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CATALOG DOCUMENTATION
EMAP-ESTUARIES PROGRAM LEVEL DATABASE
LOUISIANIAN PROVINCE 1991-1994
SEDIMENT CHEMISTRY DATA

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APPENDIX A.

APPENDIX B.

1. DATA SET IDENTIFICATION

1.1 Title

EMAP-Estuaries Province Level Database
Louisianian Province
Sediment Chemistry Data

1.2 Catalog Author

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1.3 Catalog Revision Date

June 16, 1999

1.4 Data Set Name

SED_CHEM

1.5 Task Group

ESTUARIES

1.6 Data set identification code

00045, 00085, 00125, 00165

1.7 Version number for a data set

003, 003, 004, 002

1.8 Requested acknowledgment

If you plan to publish these data in any way, EPA requires a standard statement for work is has supported:

"Although the data described in this article have 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 Sample Collection Investigator

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2.4 Data Analysis Investigator

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2.5 Additional Investigators

N/A

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3. DATA SET ABSTRACT

3.1 Abstract of the Data Set

The Sediment Chemistry data file presents a suite of chemical concentrations derived from analyses of a surface sediment sample collected at a station in the Louisianian Province. Individual and summed analyte concentrations are presented.

A code for each compound is given under ANALYTE. These include inorganics, organics, organic concentration sums, total organic carbon (TOC) and acid volatile sulfides (AVS). Concentrations are recorded in dry weight. Units are reported under a separate attribute, CHMUNITS, as ug/g, ng/g, % or µmoles/g. Quality Assurance/Quality Control issues are coded. Depending on the QA code, only a detection limit may be reported.

3.2 Keywords for the Data Set

Contaminants, DDT, metals, inorganic analytes, organic analytes, alkanes, isoprenoids, PAH, PCB, pesticides, QA Code, sediment, sediment chemistry, TOC and AVS.

4. OBJECTIVES AND INTRODUCTION

4.1 Program Objective

The Environmental Monitoring and Assessment Program (EMAP) was designed to periodically estimate the status and trends of the Nation's ecological resources on a regional basis. EMAP provides a strategy to identify and bound the extent, magnitude and location of environmental degradation and improvement on a regional scale based on randomly located station sites. Only the randomly located Base Sampling Sites were included in this data set.

4.2 Data Set Objective

The objective of the Sediment Chemistry data file is to present the concentrations of a suite of analytes and compounds measured from a surface sediment sample collected at a station in the Louisianian Province. The sample was an homogenate composed of the surficial 2 cm from several grabs.

4.3 Data Set Background Information

The presence of contaminants in estuaries has been identified in both the scientific and popular press as a major problem contributing to degraded ecological resources and restricted harvest of fish and shellfish resources due to human health concerns. Reducing contaminant inputs and concentrations, therefore, is often a major focus of regulatory programs for estuaries. Contaminants include both inorganic (primarily metals) and organic forms originating from many sources, including atmospheric deposition, freshwater inputs, land runoff and point sources. These sources are poorly characterized, except in the most well-studied estuaries. Most contaminants that are potentially toxic to indigenous biological resources tend to bind to particles, which

ultimately are deposited at the bottom of estuaries. This binding changes the form of contaminants and removes them from the water column; consequently, contaminants accumulate in estuarine sediments.

Sediment contaminant concentrations were measured to aid in the interpretation of the spatial patterns observed in the condition of biological resources in the estuaries of the Louisianian Province.

EMAP monitoring efforts have focused on sediment contaminants rather than measurement of water column contaminants because concentrations of contaminants in sediments are less variable and the sediment integrates contaminant inputs to estuaries over time (i.e., months and years).

Metals in the sediment are derived from anthropogenic sources or from the natural geochemical processes of weathering and erosion of the earth's crust. The difficulty arises in identifying which portion of the total metal content of the sediment was due to natural processes and which was due to human activities. Several methods can be used to determine whether measured metal concentrations in estuarine sediments represent anthropogenically-enriched or natural conditions.

4.4 Summary of Data Set Parameters

The organic and inorganic compound concentrations measured generally included: 15 major and trace elements, 25 Alkanes, 2 Isoprenoids, 44 individual Poly-Aromatic Hydrocarbon (PAH) compounds, the pesticide, DDT, and its metabolites, 19 pesticides other than DDT, 20 individual Poly-Chlorinated Biphenyl (PCB) congeners, mono-, di- and tri-butyltin (MBT, DBT, TBT), Total Organic Carbon (TOC) and acid volatile sulfides (AVS). This suite of analytes is similar to that measured in the National Oceanic and Atmospheric Administration's (NOAA) National Status and Trends (NS&T) program with the addition of aliphatic hydrocarbons and several PAHs. Values in this data file include individual inorganic and organic compound concentrations and concentrations summed for several major groups: total PAHs, Low and High Molecular Weight PAHs, PCBs, DDTs, BHCs, Chlordanes, Alkanes, and Isoprenoids.

Concentrations of all sediment chemistry analytes are reported on a dry weight basis.

4.5 Year-Specific Information about Data

During the first three years of the program (1991-93), all sediment chemistry was analyzed by the Geochemical and Environmental Research Group (GERG) at Texas A& M University. The quantitative list of analytes listed in 3.4 reflects the list of analytes provided by this laboratory in exceedance of the requirements of EMAP. In addition to this list, in 1993, two organophosphates (Chlorpyrifos and Dicofol) were reported. In 1994 the sediment chemistry analyses were conducted by the University System of Georgia, Skidaway Institute of Oceanography, Savannah, GA. In 1991-92, both TOC and AVS were analyzed by the Department of Biology at the University of Mississippi. In 1993, TOC was analyzed by the

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Department of Biology at the University of Mississippi and AVS was analyzed by the Chemistry Department at the Gulf Coast Research Lab.

In 1994, AVS was analyzed at GCRL; TOC analyses were subcontracted through GCRL to the Department of Geology at the University of South Carolina.

In 1994, sediment samples were no longer analyzed for alkanes.

5. METHODS

5.1 Data Acquisition

5.1.1 Sampling Objective

Collect sediment samples suitable for the analysis of organic and inorganic compounds, TOC and AVS. One sediment sample was expected to be collected at each station.

5.1.2 Sample Collection Methods Summary

The grab sampler was lowered through the water column such that travel through the last 5 meters was no faster than 1 m/sec. The grab penetrated the sediment by gravity releasing a trigger allowing the jaws to close. When the grab was pulled from the sediment using the winch, the jaws closed, encapsulating the sediment sample. The chance of sampling the exact same location twice was minimized. After three grabs were taken, the boat was moved five meters downstream by letting out the appropriate length of anchor line.

