Chesapeake Bay Program Guidance for Data Management

Chesapeake Bay Program
Information Access Strategy

The Chesapeake Bay Program is a unique regional partnership leading and directing restoration of Chesapeake Bay since 1983. The Chesapeake Bay Program partners include the states of Maryland, Pennsylvania, and Virginia; the District of Columbia; the Chesapeake Bay Commission, a tri-state legislative body; the U. S. Environmental Protection Agency, which represents the federal government; and participating citizen advisory groups.

In 1996, the Chesapeake Executive Council adopted the Chesapeake Bay Program's "Strategy for Increasing Basin-wide Public Access to Chesapeake Bay Information." The strategy calls for development of a shared resource of information, that is available through the Internet, based on standards and protocols that facilitate access to information and data across agency and jurisdictional boundaries.

This document provides guidance to contractors and grantees who accept funding from- and conduct work for Chesapeake Bay Program agency activities. The guidance in this document is provided to guide the collection, processing, and delivery of data and information products. In addition, it provides guidance to agencies serving information on the Internet as part of the Chesapeake Information Management System.

Chesapeake Bay Program
Guidance for Data Management

November 2006

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SUMMARY

This document describes the guidelines and policies for submitting data to the Chesapeake Bay Program (CBP) Data Center in Annapolis, Maryland or serving data on the Internet as part of the Chesapeake Information Management System (CIMS). Grantees, contractors, and data servers are required to submit deliverables in electronic format, whether or not this requirement is specified in the grant or contract. Electronic deliverables include reports, graphics, spreadsheets, imagery, data files, audio, and digital video products. Deliverables must be submitted on time as specified in the grant or contract. All data and information funded by CBP agencies, whether direct CBP funding or indirect (matching funds), are the property of the CBP. All data and information, funded directly or indirectly by the CBP is public information and shall be made available to the public, unless there is a grant or contract condition that specifies otherwise. In addition, source data collected and processed in the creation of a deliverable should also be submitted, if practical. If source data is submitted, it should also be delivered in electronic format. Final details about how data and information must be submitted must be arranged with the CBP Grant or Contract Officer.

This document provides information on:

- ❖ Data, Information and Document Delivery Policy
- ❖ Deliverable Serving vs. Submission Policy
- ❖ Locational Data Policy
- ❖ Map Coordinate Datum Policy
- ❖ Map Coordinate Projection Guideline
- ❖ Metadata Policy
- ❖ Common Station Names Guideline
- ❖ Common Data Dictionary Guideline
- ❖ Common Database Design Guideline
- ❖ Calendar Date Policy
- ❖ Common Method Codes Guideline
- ❖ Data Reporting Guideline
- ❖ ITIS Biological Nomenclature Policy

The data dictionaries, data definitions, and user guidance referenced in the policies and guidelines in this document provide the detail necessary to provide data to the CBP. These are listed in the "Reference Material" section.   The documents listed are available from the Chesapeake Bay Program (CBP), Chesapeake Information Management System (CIMS), Federal Geographic Data Committee (FGDC), or National Biological Information Infrastructure (NBII) Internet Web sites or the individual CBP Data Managers. For data and information not specified in the "Reference Material" documents, contact your Grant or Contracting Officer to obtain the required technical details.

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INTRODUCTION

This Guide is intended to aid contractors and grantees in effectively collecting, processing, and submitting data and information to Chesapeake Bay Program agencies that fund contract and grant activities. In addition, it is intended to aid agencies in effectively serving information on the Internet as part of the Chesapeake Information Management System.

Chesapeake Bay Program Data Center

The Chesapeake Bay Program (CBP) maintains a Data Center at its office in Annapolis, Maryland. The purpose of the Data Center is to provide data management and technical support to program participants in order to accomplish the goals agreed on by the Chesapeake Executive Council and its committees. The Data Center manages the computer hardware and software of the Chesapeake Bay Program Office (CBPO), provides user support for these computer resources, acquires and stores data sets, and provides data analysis support for Bay Program activities. Recipients of Data Center services are the CBP subcommittees, Bay Program managers, and the watershed's scientific community, stakeholders, and the public.

