analyses (see Section 5.2.6). A list of the analyte codes and their full chemical names is available under View Analyte Information.

### 3.2 Keywords for the Dataset

Sediment contaminants, metals, polynuclear aromatic hydrocarbons, PAH, polychlorinated biphenyls, PCB, pesticides, DDT.

## 4. OBJECTIVES AND INTRODUCTION

### 4.1 Program Objective

The National Coastal Assessment (NCA) is a national monitoring and assessment program with the primary goal of providing a consistent evaluation of the estuarine condition in U.S. estuaries. It is an initiative of the Environmental Monitoring and Assessment Program (EMAP), and is a partnership of several federal and state environmental agencies, including: EPA's Regions, Office of Research and Development, and Office of Water; state environmental protection agencies in the 24 marine coastal states and Puerto Rico; and the United States Geological Survey (USGS) and the National Oceanic and Atmospheric Agency (NOAA). The NCA program was initiated in 2000 and completed in 2006.

Stations were randomly selected using EMAP's probabilistic sampling framework and were sampled once during a summer index period (June to October). A consistent suite of indicators was used to measure conditions in the water, sediment, and in benthic and fish communities. The measured data may be used by the states to meet their reporting requirements under the Clean Water Act, Section 305(b). The data were also used to generate a series of national reports characterizing the condition of the Nation's estuaries <http://www.epa.gov/nccr/>.

#### 4.2 Dataset Objective

The objective of the sediment chemistry data file is to report the concentrations of chemical contaminants in estuarine sediment samples collected in the northeast NCA program in 2000-06.

#### 4.3 Dataset Background Discussion

The suite of analytes measured are very similar to the contaminants measured by EPA's Environmental Monitoring and Assessment Program (EMAP) and NOAA's National Status and Trends program. Four classes of analytes are measured: polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), organo-chlorine pesticides, and metals. Twenty-two PAHs are measured, consisting of the 16 priority pollutants defined by the Superfund program and several alkylated derivatives that prove to be useful in identifying sources of these compounds. The concentrations of 20 PCBs and 20 pesticides, all Superfund priority pollutants, are also measured. The NCA protocol calls for measuring total metal concentrations, which includes an aggressive HF/HNO<sub>3</sub> digestion prior to analysis. As is discussed below, some samples received a less aggressive HNO<sub>3</sub> digestion. Sediment grain-size and Total Organic Carbon (TOC) measurements made on the same sediments are reported in the Sediment grain composition file.

Routinely, the concentration values from clean sites were reported as smaller than the method detection limit (MDL). In this file, these 'non-detects' are reported as zero and the QACODE is set to "CH-EE" to indicate the assignment. While the concentration of the analyte is clearly small, it is not strictly zero. The MDL is therefore listed as a guideline to users who wish to substitute values other than zero, i.e., setting the non-detect value to the MDL value, half the MDL value, etc. Furthermore, results of organic analytes may routinely show non-zero values that are less than the MDL. This apparent inconsistency is possible because, by convention, the MDLs for organic analyses are calculated to indicate the threshold of reliable measurements, rather than the stricter limit of instrumental detection. In these cases, the best estimate of the concentration is reported (i.e., the value reported by the analytical laboratory), the QACODE is set to "CH-BB", and the MDL is listed. The user can be confident that the analyte is present, but there is a high degree of uncertainty in the reported concentration. Note that the value of the MDL depends on the dilution history of the sample; therefore, its magnitude can differ widely among samples. Most results in this file are larger than the MDL and are reported directly without MDL values or QACODEs. Finally, records flagged with "CH-CC" indicate that the concentration value is uncertain because an interference was noted in the blank analysis performed with the sample; caution is advised in interpreting these results. To summarize:

QA Code	Interpretation	Conc. reported	MDL reported
<none>	result is detectable and > MDL	as measured	<none>
CH-EE	result is </= MDL and undetectable	zero	MDL is listed
CH-BB	result is </= MDL but detectable	best estimate	MDL is listed
CH-CC	result may be affected by interference	best estimate	<none>

Three analytical labs were involved in analyzing sediment analytes in 2000 and 2001: two state labs for sediment samples collected by co-operative teams in Connecticut and New York and a national contract lab for samples collected in other northeastern states. In two respects, there are noticeable differences in results attributable to different methods used by the three labs. (1) There is a distinction in the number of "non-detects" (concentrations less than the method detection limit or MDL) evident among

labs, probably arising from different MDL values used by the labs during analysis. (2) The labs used different procedures to digest sediment samples prior to metal analysis, affecting results for several metals. Refer to Section 5.2.6 for discussion of the nature and implications of the discrepancies.