Stainless steel utensils were used to remove the top two cm of sediment from a grab. The sediment was removed to a stainless steel bowl and placed in a cooler of ice to remain cold, but unfrozen. The grab sampler was rinsed and re-deployed. This procedure was repeated until approximately 3,000 cc of sediment was collected. The sediment was mixed by hand until thoroughly homogenized, and aliquots were placed immediately into pre-cleaned glass jars (for organics) or plastic containers (for inorganics and AVS). In 1992-1994, the AVS subsample was taken independently from the composited, homogenated sediment. For AVS, a small plug was taken at a depth of 2-3 (cm) from each of the 3-4 grabs; the plugs were combined into a 60-ml wide-mouth container until the container was nearly devoid of any headspace. This procedure was adopted to avoid the loss of volatile sulfides by aeration or release during the homogenization process with the bulk composite sediment. The sample container was held on ice between the collection of individual plugs. The completed samples were immediately stored on ice following collection. The remainder of the sediment was split between grain size and sediment toxicity samples.

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5.1.3 Beginning Sampling Date

09 July 1991
08 July 1992
06 July 1993
06 July 1994

5.1.4 Ending Sampling Date

10 September 1991
11 September 1992
19 August 1993
15 September 1994

5.1.5 Sampling Platform

Each team was supplied with a 25-foot SeaArk work boat equipped with a 7.5 L gas engine fitted with a Bravo outdrive, an "A" frame boom assembly and hydraulic winch. On-board electronics consist of: a Loran C unit, GPS (beginning in 1993), radar unit, 2 VHF radios, cellular phone, compass, a depth finder and a pump-driven seawater washdown system. Each vessel was provided with an extensive tool kit and all required safety equipment. One completely outfitted spare boat was stored at the Field Operations Center (EPA Lab) as backup.

5.1.6 Sampling Equipment

A 1/25 m2, stainless steel, Young-modified Van Veen Grab sampler was used to collect sediments. This grab sampled an area of 440 cm2 and a maximum depth of penetration in the sediment of 10 cm.

5.1.7 Manufacturer of Sampling Equipment

5.1.8 Key Variables

5.1.9 Sampling Method Calibration

Field technicians were trained to follow Standard Operating Procedures to insure the collection of representative, uncontaminated and high quality samples. QA/QC measures were taken in the field to avoid or reduce contamination and insure the collection of representative samples. These included: use of stainless steel instruments, thorough cleaning of the sampler between grabs and use of pre-cleaned containers for sediment storage.

5.1.10 Sample Collection Quality Control

A successful grab had relatively level, intact sediment over the entire area of the grab and a sediment depth of 7-10 centimeters. Unacceptable grabs included those: containing no sediments, which were partially filled or had shelly substrates or grossly slumped surfaces. Grabs completely filled to the top, where the sediment was oozing out of the hinged top, were also unacceptable.

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5.1.11 Sample Collection Method Reference

Macauley, J.M. 1991. Environmental Monitoring and Assessment Program-Near Coastal Louisianian Province: 1991 Monitoring Demonstration. Field Operations Manual. EPA/600/X-91/XXX. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL 32561.

Macauley, J.M. 1992. Environmental Monitoring and AssessmentProgram: Louisianian Province:1992 Sampling: Field Operations Manual. EPA/ERL-GB No. SR-119. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL 32561.

Macauley, J.M. 1993. Environmental Monitoring and Assessment Program: Louisianian Province:1993 Sampling: Field Operations Manual. EPA/ERL-GB No. SR-XXX. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL 32561.

Macauley, J.M. 1994. Environmental Monitoring and Assessment Program: Louisianian Province:1993 Sampling: Field Operations Manual. EPA/ERL-GB No. SR-XXX. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL 32561.

5.1.12 Sample Collection Method Deviations

None

5.2 Data Preparation and Sample Processing

5.2.1 Date Preparation Objective

Process sediment samples for characterization of contaminants.

5.2.2 Data Processing Methods Summary

Upon receipt at the laboratory, the samples were frozen pending analysis, except for those collected for TOC analysis which were refrigerated at 4 C. The frozen sediment samples were thawed and thoroughly homogenized prior to analysis. Separate aliquots of the homogenized sediment were removed. The aliquots were processed for several types of chemical analyses. These included: inorganic analyses (major and trace elements); butyltins (MBT, TBT and DBT)); and organic analyses (PAHs, PCBs, aliphatic hydrocarbons, and pesticides).

5.2.2.1 Inorganic Analytes

Analysis of the sediment for major and trace elements involved a total digestion (i.e., complete dissolution) of the sediment matrix using HNO3/HC1O3 in pressurized Teflon bombs heated at 130E (conventional oven) followed with additions of HF. Instrument analysis for metals Al, Cu, Fe, Mn, and Zn was by flame atomic absorption (FAA); for metals Ag, As, Cd, Cr, Ni,

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Pb, Se and Sn, graphite furnace atomic absorption (GFAA) for 1991-1993 and by Inductively Coupled Plasma (ICP) method for 1994; and for mercury (Hg), cold vapor atomic absorption.

Sediment concentrations of butyltin compounds were determined using high resolution gas chromatography and flame photometric detection.

5.2.2.2 Organic Analytes

The analyses of organic contaminants involved extraction and cleanup followed by instrumental analysis. This included the following basic steps: Soxhlet extraction with methylene chloride, extract drying using sodium sulfate, extract concentration using Kuderna-Danish apparatus, removal of elemental sulfur with activated copper, removal of organic interferents with silica gel/alumina column purification. Following extraction and cleanup, PAH compounds were analyzed using gas chromatography/mass spectrometry (GC/MS). The pesticides and PCB congeners were analyzed using gas chromatography/electron capture detection (GC/ECD).

5.2.2.3 Other Analytes

The concentration of total organic carbon (TOC) in each sediment sample was determined by TOC analyzer using combustion/non- dispersive infrared gas analysis. Acid volatile sulfides (AVS) were measured using a sulfide ion-specific electrode following reaction of the sediment with hydrochloric acid and subsequent trapping of the evolved hydrogen sulfide in solution.

6. DATA MANIPULATIONS

6.1 Name of New or Modified Values

PCB_TOT, PAH_TOT, PAH_LMW, PAH_HMW, DDT_TOT and TOT_ANAL

6.2 Data Manipulation Description

6.2.1 PCB_TOT, PAH_TOT, PAH_LMW, PAH_HMW, DDT_TOT

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

6.2.2 TOT_ANAL

The number of analytes under TOT_ANAL include only those with a concentration.

6.3 Data Manipulation Examples

The following groups must be summed in order to have consistency across Provinces:

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6.3.1 Total Poly-aromatic Hydrocarbons

PAH_TOT = sum of concentrations of biphenyl, fluorene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, 2,6-dimethylnaphthalene, acenaphthene, phenanthrene, anthracene, acenaphthlyene, 2,3,5-trimethylnaphthalene, 1-methylphenanthrene, fluoranthene, pyrene, benz(a)anthracene, chrysene, benzo(b,k)fluoranthene or individual compounds, ideno(1,2,3-c,d)pyrene, benzo(g,h,i)perylene, perylene, benzo(a)pyrene, benzo(e)pyrene and dibenz(a,h)anthracene.