Most Chesapeake Bay Program participating organizations maintain separate information systems at their facilities. Therefore, it is the responsibility of the organization to comply with the contract/grant requirements of the funding agency and the policies and standards of the Chesapeake Bay Program.
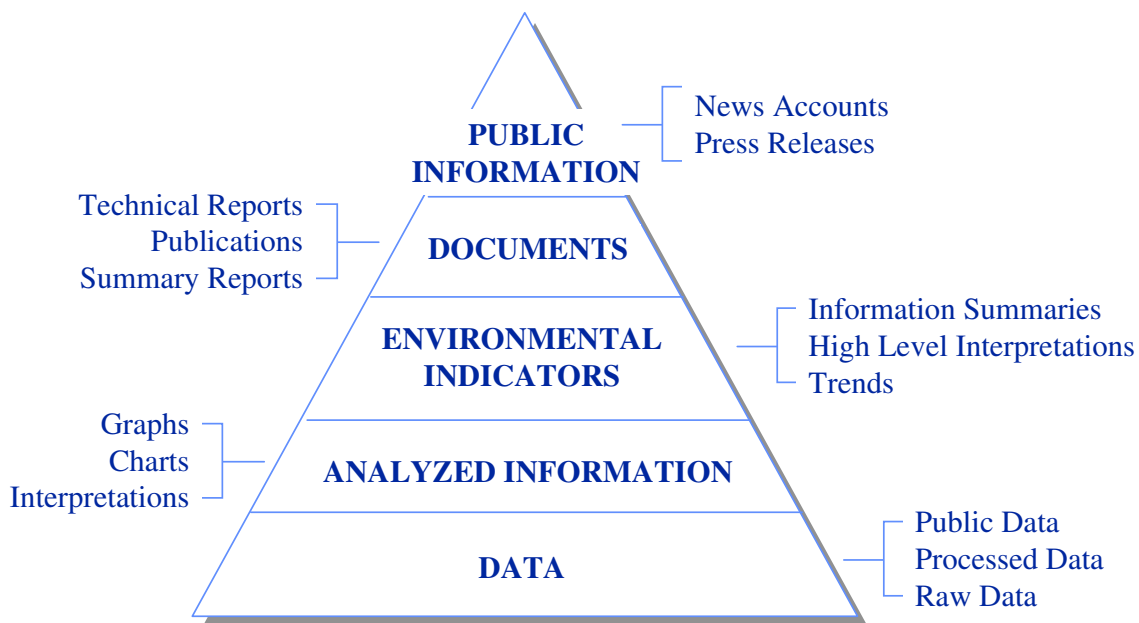
Chesapeake Information Management System

The Chesapeake Bay Program is continuing to implement the Chesapeake Information Management System (CIMS), which is composed of a network of distributed information servers operated by CBP participating agencies. The creation of a distributed information system is required as a result of the rapid expansion of the Internet and the advancement of data management practices. As CIMS matures, the intent is to have CBP databases created and managed by the data originator, to have the information reside with the data originator, and to have the information made directly available from the data originator's institution through an Internet server. This system has several advantages over a centralized information repository. Primarily, the people with the most expertise and knowledge about the information, the data originators, would be managing the data. Additional advantages include reduced costs due to elimination of intermediate data handling at a central repository, and decreased time between collection and release of the information. The major difficulties with a distributed system include: 1) the information provider MUST ensure a stable Internet connection; 2) the information MUST be maintained in a high quality controlled condition; 3) the information MUST be maintained up-to-date; and 4) the information MUST conform to agreed organization and data structures so that the information can be accessed and used by the larger Bay Program user audience.

Types of Information

Various kinds of data and information are collected, used or generated by the Chesapeake Bay Program and its participants (see Information Pyramid). Each of the major types of information–data, analyzed information, environmental indicators, documents, and public information–serves one or more purposes aimed at addressing management questions related to the Bay.

Information Pyramid

PUBLIC INFORMATION — News Accounts / Press Releases

Technical Reports / Publications / Summary Reports — DOCUMENTS

ENVIRONMENTAL INDICATORS — Information Summaries / High Level Interpretations / Trends

Graphs / Charts / Interpretations — ANALYZED INFORMATION

DATA — Public Data / Processed Data / Raw Data

Internet technology has provided the opportunity to make all of this information available to CBP partner organizations and the public. A goal for all CBP partner organizations and CIMS MOA signatories is to publish all of these types of information for electronic access over the Internet.

CBP Internet Web Page

The CBP has operated an Internet Web Page since April 1995. Currently, this web site (http://www.chesapeakebay.net/) provides the most complete inventory of data and information that is available for the Program. This web site has been designed to provide information at all levels of the Information Pyramid.

CIMS Internet Web Page

A fundamental CIMS requirement is to make data and information available through the Internet from a variety of distributed information servers across the Chesapeake region. A centralized CIMS web site (http://www.chesapeakebay.net/CIMS/) serves as a hub for CIMS information access. This web site is primarily a group of powerful search engines that can point user-queries to the appropriate information sources. Longer term, the CIMS web site is envisioned as an information interpretation and analysis engine.