A suffix indicates whether the station location was the original site, first alternate, or second alternate by -A, -B, or -C, respectively. The user may wish to adjust the magnitude of the weighting factor (station areas) based on this value, for example, by multiplying the weighting factor by 0.5 or 0.33 if sampling crews had to sample at the first or second alternate location, respectively. Such an adjustment reflects the fact that the station did not represent the entire area originally assigned to the station.

Massachusetts did not participate in the NCA program in 2003. Rhode Island conducted fish trawls only in 2003, and collected physical water parameters in conjunction with the trawls. Connecticut collected all parameters in 2002, but at an abbreviated group of in-shore stations and sampled stations in Long Island Sound in 2003.

#### 4.4 Summary of Dataset Parameters

The Sediment Chemistry Data report concentrations of 77 analytes measured in estuarine sediment samples collected in 2000-06 from northeastern U.S.

#### 5.0 DATA ACQUISITION AND PROCESSING METHODS

##### 5.1 Data Acquisition / Field Sampling

The sample collection methods used by USEPA trained field crews will be described here. Any significant variations by NCA partners are noted in Section 5.1.12.

##### 5.1.1 Sampling Objective

Sediment sub-samples were collected for the analysis of metallic and organic chemical constituents. Separate sub-samples from the same grab were used for sediment grain-size analyses and toxicity testing. Additional sediment grabs were taken for benthic macrofaunal analysis.

##### 5.1.2 Sample Collection: Methods Summary

Sediment was collected with a 0.04-m<sup>2</sup> Young-modified Van-Veen grab or similar sampler. Only the top two centimeters of a grab were retained for physical, chemical, and toxicological analyses. A sufficient number of grabs were processed to provide three liters of the 2-cm composite material. The composite was homogenized and separated into two fractions for storage until analysis. One fraction was frozen and used in the measurement of total organic carbon (TOC) and concentrations of chemical contaminants. The second fraction was chilled but not frozen during storage, and was used for grain-size and toxicity analyses. Separate sediment grabs were taken for benthic macrofaunal analysis.

##### 5.1.3 Beginning Sampling Dates

7 July 2000  
25 June 2001  
2 May 2002  
1 May 2003  
16 April 2004  
20 June 2005  
1 June 2006

#### 5.1.4 Ending Sampling Dates

20 October 2000  
31 October 2001  
31 October 2002  
7 November 2003  
4 November 2004  
22 November 2005  
24 November 2006

#### 5.1.5 Sampling Platform

Samples were collected from gasoline or diesel powered boats, 18 to 133 feet in length.

#### 5.1.6 Sampling Equipment

A 1/25 m<sup>2</sup>, stainless steel (coated with Kynar), Young-modified Van Veen grab sampler was used to collect sediments.

#### 5.1.7 Manufacturer of Sampling Equipment

Young's Welding, Sandwich, MA

#### 5.1.8 Key Variables

Not applicable

#### 5.1.9 Sample Collection: Methods Calibration

The sampling gear does not require calibration, although it was inspected regularly for damage by mishandling or impact on rocky substrates.

#### 5.1.10 Sample Collection: Quality Control

Care was taken to minimize disturbance to the sediment grabs. Grabs that were incomplete, slumped, less than 7 cm in depth, or comprised chiefly of shelly substrates were discarded. The chance of sampling the same location was minimized by repositioning the boat five meters downstream after three sampling attempts.

#### 5.1.11 Sample Collection: References

Strobel, C.J. 2000. Environmental Monitoring and Assessment Program: Coastal 2000 - Northeast component: field operations manual. Narragansett (RI): U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Atlantic Ecology Division. Report nr EPA/620/R-00/002. 68 p.

#### 5.1.12 Sample Collection: Alternate Methods

Different grab samplers used by NCA partners include the Smith-MacIntyre and Ponar grab samplers.

### 5.2 Data Preparation and Sample Processing

#### 5.2.1 Sample Processing Objective

Sediment samples were analyzed for total metals, PAHs, PCBs and pesticides.