6.3.2 Low Molecular Weight PAHs

PAH_LMW = sum of concentrations of biphenyl, fluorene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, 2,6-dimethylnaphthalene, anthracene, acenaphthlyene, 2,3,5-trimethylnaphthalene.

6.3.3 High Molecular Weight PAHs

PAH_HMW = sum of concentrations of fluoranthene, pyrene, benz(a)anthracene, chrysene, benzo(b,k)fluoranthene or individual compounds, ideno(1,2,3-c,d)pyrene, benzo(g,h,i)perylene, perylene, benzo(a)pyrene, benzo(e)pyrene and dibenz(a,h)anthracene, acenaphthene, phenanthrene and 1-methylphenanthrene.

6.3.4 Total DDT

DDT_TOT = sum of concentrations of OPDDE, OPDDD, OPDDT, PPDDE, PPDDD, PPDDT.

6.3.5 Total Polychlorinated Biphenyls

PCB_TOT = sum of concentrations of the following PCB congeners: 8, 18, 28, 52, 44, 66, 101, 118, 153, 105, 138, 187, 128, 180, 170, 195, 206 and 209.

6.4 Data Manipulation Computer Code Set

6.5 Data Manipulation Computer Code Language

6.6 Data Manipulation Computer Code

7. DESCRIPTION OF PARAMETERS

7.1 Description of Parameters

See Appendix A for a list of analytes.

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7.1.1 Parameter Name

Field Name	Data Type	Max Field Len	Format	Variable Field Label
STA_NAME	Char	8	8.	The Station Identifier
VST_DATE	Num	8	YMMDD6.	The Date the Sample was Collected
ANALYTE	Char	8	8.	Analyte Code
CONC	Num	13	13.6	Conc. of Analyte (dry wt.)
CHMUNITS	Char	12	12.	Concentration Units
QA_CODE	Char	15	15.	Quality Assurance Code for Data
TOT_ANAL	Num	8	3.	Analytes (#) Included in Summed Conc.
DETLIMIT	Num	13	13.6	Method Detection Limit for Analyte
ANAL_CAT	Char	15	15.	General Category for Group of Analytes
LABEL	Char	25		Full Chemical Name of Analyte

7.1.6 Precision to which values are reported

The sediment chemistry concentrations presented are in a format of 6 decimal places. This format is necessary because some concentrations are in ug/g and some concentrations are in ng/g. However, the concentrations are only valid FOR THREE SIGNIFICANT FIGURES (not necessarily three decimal places), e.g., 345.67 ug/g is 346 ug/g but 0.00235 ng/g remains as 0.00235 ng/g.

7.1.7 Minimum Value in Data Set by Analyte

7.1.8 Maximum Value in Data Set by Analyte

7.2 Data Record Example

7.2.1 Column Names for Example Records

OBS STA_NAME ANALYTE CONC DETLIMIT QA_CODE TOT_ANAL CHMUNITS _LABEL_ ANAL_CAT VST_DATE

7.2.2 Example Data Records

OBS	STA_NAME	ANALYTE	CONC	DETLIMIT	QA_CODE
1	LA91LR01	ACENTHE	0.090000	4.500000	CH-B
2	LA91LR01	ACENTHY	0.040000	3.700000	CH-B
3	LA91LR01	AG	0.020000	.	
4	LA91LR01	AL	1700.000000	3000.000000	CH-B
5	LA91LR01	ALDRIN	.	0.160000	CH-A

OBS	TOT_ANAL	CHMUNITS	_LABEL_	ANAL_CAT
1	.	ng/g	ACENAPHTHENE	PAH
2	.	ng/g	ACENAPHTHYLENE	PAH
3	.	ug/g	SILVER	METAL
4	.	ug/g	ALUMINUM	METAL
5	.	ng/g	ALDRIN	PESTICIDE

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OBS	VST_DATE
1	910721
2	910721
3	910721
4	910721
5	910721

7.3 Related Data Sets

7.3.1 Related Data Set Name

7.3.2 Related Data Set Identification Code

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude

-97 Degrees 27 Minutes 13.20 Decimal Seconds

8.2 Maximum Longitude

-82 Degrees 39 Minutes 28.20 Decimal Seconds

8.3 Maximum Latitude

30 Degrees 48 Minutes 30.00 Decimal Seconds

8.4 Minimum Latitude

26 Degrees 02 Minutes 55.80 Decimal Seconds

8.5 Name of the area or region

Louisianian Province - Coastal distribution of sampling is along the Gulf of Mexico from the Rio Grande, TX to Anclote Key, FL. States represented: Texas, Louisiana, Alabama, Mississippi, Florida

8.6 Direct Spatial Reference Method

Point

8.7 Horizontal Coordinate System Used

Universal Transverse Mercator

8.8 Resolution of Horizontal Coordinates

0.5

8.9 Units for Horizontal Coordinates

Meters

8.10 Vertical Coordinate System

N/A

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8.11 Resolution of Vertical Coordinates

N/A

8.12 Units for Vertical Coordinates

N/A

9. QUALITY CONTROL AND QUALITY ASSURANCE

Because of the complexity and importance of sediment contaminant data, EMAP has expended a tremendous effort in the Quality Assurance of these data as is reflected in the detail provided in this section.

9.1 Measurement Quality Objectives

Measurement Quality Objectives (MQOs) for the Louisianian Province sediment chemistry analyses were defined in the Louisianian Province Quality Assurance Project Plan. This plan required each laboratory to analyze the following quality control (QC) samples along with every batch or "set" of field chemistry samples: laboratory reagent blank, calibration check standards, laboratory fortified sample matrix, laboratory duplicate, and Laboratory Control Material (LCM). Results for these QC samples had to fall within certain pre-established control limits.

9.1.1 Sample Processing Method Calibration

For the sediment analyses, a Standard or Certified Reference Material (SRM or CRM) typically was used as the Laboratory Control Material (LCM). SRMs and CRMs have known or "certified" concentrations of the analytes being measured and therefore, are useful for assessing both accuracy and precision. The QA Plan required the laboratory's percent recovery (relative to the certified concentration in the reference material) to fall within the range of 80 to 120 % for each inorganic analyte and 65 to 135 % for each organic analyte. If the laboratory consistently failed to meet these accuracy goals for the CRM or SRM, the values reported for the failed analytes were considered to be suspect and were flagged.

9.1.2 Sample Processing Quality Control

Each laboratory was required to analyze the following quality control (QC) samples along with every batch or "set" of field chemistry samples: laboratory reagent blank, calibration check standards, laboratory fortified sample matrix, laboratory 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

If results for these QC samples did not fall within certain pre-established control limits, the analysis of a batch of samples was not considered acceptable. These and other quality control

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issues are coded in four data qualifier codes (QA_CODE) or "flags" used in the Louisianian Province sediment chemistry data file:

CH-A CODE

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

CH-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 "CH-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.