Additionally, the Chesapeake Information Management System may also host web sites and pages for CBP organizations that do not have adequate resources to maintain their own Internet servers.

Users who retrieve data and information from the CBP and CIMS web sites should, as a professional courtesy, acknowledge the CBP and data originators in publications that reference or use the databases.

CBP Information Management Guidelines and Policies

This section discusses the guidelines and policies that must be followed by all agencies, institutions, and organizations participating in data and information collection, processing, document generation and submittal to the Chesapeake Bay Program under grant or cooperative agreement funding. The Chesapeake Bay Program has adopted these guidelines and policies in order to improve coordination, compatibility, standardization, and information access across all the Bay Program partners. In addition to these guidelines and policies, any activities funded with Federal Government funds, must also adhere to applicable Federal Information Processing Standards (FIPS) (http://www.itl.nist.gov/div897/pubs/) and executive order #12906.

❖ Data, Information, and Document Deliverables Requirements
❖ Deliverable Serving vs. Submission Policy
❖ Locational Data Policy
❖ Map Coordinate Datum Policy
❖ Map Coordinate Projection Guideline
❖ Metadata Policy
❖ Common Station Names Guideline
❖ Common Data Dictionary Guideline
❖ Common Database Design Guideline
❖ Calendar Date Policy
❖ Common Method Codes Guideline
❖ Data Reporting Guideline
❖ ITIS Biological Nomenclature Policy

Data, Information, and Document Deliverables Requirements

Recipients are required to submit data, information, and document deliverables in electronic format unless exceptions are specified in the grant or cooperative agreement work plan. Electronic deliverables include but are not limited to reports, graphics, spreadsheets, imagery, data files, audio, and digital video products.

All data, information, and documents funded by the Chesapeake Bay Program whether through direct Chesapeake Bay Program funding or indirect matching funds are public information and shall be made available to the public unless there is a grant/cooperative agreement award condition that specifies otherwise. In addition, source data collected and processed in the creation of a deliverable should also be submitted when practical. If source data is submitted, it should also be delivered in electronic format. All deliverables must have associated metadata.

Document Type	Acceptable Formats
Text	**Preferred:** Microsoft Word (DOC) Portable Document Format (PDF) * ASCII Text Extensible Markup Language (XML)
Spreadsheet	**Preferred:** Microsoft Excel 97 or higher **With Prior Approval:** PageMaker Lotus 1-2-3 QuatroPro Tab/Comma delimited text files
Database	**Preferred:** Microsoft Access 97 or higher Microsoft SQL Server Extensible Markup Language (XML)
Graphics	**Preferred:** TIFF GIF JPEG SVG
Geographic Information System	**Preferred:** ESRI Spatial Database Engine (SDE) ESRI personal geodatabases ESRI coverages, grids, shapefiles ArcExport non-compressed (E00)

* Data tables delivered within PDF documents must be delivered in one of the spreadsheet formats.

Deliverable Serving vs. Submission Policy

Recipients can submit deliverables directly to the Chesapeake Bay Program or serve deliverables from a data/web server. The preferred method for serving data is through an extensible markup language (XML) web service. Recipients who plan to directly serve their grant/cooperative agreement deliverables through their own data server/web site must have signed a CIMS Memorandum of Understanding with the Chesapeake Bay Program.

Locational Data Policy

The Chesapeake Bay Program adheres to the EPA's locational data policy, which requires consistent use of latitude/longitude coordinates to identify the location of entities. All data, containing spatial and/or specific geographic locations, collected or assembled under a Chesapeake Bay Program grant or cooperative agreement or to be served on the Internet via the Chesapeake Information Management System, must have latitude and longitude information for

each entity. Projects not creating or reporting spatial data, but-confined to a given project location(s), shall include the latitude/longitude of the location(s) within the study/final report.

In accordance with Chesapeake Bay Program locational data policy, the recipients agree to ensure that latitude and longitude coordinates (given in degrees and decimal degrees) are provided for all sites for which data are collected and accurate to the level required for the purpose of the application of the data. Field measured locations shall be accurate to the best practical geographic positioning method. Currently, Differential Global Positioning System (GPS) equipment can reliably provide coordinates accurate to within 10-25 meters (5 decimal places in decimal degrees), and is the preferred method of point location determination. Applications such as station monitoring locations should provide locational data with accuracy to that level. Other applications, such as digitizing points or watershed boundaries from Mylar media maps, can not provide accuracy better than that of the original map, and can not match the accuracy of GPS or surveyed locations. Remote sensing platforms can now collect sub-meter resolution data (6 decimal places in decimal degrees). Therefore, it is required that metadata be provided for all data and must include a measurement of the accuracy of the coordinates and the original source material and methods for obtaining the coordinates. It is the responsibility of data generators/providers to provide coordinates accurate to the level that is practical for the intended application, and to document the accuracy of those coordinates. The recipient further agrees to document, in writing, that locational data were derived using an approved method and recorded in accordance with federal regulations and other EPA requirements, noted in the "Authorities" section of the EPA's policy. Recipient shall include in their work plan an assurance to comply with this requirement.