#### 5.2.2 Sample Processing: Methods Summary

All analyses were performed on samples that were stored frozen. Sediments analyzed for total metals were dried and completely digested in nitric/hydrofluoric acids (acid persulfate for mercury). The analytical methods used to measure analyte concentrations were: cold vapor atomic analysis (AA) for mercury; graphite furnace AA for silver, arsenic, cadmium, lead, antimony, tin and thallium; hydride generation atomic fluorescence for selenium; and optical-emission ionically coupled plasma (ICP) for the remaining metals. For

the organic analyses, sediments were extracted using the procedures of NOAA National Status and Trends Program (Lauenstein and Cantillo, 1993). The PAHs were analyzed by gas-chromatography / mass-spectrometry (GC/MS); pesticides and PCBs were analyzed by GC/ECD (electron capture detector).

#### 5.2.3 Sample Processing: Calibration

The analytical instruments were calibrated by standard laboratory procedures including: constructing calibration curves, running blank and spiked quality control samples, and analyzing standard reference materials.

#### 5.2.4 Sample Processing: Quality Control (QC)

Each batch of samples was accompanied by QC analyses consisting of method blanks, matrix spikes, matrix spike duplicates, and standard reference materials (SRMs). In total, approximately 5% of all analyses were QC analyses. Processing quality was considered acceptable if the following criteria were met: blanks were less than three times the minimum detection limit; accuracy, as determined by analysis of certified reference materials, was within 30% for organic analytes and within 15% for inorganic analytes; and precision, as determined by replicate analyses, was within 30% for organic analytes and within 15% for inorganic analytes. Additional specifications and guidelines are presented in U.S. EPA 2001.

#### 5.2.5 Sample Processing: References

Lauenstein, G. G. and A. Y. Cantillo (eds.). 1993. Sampling and analytical methods of the National Status and Trends Program National Benthic Surveillance and Mussel Watch Projects 1984-1992: Comprehensive descriptions of trace organic analytical methods, Volume IV NOAA Technical Memorandum NOS ORCA 71, Silver Spring, MD. 182 pp.

Texas A & M University, Geochemical and Environmental Research Group. 1990. NOAA Status and Trends, Mussel Watch Program, Analytical Methods. Submitted to NOAA. Rockville (MD): U.S. Dept. of Commerce, National Oceanic & Atmospheric Administration, Ocean Assessment Division.

U.S. EPA. 1995. Environmental Monitoring and Assessment Program (EMAP): Laboratory Methods Manual-Estuaries, Volume 1: Biological and Physical Analyses. Narragansett (RI): U.S. Environmental Protection Agency, Office of Research and Development, EPA/620/R-95/008.

U.S. EPA. 2001. Environmental Monitoring and Assessment Program (EMAP): National Coastal Assessment Quality Assurance Project Plan 2001-2004. U.S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Gulf Ecology Division, Gulf Breeze, FL. EPA/620/R-01/002. 189 p

#### 5.2.6 Sample Processing: Alternate Methods

Not applicable

### 6. DATA ANALYSIS AND MANIPULATIONS

#### 6.1 Name of New or Modified Values

Not applicable

## 6.2 Data Manipulation Description

Concentrations of metallic analytes smaller than the method detection limit were reported as zero (see Section 4.3 for details).

## 7. DATA DESCRIPTION

### 7.1 Description of Parameters

#### 7.1.1 Components of the Dataset

Attribute Name	Format	Description
Data Group	VARCHAR2(20)	Data group conducting sampling
Sampling Year	NUMBER(4)	Year of data collection
Station Name	VARCHAR2(20)	The station identifier
Sampling Collection Date	DATE	Date of sample collection
Latitude Decimal Degrees	NUMBER(9.3)	Station-decimal degrees of latitude
Longitude Decimal Degrees	NUMBER(9.3)	Station-decimal degrees of longitude
Analyte Code	VARCHAR2(8)	Analyte code
Analyte Name	VARCHAR2(80)	Chemical name
Analyte Category	VARCHAR2(15)	General category of analyte
Analyte Concentration	NUMBER(13.6)	Concentration of (dry wt.)
Unit Code	VARCHAR2(15)	Units of measure
Detection Limit Conc.	NUMBER(13.6)	Method detection limit for analyte
Analyte Count in Totals	NUMBER(4)	Analytes (#) in summed concentration
QA Code	VARCHAR2(8)	Quality Assurance code and definition

#### 7.1.2 Precision of Reported Values

All values have been rounded to three significant digits.