CH-C CODE

The CH-C code indicates that the laboratory experienced minor deficiencies meeting the QC requirements, but the overall data quality is judged to be reliable for EMAP assessments.

CH-I CODE

Some analytes are difficult to quantify because they co-elute with other closely related analytes. This phenomenon is called "matrix interference". When this occurs, the suspect analyte(s) are given a "CH-I" code and concentration is left blank.

CH-M CODE

Samples were lost or destroyed.

CH-X CODE

In favor of expediency, a laboratory may elect to cease reporting some of the analytes. EMAP protocol only requires that the laboratory analyze a given list of chemicals; when they go beyond this list and report additional chemicals, we include them in our data. The "CH-X" code indicates that an analyte has been excluded from a given set of data

CH-Z CODE

Some of the analytes listed represent the sum of concentrations of similar analytes (e.g., PCB_TOT is the sum of the concentrations of all PCB congeners). In the event that the concentrations for all of the individual analytes included in the sum are non-detects (have CH-A code) the sum is missing. This is not technically a non-detect, but a sum of non-detects, hence the CH-Z code.

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Only "unflagged", CH-B and CH-C coded values are considered valid and useful for most assessment purposes.

Note: In 1994, the method detection limits (field value DETLIMIT) for PAH analytes changed during the analysis due to equipment upgrade. There are two detection limits for all PAH analytes for this year.

9.3 Actual Measurement Quality

Results of QC sample analyses are stored in the Louisianian Province database and are available upon request.

9.3.1 1991-1993 Analyses for Chemical Contaminants in Sediment

Inorganic Contaminants

All analytical data related to inorganic contaminants (trace elements and metals) in 1991-93 Louisianian Province (LP) sediment samples were acceptable for EMAP assessments without further qualification. Results of the inorganic SRM analyses (primary QC check for relative accuracy) are summarized in Tables 9-1(a-c).

Organic Contaminants

Data quality for the analyses of organic contaminants (organochlorine pesticides, organophosphorus pesticides, PCBs, PAHs, and butyltin compounds) in 1991-93 LP sediment samples routinely met the quality criteria and the analytical results for most analytes were acceptable for EMAP assessments; results of the SRM/LCM analyses (primary QC checks for relative accuracy) are summarized in Tables 9-2(a-c). There were, however, isolated cases in which the laboratory failed to meet the quality criteria for certain organic analyses resulting in those data being rejected or otherwise flagged with an appropriate qualifier code, as follows:

1991-

4,4'- DDD -	CH-C code (minor deficiencies)
Dieldrin -	rejected
PCB 52 -	rejected
PCB 170-	rejected

1992-

PCB 52 -	CH-C code
PCB 170 -	CH-C code
Dieldrin -	rejected

1993-

PCB 206 -	CH-C code
PCB 209 -	CH-C code
Alkanes (C13,C14 C15, C16, C29, and C26) -	CH-C code
PCB 110/77 -	rejected
PCB 170 -	rejected

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Dieldrin - rejected
Biphenyl (PAH) - rejected

The data from all other 1991-93 organic analyses of sediment samples (i.e., organochlorine pesticides, organophosphorus pesticides, PCBs, PAHs, and butyltins) were acceptable without further qualification.

9.3.2 1994 Analyses for Chemical Contaminants in Sediments

In 1994, the cooperative agreement for analytical chemistry supporting Louisianian Province Monitoring was awarded to laboratory different from that responsible for the previous analyses of 1991-93 EMAP-LP samples. Laboratory selections for both the initial and subsequent cooperative agreements were based on competitive proposals and were awarded for 3-year terms.

Inorganic Analyses - 1994

The laboratory routinely met or exceeded the required QC criteria related to the analyses of inorganic contaminants in sediment samples and all 1994 results for inorganic contaminants were acceptable for EMAP assessments without further qualification. See Table 9-1d for a summary of the laboratory's 1994 SRM results for inorganic analytes in sediments.

Organic Analyses - 1994

The laboratory generally met the QC requirements for most of the analyses of organic contaminants in sediments; see Table 9-2d for a summary of the laboratory's 1994 SRM results for organic analytes in sediments. However, some analytes, particularly within the organochlorine classes (pesticides and PCBs) proved to be problematic; as a result, the analytical data for those analytes that consistently failed to meet the QC criteria were dropped from the database (see below). All data for OC pesticides was flagged with a "CH-C" qualifier code because the entire set of OC pesticide data was characterized by minor data quality deficiencies, however, these data were still judged to be acceptable for most EMAP assessments. The following summary details the data quality for organic analyses with 1994 sediments:

Organochlorine (OC) pesticides:

Endrin - rejected
2,4-DDT - rejected

All other OC pesticides were flagged with the "CH-C" code (minor deficiencies, but generally acceptable for EMAP assessments).

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PCBs:

PCB 77- rejected
PCB 8 - CH-C code
PCB 52 - CH-C code

All other PCB data were acceptable for EMAP assessments without further qualification.

PAHs:

All PAH data were acceptable for EMAP assessments without further qualification.

Organophosphorus (OP) Compounds

All OP data were acceptable for EMAP assessments without further qualification.

Butyltin Compounds:

All butyltin data were acceptable without further qualification.

9.3.3 Total Organic Carbon (TOC) Analyses

All QC results for the analysis of TOC in sediment sample from the 1991-94 Louisianian Province Monitoring consistently met the required quality criteria for both accuracy and precision. The Certified Reference Material BCSS-1 (standard marine sediment) supplied by the National Research Council of Canada was analyzed along with each batch of 10-20 field samples; also, along with each sample batch, a duplicated sample and a blank were included. For all four years, the percent recovery of TOC from the CRM remained >90% and the relative percent difference for duplicate analyses remained <10%. All 1991-94 sediment TOC data were acceptable for EMAP assessments without further qualification.

9.3.4 Acid Volatile Sulfides (AVS)

The QC data for the analysis of AVS in sediment for the 1991-94 Louisianian Province Monitoring consistently met the required quality criteria for accuracy and precision. The percent recovery of sulfide for calibration check standards, laboratory fortified blanks, and laboratory fortified matrix samples routinely fell within 85-115% of the known concentration; the relative percent difference between duplicate samples routinely met the control limit of 20%. All AVC analyses for 1991-94 were judged acceptable for EMAP assessments.