#### 7.1.3 Minimum and Maximum Value in Dataset (non-zero data)

##### Metals

ANALYTE ID	ANALYTE NAME	MIN	MAX
AG	Silver	0.005	29.2
AL	Aluminum	4	109000
AS	Arsenic	0.32	88.1
CD	Cadmium	0.005	40.6
CR	Chromium	0.42	489
CU	Copper	0.35	741
FE	Iron	159	126000
HG	Mercury	0.001	5.3
MN	Manganese	8.09	2790
NI	Nickel	0.4	86
PB	Lead	0.306	539
SB	Antimony	0.004	97.3
SE	Selenium	0.015	40.8
SN	Tin	0.04	317
ZN	Zinc	1.19	1640

##### Polynuclear aromatic hydrocarbons (PAHs)

ANALYTE ID	ANALYTE NAME	MIN	MAX
ACENTHE	Acenaphthene	0.02	1300
ACENTHY	Acenaphthylene	0.01	730
ANTHRA	Anthracene	0.01	4260
BENANTH	Benz(a)anthracene	0.01	7500
BENAPY	Benz(a)pyrene	0.021	7700
BENZOBFL	Benzo(b)fluoranthene	0.04	8800
BENZOKFL	Benzo(k)fluoranthene	0.016	3000
BENZOP	Benzo(g,h,i)perylene	0.019	3900

BIPHENYL	Biphenyl	0.02	860
CHRYSENE	Chrysene	0.01	6900
DIBENTP	Dibenzothiophene	0.01	780
DIBENZ	Dibenz(a,h)anthracene	0.003	933
DIMETH	2,6-dimethylnaphthalene	0.006	4730
FLUORANT	Fluoranthene	0.073	15000
FLUORENE	Fluorene	0.01	1700
INDENO	Indeno(1,2,3-c,d)pyrene	0.018	4100
MENAP1	1-methylnaphthalene	0.03	10400
MENAP2	2-methylnaphthalene	0.033	13800
MEPHEN1	1-methylphenanthrene	0.008	1600
NAPH	Naphthalene	0.06	7880
PYRENE	Pyrene	0.05	14000
TRIMETH	2,3,5-trimethylnaphthalene	0.021	360

Polychlorinated biphenyls (PCBs)

ANALYTE ID	ANALYTE NAME	MIN	MAX
PCB101	2,2',4,5,5'-pentachlorobiphenyl	0.01	3800
PCB105	2,3,3',4,4'-pentachlorobiphenyl	0.003	680
PCB110	2,2',4,5,5'pentachlorobiphenyl	0.2	9700
PCB118	2,3',4,4',5-pentachlorobiphenyl	0.008	690
PCB126	3,3',4,4',5-pentachlorobiphenyl	0.014	19
PCB128	2,2',3,3',4,4'-hexachlorobiphenyl	0.004	280
PCB138	2,2',3,4,4',5'-hexachlorobiphenyl	0.008	2600
PCB153	2,2',4,4',5,5'-hexachlorobiphenyl	0.012	5200
PCB170	2,2',3,3',4,4',5-heptachlorobiphenyl	0.01	370
PCB18	2,2',5-trichlorobiphenyl	0.014	8400
PCB180	2,2',3,4,4',5,5'-heptachlorobiphenyl	0.005	580
PCB187	2,2',3,4',5,5',6-heptachlorobiphenyl	0.005	1100
PCB195	2,2',3,3',4,4',5,6-octachlorobiphenyl	0.003	48
PCB206	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	0.003	110
PCB209	decachlorobiphenyl	0.002	48
PCB28	2,4,4'-trichlorobiphenyl	0.007	18000
PCB44	2,2',3,5'-tetrachlorobiphenyl	0.013	7300
PCB52	2,2',5,5'-tetrachlorobiphenyl	0.01	18000
PCB66	2,3',4,4'-tetrachlorobiphenyl	0.007	7900
PCB77	3,3',4,4'-tetrachlorobiphenyl	0.032	4700
PCB8	2,4'-dichlorobiphenyl	0.021	3800

Pesticides

ANALYTE ID	ANALYTE NAME	MIN	MAX
ALDRIN	Aldrin	0.28	12
CISCHL	alpha-Chlordane	0.005	340
DIELDRIN	Dieldrin	0.005	100
ENDOSUI	Endosulfan I	0.024	11.8
ENDOSUII	Endosulfan	0.013	21
ENDOSULF	Endosulfan II	0.005	77
ENDRIN	Endrin	0.034	1200
HEPTACHL	Heptachlor	0.012	9.0
HEPTAEPO	Heptachlor epoxide	0.006	7.8
HEXACHL	Hexachlorobenzene	0.002	220
LINDANE	Lindane (gamma-BHC)	0.005	270
MIREX	Mirex	0.005	9
OPDDD	2,4'-DDD	0.012	120
OPDDE	2,4'-DDE	0.014	550
OPDDT	2,4'-DDT	0.007	14.4
PPDDD	4,4'-DDD	0.009	360

PPDDE	4,4'-DDE	0.001 280
PPDDT	4,4'-DDT	0.006 580
TNONCHL	trans-Nonachlor	0.004 18

7.1.4 Maximum Value in Dataset  
See Section 7.1.3

## 7.2 Data Record Example

### 7.2.1 Column Names for Example Records

Data Group, Sampling Year, Station Name, Sampling Collection Date, Latitude Decimal Degrees, Longitude Decimal Degrees, Analyte Code, Analyte Name, Analyte Category, Analyte Concentration, Unit Code, Detection Limit Concentration, QA Code

### 7.2.2 Example Data Records

National Coastal Assessment-Northeast/Connecticut, 2000, CT00-0001-A, 08/17/00, 41.151, -73.22, AG, Silver, Metal, 0.75, ug/g, , ,  
National Coastal Assessment-Northeast/Connecticut, 2000, CT00-0001-A, 08/17/00, 41.151, -73.22, AL, Aluminum, Metal, 4780, ug/g, , ,  
National Coastal Assessment-Northeast/Connecticut, 2000, CT00-0001-A, 08/17/00, 41.151, -73.22, ALDRIN, Aldrin, Organic, 0, ng/g, 1500, CH-EE,

## 8. GEOGRAPHIC AND SPATIAL INFORMATION

### 8.1 Minimum Longitude (Westernmost)

-77.3041 decimal degrees

### 8.2 Maximum Longitude (Easternmost)

-66.9562 decimal degrees

### 8.3 Minimum Latitude (Southernmost)

36.5637 decimal degrees

### 8.4 Maximum Latitude (Northernmost)

45.1848 decimal degrees

### 8.5 Name of Region

The National Coastal Assessment Northeast Region covers the northeastern US coastline from Maine to Virginia.

## 9. QUALITY CONTROL AND QUALITY ASSURANCE

### 9.1 Measurement Quality Objectives

The measurement quality objectives of the EMAP-Estuaries program (see U.S. EPA 2001) specify accuracy goals of 35% and 20% respectively for analyses of organics and inorganics; and precision goals of 30% for all sediment chemistry analyses.

### 9.2 Data Quality Assurance Procedures

QA procedures included running blanks, spiked samples, and standard reference materials with each batch of samples. Any batch failing to meet the specifications presented in Section 9.1 was reanalyzed or rejected.

### 9.3 Actual Measurement Quality

All of the data reported in this data file met the QA specifications listed in Section 9.1 or are flagged under Quality Assurance Code.

## 10. DATA ACCESS

### 10.1 Data Access Procedures

Data can be accessed at: <http://www.epa.gov/emap/nca/html/data/>

### 10.2 Data Access Restrictions

None

### 10.3 Data Access Contact Persons

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### 10.4 Dataset Format

Tab-delimited ASCII files

### 10.5 Information Concerning Anonymous FTP

Not available

### 10.6 Information Concerning WWW

Data can be downloaded from the WWW server.

### 10.7 EMAP CD-ROM Containing the Dataset

Data not available on CD-ROM

## 11. REFERENCES

Strobel, C.J. 2000. Environmental Monitoring and Assessment Program: Coastal 2000 - Northeast component: field operations manual. Narragansett (RI): U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Atlantic Ecology Division. EPA/620/R-00/002. 68 p.

U.S. EPA. 2001. National Coastal Assessment: Field Operations Manual. U.S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Gulf Ecology Division, Gulf Breeze, FL. EPA/620/R-01/003. 72 p.

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## 12. TABLE OF ACRONYMS

AED Atlantic Ecology Division

EMAP Environmental Monitoring and Assessment Program

EPA Environmental Protection Agency

NCA National Coastal Assessment

NHEERL National Health and Environmental Effects Research Laboratory

QA/QC Quality Assurance/Quality Control

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