It should be noted that the 1991 AVS analysis was conducted differently from the 1992-94 analyses. For 1991, only AVS was measured, no simultaneously extracted metals (SEMs) were analyzed; in 1992-94 both AVS and SEMs were analyzed. Also, in 1991, the field collected samples for AVS analysis were taken from a composited sediment sample (consisting of the top 2-3 cm of surficial sediment combined from 5-6 separate sediment grabs). The

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composited sediment was well mixed to ensure homogeneity before subsamples for the various sediment analyses were collected. After the fact, it was suggested that AVS sediment samples should be collected in as undisturbed manner as possible to avoid the release of sulfides. In subsequence monitoring (1992-94), at each sampling site, small 2-3 cm cores of sediment were carefully collected from individual grabs and combined into a single sample container with little disruption to the sediment. Comparison of cumulative distribution frequencies for AVS concentration across the Louisianian Province on year-to-year basis showed no significant difference between the 1991 AVS values and the other years; therefore, the inadvertent sediment mixing that occurred in 1991 had little apparent effect on the release of volatile sulfides from the samples.

9.4 Sources of Error

9.5 Known Problems with the Data

9.6 Confidence Level/Accuracy Judgement

Appendix B (Tables)

9.7 Allowable Minimum Values

9.8 Allowable Maximum Values

9.9 QA Reference Data

10. DATA ACCESS

10.1 Data Access Procedures

A Data Request Package can be requested from a contact under Section 10.3. Data can be downloaded from the WWW site.

10.2 Data Access Restrictions

Data can only be accessed from the WWW site.

10.3 Data Access Contact Persons

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10.4 Data Set Format

Data can be transmitted in a variety of formats derived from SAS data files when a Data Request Form is submitted.

10.5 Information Concerning Anonymous FTP

Not accessible

10.6 Information Concerning Gopher

10.7 Information Concerning World Wide Web

Data can be downloaded from the WWW

10.8 EMAP CD-ROM Containing the Data set

Data not available on CD-ROM.

11. REFERENCES

11.1 EMAP References

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

11.2 Background References

Engle, V.D., J.K. Summers, G.R. Gaston. 1994. A Benthic Index of Environmental Condition of Gulf of Mexico Estuaries. Estuaries: 17:372-384.

Summers, J. Kevin, John F. Paul, Andrew Robertson. 1995. Monitoring the Ecological Condition Of Estuaries In The United States. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL 32651.

12. GLOSSARY AND TABLE OF ACRONYMS

12.1 Acronym used in the Detailed Documentation

12.2 Definition of Acronym

13. PERSONNEL INFORMATION

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Appendix A - List of Analytes

---------- General Category for Group of Analytes=ALKANES----------

ANALYTE	_LABEL_
ALKANE_T	TOTAL ALKANES
N_DECANE	N-DECANE ALIPHATIC HYDROCARBONS
N_DOCOSN	N-DOCOSANE ALIPHATIC HYDROCARBONS
N_DODECA	N-DODECANE ALIPHATIC HYDROCARBONS
N_DOTRCT	N-DOTRIACONTANE ALIPHATIC HYDROCARBONS
N_EICOSN	N-EICOSANE ALIPHATIC HYDROCARBONS
N_HENESN	N-HENEICOSANE ALIPHATIC HYDROCARBONS
N_HENTCT	N-HENTRIACONTANE ALIPHATIC HYDROCARBONS
N_HEPADC	N-HEPTADECANE ALIPHATIC HYDROCARBONS
N_HEPTSN	N-HEPTACOSANE ALIPHATIC HYDROCARBONS
N_HEXADC	N-HEXADECANE ALIPHATIC HYDROCARBONS
N_HEXASN	N-HEXACOSANE ALIPHATIC HYDROCARBONS
N_NONADC	N-NONADECANE ALIPHATIC HYDROCARBONS
N_NONASN	N-NONACOSANE ALIPHATIC HYDROCARBONS
N_OCTADC	N-OCTADECANE ALIPHATIC HYDROCARBONS
N_OCTASN	N-OCTACOSANE ALIPHATIC HYDROCARBONS
N_PENTDC	N-PENTEDECANE ALIPHATIC HYDROCARBONS
N_PENTSN	N-PENTACOSANE ALIPHATIC HYDROCARBONS
N_TETRCT	N-TETRATRIACONTANE ALIPHATIC HYDROCARBON
N_TETRDC	N-TETRADECANE ALIPHATIC HYDROCARBONS
N_TETRSN	N-TETRACOSANE ALIPHATIC HYDROCARBONS
N_TRIACT	N-TRIACONTANE ALIPHATIC HYDROCARBONS
N_TRICSN	N-TRICOSANE ALIPHATIC HYDROCARBONS
N_TRIDC	N-TRIDECANE ALIPHATIC HYDROCARBONS
N_TRITCT	N-TRITRIACONTANE ALIPHATIC HYDROCARBONS
N_UNDECA	N_UNDECANE ALIPHATIC HYDROCARBONS

------------------General Category for Group of Analytes=AVS-----------------

ANALYTE	_LABEL_
AVS_CON	ACID-VOLATILE SULFIDES

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---------- General Category for Group of Analytes=ISOPRENOID ----------

ANALYTE	_LABEL_
ISOPRN_T	TOTAL ISOPRENOIDS
PHYTANE	PHYTANE
PRISTANE	PRISTANE

---------- General Category for Group of Analytes=METAL ----------

ANALYTE	_LABEL_
AG	SILVER
AL	ALUMINUM
AS	ARSENIC
CD	CADMIUM
CR	CHROMIUM
CU	COPPER
FE	IRON
HG	MERCURY
MN	MANGANESE
NI	NICKEL
PB	LEAD
SB	ANTIMONY
SE	SELENIUM
SN	TIN
ZN	ZINC

---------- General Category for Group of Analytes=ORGANOPHOS----------

ANALYTE	_LABEL_
CARBOFEN	CARBOFENOTHION
CHLORPYR	CHLORPYRIFOS
DIAZINON	DIAZINON
DISULFOT	DISULFOTON
ETHION	ETHION
TERBUFOS	TERBUFOS

---------- General Category for Group of Analytes=PAH----------

ANALYTE	_LABEL_
ACENTHE	ACENAPHTHENE
ACENTHY	ACENAPHTHYLENE
ANTHRA	ANTHRACENE
BENANTH	BENZO(A)ANTHRACENE
BENAPY	BENZO(A)PYRENE
BENEPY	BENZO(E)PYRENE
BENZOBFL	BENZO(B)FLUORANTHENE
BENZOKFL	BENZO(K)FLUORANTHENE
BENZOP	BENZO(G,H,I)PERYLENE
BIPHENYL	BIPHENYL
C1CHRYS	C1-CHRYSENES

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---------- General Category for Group of Analytes=PAH (cont.)---------

C1DIBENZ	C1-DIBENZOTHIOPHENES
C1FLRAN	C1-FLUORANTHENE PYRENE
C1FLUOR	C1-FLUORENES
C1NAPH	C1-NAPHTHALENES
C1PHENAN	C1-PHENANTHRENES
C2CHRYS	C2-CHRYSENES
C2DIBENZ	C2-DIBENZOTHIOPHENES
C2FLUOR	C2-FLUORENES
C2NAPH	C2-NAPHTHALENES
C2PHENAN	C2-PHENANTHRENES
C3CHRYS	C3-CHRYSENES
C3DIBENZ	C3-DIBENZOTHIOPHENES
C3FLUOR	C3-FLUORENES
C3NAPH	C3-NAPHTHALENES
C3PHENAN	C3-PHENANTHRENES
C4CHRYS	C4-CHRYSENES
C4NAPH	C4-NAPHTHALENES
C4PHENAN	C4-PHENANTHRENES
CHRYSENE	CHRYSENE
DIBENZ	DIBENZO(A,H)ANTHRACENE
DIBENZO	DIBENZOTHIOPHENE
DIMETH	2,6-DIMETHYLNAPHTHALENE
FLUORANT	FLUORANTHENE
FLUORENE	FLUORENE
INDENO	(I)1,2,3-C,D-PYRENE
MENAP1	1-METHYLNAPHTHALENE
MENAP2	2-METHYLNAPHTHALENE
MEPHEN1	1-METHYLPHENANTHRENE
NAPH	NAPHTHALENE
PAHTOT_L	TOTAL PAHS - LA PROVINCE
PAH_HMW	HIGH MOLECULAR WT - TOT. PAH
PAH_LMW	LOW MOLECULAR WT - TOT. PAH
PAH_TOT	TOTAL PAHS
PERYLENE	PERYLENE
PHENANTH	PHENANTHRENE
PYRENE	PYRENE
TRIMETH	2,3,5-TRIMETHYLNAPHTHALENE

---------- General Category for Group of Analytes=PCB ---------------

ANALYTE	_LABEL_
PCB101	PCB 101
PCB105	PCB 105
PCB110	PCB 110/77
PCB118	PCB 118/108/149
PCB126	PCB 126
PCB128	PCB 128
PCB138	PCB 138
PCB153	PCB 153
PCB170	PCB 170
PCB18	PCB 18
PCB180	PCB 180
PCB187	PCB 187/182/159
PCB195	PCB 195

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---------- General Category for Group of Analytes=PCB (cont.)---------

PCB200	PCB 200
PCB206	PCB 206
PCB209	PCB 209
PCB28	PCB 28
PCB29	PCB 29
PCB44	PCB 44
PCB52	PCB 52
PCB66	PCB 66
PCB8	PCB 8
PCB87	PCB 87
PCBTOT_L	TOTAL PCBS - LA PROVINCE
PCB_TOT	TOTAL PCBS

---------- General Category for Group of Analytes=PESTICIDE ----------

ANALYTE	_LABEL_
ALDRIN	ALDRIN
ALPHABHC	ALPHA-BHC
ALPHACHL	ALPHA-CHLORDANE
BETABHC	BETA-BHC
BHC_TOT	TOTAL BHC
CHL_TOT	TOTAL CHLORDANE
CISNONA	CIS-NONACHLOR
DDD	OP-DDD + PP-DDD
DDE	OP-DDE + PP-DDE
DDT	OP-DDT + PP-DDT
DDT_TOT	TOTAL DDT
DELTABHC	DELTA-BHC
DICOFOL	DICOFOL
DIELDRIN	DIELDRIN
ENDOSUL1	ALPHA-ENDOSULFAN
ENDOSUL2	BETA -ENDOSULFAN
ENDRIN	ENDRIN
GAMMACHL	GAMMA-CHLORDANE
HEPTACHL	HEPTACHLOR
HEPTAEPO	HEPTACHLOR-EPOXIDE
HEXACHL	HEXACHLOROBENZENE
LINDANE	LINDANE (GAMMA-BHC)
MIREX	MIREX
OPDDD	O,P'DDD
OPDDE	O,P'DDE
OPDDT	O,P'DDT
OXYCHL	OXYCHLORDANE
OXYFL	OXYFLUORFEN
PPDDD	P,P'DDD
PPDDE	P,P'DDE
PPDDT	P,P'DDT
TNONCHL	TRANS-NONACHLOR
TOXAPHEN	TOXAPHENE

---------- General Category for Group of Analytes=TBT ----------

ANALYTE	_LABEL_
DBT	DI-BUTYL TIN
MBT	MONO BUTYL TIN
TBT	TRI-BUTYL TIN

---------- General Category for Group of Analytes=TOC ----------

ANALYTE	_LABEL_
TOC	TOTAL ORGANIC CARBON

Appendix B

TABLE 9-1a. Relative accuracy for the 1991 EMAP-LP analyses of inorganic contaminants in sediments based on the laboratory's analytical results of a certified reference materials (CRMs), the National Research Council of Canada's (NRC) BCSS-1, MESS-1, and BEST-1 (for mercury, only); the CRMs were analyzed on a per batch basis (batch = <=20 samples). Relative accuracy was computed by comparing the laboratory's result for an analyte against the NRC's certified value to calculate percent recovery. The accuracy goal for EMAP-LP inorganic analyses was that the Laboratory's averaged value to be within +-20% agreement to the CRM values. (note: this pertained only to those analytes with NRC-reported concentrations >= 10X the laboratory's reported MDL).

ANALYTE	RECOVERY (%)	RANGE (% recov)
BCSS-1 (n=7)		
Arsenic	88	81 - 99
Cadmium	94	72 - 108
Chromium	90	85 - 97
Copper	85	75 - 95
Lead	100	86 - 119
Manganese	96	89 - 106
Nickel	93	89 - 95
Selenium	93	46 - 140
Tin	106	86 - 135
Zinc	90	84 - 103
MESS-1 (n=7)		
Arsenic	90	78 - 106
Cadmium	100	95 - 107
Chromium	84	76 - 90
Copper	89	76 - 98
Lead	89	84 - 96
Manganese	96	92 - 103
Nickel	85	77 - 94
Selenium	76	33 - 100
Tin	73	55 - 88
Zinc	95	89 - 106
BEST-1 (n=7)		
Mercury	92	78 - 100

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TABLE 9-1b. Relative accuracy for the 1992 EMAP-LP analyses of inorganic contaminants in sediments based on the laboratory's analytical results of a certified reference materials (CRMs), the National Research Council of Canada's (NRC) BCSS-1 and BEST-1 (for mercury, only); the CRMs were analyzed on a per batch basis (batch = <=20 samples). Relative accuracy was computed by comparing the laboratory's result for an analyte against the NRC's certified value to calculate percent recovery. The accuracy goal for EMAP-LP inorganic analyses was that the Laboratory's averaged value (n=18) to be within +-20% agreement to the CRM values. (note: this pertained only to those analytes with NRC-reported concentrations >= 10X the laboratory's reported MDL).

ANALYTE	RECOVERY (%)	RANGE (% recov)
Arsenic	104	90 - 153
Cadmium	116	104 - 140
Chromium	87	78 - 96
Copper	90	85 - 96
Lead	97	86 - 109
Manganese	104	99 - 108
Mercury	101	90 - 111
Nickel	100	89 - 115
Selenium	102	0 - 130
Tin	110	85 - 147
Zinc	97	92 - 103

TABLE 9-1c. Relative accuracy for the 1993 EMAP-LP analyses of inorganic contaminants in sediments based on the laboratory's analytical results of a certified reference material (CRM), the National Research Council of Canada's (NRC) MESS-1; the CRMs were analyzed on a per batch basis (batch = <=20 samples). Relative accuracy was computed by comparing the laboratory's result for an analyte against the NRC's certified value to calculate percent recovery. The accuracy goal for EMAP-LP inorganic analyses was that the Laboratory's averaged value (n=15) to be within +-20% agreement to the CRM values. (note: this pertained only to those analytes with NRC-reported concentrations >= 10X the laboratory's reported MDL).

ANALYTE	RECOVERY (%)	RANGE (% recov)
Arsenic	97	83 - 117
Cadmium	98	88 - 108
Chromium	93	85 - 99
Copper	92	85 - 109
Lead	89	83 - 95
Manganese	99	93 - 102
Mercury	99	89 - 108
Nickel	96	86 - 107
Selenium	100	89 - 107
Silver	101	83 - 117
Tin	86	81 - 97
Zinc	95	86 - 102

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TABLE 9-1d. Relative accuracy for the 1994 EMAP-LP analyses of inorganic contaminants in sediments based on the laboratory's analytical results of a certified reference material (CRM), the National Research Council of Canada's (NRC) BCSS-1; the CRM was analyzed on a per batch basis (batch = <=20 samples). Relative accuracy was computed by comparing the laboratory's result for an analyte against the NRC's certified value to calculate percent recovery. The accuracy goal for EMAP-LP inorganic analyses was that the Laboratory's averaged value (n=11) to be within +-20% agreement to the CRM values. (note: this pertained only to those analytes with NRC-reported concentrations >= 10X the laboratory's reported MDL).

ANALYTE	RECOVERY (%)	RANGE (% recov)
Arsenic	95	78 - 119
Cadmium	111	96 - 136
Chromium	92	70 - 103
Copper	103	97 - 112
Lead	96	83 - 121
Manganese	98	93 - 109
Mercury	100	100
Nickel	101	89 - 114
Selenium	97	77 - 119
Silver	98	58 - 136
Tin	101	77 - 134
Zinc	94	84 - 106

TABLE 9-2a. Summary of 1991 laboratory results for the analyses of the organics-in-sediment laboratory control material (LCM). The LCM used was the National Institute of Standards and Technology (NIST) issued Standard Reference Material 1941 (SRM 1941) - Organics in Marine Sediment; the LCM was analyzed with each batch run of samples. Results are reported as the laboratory's average percent recovery (n=19) based on the NIST-reported "true" concentrations for the analytes of interest. The EMAP-E performance-based accuracy goal for organic analyses was that the laboratory percent recovery consistently fall within +- 30% the NIST concentration (note: this pertained only to those analytes with NIST-reported concentrations >= 10X the laboratory's reported MDL).

ANALYTE	RECOVERY (%)	RANGE (% recov)
PAHs:		
Acenaphthene	101	(93 - 109)
Acenaphthylene	100	(90 - 115)
Anthracene	99	(92 - 100)
Benzo (a) anthracene	100	(94 - 105)
Benzo (a) pyrene	99	(92 - 100)
Benzo (e) pyrene	101	(83 - 124)
Benzo (b) fluoranthene	100	(98 - 100)
Benzo (k) fluoranthene	107	(81 - 143)
Benzo (g,h,,i) perylene	99	(85 - 114)
Biphenyl	101	(100 - 107)
Chrysene	108	(78 - 128)
2,6-Dimethylnapthalene	101	(94 - 109)

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TABLE 9-2a.(cont.)

ANALYTE	RECOVERY (%)	RANGE (% recov)
Fluoranthene	100	(98 - 108)
Fluorene	102	(89 - 110)
(i) 1,2,3-c,d-pyrene	99	(77 - 116)
1-methylnaphthalene	100	(89 - 114)
2-methylnaphthalene	100	(85 - 109)
1-methylphenanthrene	98	(77 - 110)
Naphthalene	101	(86 - 115)
Perylene	102	(96 - 112)
Phenanthrene	99	(79 - 106)
Pyrene	99	(92 - 103)
PCBs:		
PCB 105	110	(77 - 170)
PCB 153	126	(69 - 182)
PCB 180	117	(58 - 177)
PCB 206	79	(26 - 147)
PCB 28	81	(62 - 98)
Organochlorine pesticides:		
alpha-Chlordane	74	(37 - 99)
Dieldrin	298	(0 - 476)
Heptachlor-epoxide	308	(0 - 688)
p,p-DDD	61	(33 - 115)
p,p-DDE	101	(63 - 202)
p,p-DDT	64	(0 - 155)
trans-Nonachlor	57	(0 - 89)

TABLE 9-2b. Summary of 1992 laboratory results for the analyses of the organics-in-sediment laboratory control material (LCM). The LCM used was the National Institute of Standards and Technology (NIST) issued Standard Reference Material 1941 (SRM 1941) - Organics in Marine Sediment; the LCM was analyzed with each batch run of samples. Results are reported as the laboratory's average percent recovery (n=14) based on the NIST-reported "true" concentrations for the analytes of interest. The EMAP-E performance-based accuracy goal for organic analyses was that the laboratory percent recovery consistently fall within +- 30% the NIST concentration (note: this pertained only to those analytes with NIST-reported concentrations >= 10X the laboratory's reported MDL).

ANALYTE	RECOVERY (%)	RANGE (% recov)
PAHs:		
Acenaphthene	69	(57 - 90)
Acenaphthylene	77	(66 - 93)
Anthracene	100	(99 - 100)
Benzo (a) anthracene	101	(98 - 106)
Benzo (a) pyrene	98	(89 - 100)
Benzo (e) pyrene	106	(90 - 122)

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TABLE 9-2b.(cont.)

ANALYTE	RECOVERY (%)	RANGE (% recov)
Benzo (b) fluoranthene	100	(96 - 100)
Benzo (k) fluoranthene	157	(131 - 180)
Benzo (g,h,,i) perylene	98	(73 - 112)
Biphenyl	86	(76 - 100)
Chrysene	140	(111 - 162)
2,6-Dimethylnapthalene	88	(77 - 100)
Fluoranthene	99	(92 - 100)
Fluorene	74	(61 - 87)
(i) 1,2,3-c,d-pyrene	99	(69 - 116)
1-methylnaphthalene	81	(74 - 90)
2-methylnaphthalene	84	(76 - 90)
1-methylphenanthrene	89	(69 - 100)
Naphthalene	71	(64 - 78)
Perylene	79	(69 - 100)
Phenanthrene	93	(79 - 100)
Pyrene	99	(90 - 100)
PCBs:		
PCB 101	121	(103 - 146)
PCB 105	118	(56 - 224)
PCB 118	115	(80 - 159)
PCB 138	96	(68 - 119)
PCB 153	125	(101- 152)
PCB 18	60	(44 - 82)
PCB 180	118	(73 - 152)
PCB 187	111	(84 - 126)
PCB 195	190	(0 - 310)
PCB 206	92	(41 - 156)
PCB 209	101	(54 - 172)
PCB 28	84	(59 - 101)
PCB 52	226	(157 - 298)
PCB 66	67	(43 - 77)
Organochlorine pesticides:		
alpha-Chlordane	112	(62 - 174)
Dieldrin	451	(286 - 707)
Heptachlor-epoxide	250	(0 - 494)
p,p-DDD	65	(40 - 100)
p,p-DDE	100	(86 - 124)
p,p-DDT	18	(0 - 100)
trans-Nonachlor	87	(55 - 125)

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TABLE 9-2c. Summary of 1993 laboratory results for the analyses of the organics-in-sediment laboratory control material (LCM). The LCM used was the National Institute of Standards and Technology (NIST) issued Standard Reference Material 1941a (SRM 1941a) - Organics in Marine Sediment; the LCM was analyzed with each batch run of samples. Results are reported as the laboratory's average percent recovery (n=10) based on the NIST-reported "true" concentrations for the analytes of interest. The EMAP-E performance-based accuracy goal for organic analyses was that the laboratory percent recovery consistently fall within +- 30% the NIST concentration (note: this pertained only to those analytes with NIST-reported concentrations >= 10X the laboratory's reported MDL).

ANALYTE	RECOVERY (%)	RANGE (% recov)
PAHs:		
Acenaphthene	99	(96 - 100)
Acenaphthylene	115	(100 - 134)
Anthracene	76	(55 - 100)
Benzo (a) anthracene	87	(73 - 100)
Benzo (a) pyrene	82	(71 - 92)
Benzo (e) pyrene	82	(71 - 98)
Benzo (b) fluoranthene	90	(68 - 101)
Benzo (k) fluoranthene	104	(62 - 159)
Benzo (g,h,,i) perylene	82	(57 - 100)
Biphenyl	43	(36 - 57)
Chrysene	111	(87 - 142)
Dibenzo (a,h) anthracene	107	(100 - 117)
Dibenzothiophene	72	(58 - 89)
Fluoranthene	78	(64 - 100)
Fluorene	71	(57 - 95)
(i) 1,2,3-c,d-pyrene	88	(69 - 100)
1-methylphenanthrene	85	(71 - 112)
Naphthalene	80	(66 - 100)
Perylene	60	(46 - 88)
Phenanthrene	75	(61 - 100)
Pristane	142	(100 - 205)
Pyrene	74	(61 - 83)
PCBs:		
PCB 8	133	(96 - 241)
PCB 18	223	(145 - 302)
PCB 28	87	(75 - 100)
PCB 44	92	(73 - 100)
PCB 52	119	(95 - 162)
PCB 66	95	(69 - 100)
PCB 101	88	(67 - 108)
PCB 105	71	(41 - 100)
PCB 110	168	(100 - 247)
PCB 118	71	(52 - 92)
PCB 128	73	(0 - 193)
PCB 138	71	(57 - 100)
PCB 153	64	(44 - 87)
PCB 170	595	(268 - 1560)
PCB 180	106	(97 - 134)
PCB 187	91	(65 - 100)

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TABLE 9-2c. (continued)

ANALYTE	RECOVERY (%)	RANGE (% recov)
PCB 206	41	(14 - 88)
PCB 209	53	(36 - 87)
Organochlorine pesticides:		
alpha-Chlordane	77	(42 - 100)
Dieldrin	140	(100 - 217)
Hexachlorobenzene	97	(86 - 100)
o,p- DDE	70	(0 - 149)
p,p-DDD	90	(69 - 106)
p,p-DDE	57	(42 - 97)
p,p-DDT	17	(0 - 55)
trans-Nonachlor	89	(61 - 100)

TABLE 9-2d. Relative accuracy for the 1994 EMAP-LP analyses of organics in sediments based on the laboratory's analytical results of a standard reference material (SRM), the National Institute of Technology and Standards (NIST) SRM 1941a; the SRM was analyzed on a per sample batch basis. Relative accuracy was computed by comparing the laboratory's value for an analyte against either end of the range of values (i.e., 95% confidence limits) reported by NIST for the analyte. The accuracy goal for EMAP-LP organic analyses was that the laboratory's averaged value (n=10) to be within +- 35% agreement to the SRM values.

ANALYTE	RECOVERY (%)	RANGE (% recov)
PAHs:		
Acenaphthene	110	(102 - 118)
Acenaphthylene	118	(102 - 135)
Anthracene	107	(98 - 115)
Benzo (a) anthracene	108	(101 - 117)
Benzo (a) pyrene	94	(81 - 100)
Benzo (e) pyrene	102	(87 - 109)
Benzo (b) fluoranthene	95	(70 - 111)
Benzo (k) fluoranthene	123	(97 - 163)
Benzo (g,h,,i) perylene	100	(88 - 113)
Biphenyl	85	(69 - 102)
Chrysene	104	(98 - 109)
Dibenzo (a,h) anthracene	109	(85 - 134)
Fluoranthene	102	(95 - 105)
Fluorene	96	(85 - 116)
(i) 1,2,3-c,d-pyrene	115	(93 - 140)
1-methylphenanthrene	92	(78 - 113)
Naphthalene	101	(85 - 109)
Perylene	87	(68 - 107)
Phenanthrene	105	(99 - 115)
Pyrene	101	(93 - 107)

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TABLE 9-2d. (continued)

ANALYTE	RECOVERY (%)	RANGE (% recov)
PCBs:		
PCB 8	158	(106 - 284)
PCB 18	248	(209 - 317)
PCB 28	99	(97 - 100)
PCB 44	113	(100 - 144)
PCB 52	111	(100 - 140)
PCB 66	148	(123 - 203)
PCB 101	102	(94 - 119)
PCB 105	167	(137 - 205)
PCB 118	99	(89 - 118)
PCB 138	110	(98 - 137)
PCB 153	74	(58 - 100)
PCB 170	134	(112 - 169)
PCB 180	131	(100 - 158)
PCB 187	99	(94 - 100)
PCB 206	141	(94 - 355)
PCB 209	84	(65 - 100)
Organochlorine pesticides:		
alpha-Chlordane	66	(0 - 100)
Dieldrin	104	(63 - 133)
Hexachlorobenzene	74	(46 - 100)
o,p- DDE	163	(0 - 232)
p,p-DDD	91	(79 - 102)
p,p-DDE	89	(69 - 112)
p,p-DDT	96	(73 - 131)
trans-Nonachlor	115	(100 - 151)
Oxychlordane	15	(0 - 72)

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