Map Coordinate Datum Policy

The Chesapeake Bay Program has adopted the policy that all data generated or collected for, submitted to the Chesapeake Bay Program, or served on the Internet via CIMS shall utilize either the North American Datum 1983 (NAD83) or World Geodetic System 1984 (WGS84) horizontal reference and the North American Vertical Datum 1988 (NAVD88) vertical reference. Most likely, organizations have been using NAD27 horizontal reference since USGS maps were historically created using this reference. The requirement to use NAD83 or WGS84 will require conversion of latitudes and longitudes using NAD27 to NAD83/WGS84. Metadata reporting requires specification of the horizontal and vertical datum where applicable.

Map Coordinate Projection Guideline

The Chesapeake Bay Program has adopted the policy that the standard projection for geographic information system (GIS) files maintained at the Chesapeake Bay Program Office (CBPO) shall be UTM Zone 18 (meters) for all data within the Chesapeake Bay basin. For larger or national GIS data files, the standard projection for GIS files maintained at the CBPO shall be Albers Conical Equal Area (meters). This policy was established to provide consistency in computing distance and area calculations, map shapes, and to facilitate database design and maintenance, and based on the recommendation of USGS. GIS and data files containing spatial data, must have coordinates reported as latitude and longitude (decimal degrees) as per the Locational Data Policy. Ideally, it is requested that information containing projected coordinates, also report coordinates in UTM Zone 18. GIS files submitted to the

Program or served by CIMS participants, are preferred in ARC/INFO non-compressed export or ArcView shape format for compatibility with the majority of the Chesapeake Bay Program GIS databases. Partner organizations who have historically maintained GIS files in another projection or coordinate system are exempt from this policy (unless they are developing or providing data products as part of a Bay Program initiative) since the effort to convert large historical holdings would be prohibitive.

Metadata Policy

The Chesapeake Bay Program has adopted the policy, consistent with Presidential Executive Order # 12906, that all data generated or collected using federal funds, submitted to the Chesapeake Bay Program, or served on the Internet via CIMS, shall be accompanied by metadata (descriptive information about the data, often referred to as documentation), that fully conforms to the Federal Geographic Data Committee's requirements for metadata. Metadata created for Chesapeake Bay Program shall also be delivered to the EPA or other federal Clearinghouse as a requirement to fulfilling this policy and related grant or contract conditions. The FGDC guide for creating metadata is the *Content Standard for Digital Geospatial Metadata Workbook* (www.fgdc.gov/metadata).

The Chesapeake Bay Program has also adopted the policy, that all data generated or collected using federal funds, submitted to the Chesapeake Bay Program, or served on the Internet via CIMS, shall adhere to the National Biological Information Infrastructure's (NBII) Metadata Standard, where applicable. The NBII Metadata Standard, popular for environmental programs, provides extensions to the FGDC Metadata for documenting biological data and information. The NBII Biological Data Profile can be found at: www.nbii.gov.

Data to be accessed on the Internet via CIMS must follow the *CIMS Metadata Reporting Guidelines* established by the Chesapeake Bay Program. This Guideline was established to facilitate entering consistent, accurate metadata to ensure the information about the Chesapeake Bay will be easily available, and used appropriately. The *CIMS Metadata Reporting Guidelines* is also accessible on the CIMS Internet Web Page. The COMET system (www.chesapeakebay.net/comet) provides a streamlined, easy to use tool for entering metadata that meets CIMS and FGDC requirements.

Common Station Names Guideline

The Chesapeake Bay Program has adopted the guideline that all data generated or collected for, submitted to the Chesapeake Bay Program, or served on the Internet via CIMS should utilize a consistent set of common station names for identifying and reporting monitoring station locations. It is the data provider's responsibility to comply with this guideline. The purpose of this guideline is to create one master table of station names, to the extent possible, to reduce confusion among cooperating agencies. The Station Names table, maintained on the Chesapeake Bay Program web site, should serve as the master list. Updates to this table that are required by data submitters shall be coordinated with the CIMS Workgroup to maintain one consistent stations names list.

Common Data Dictionary Guideline

The Chesapeake Bay Program has adopted the guideline that all data generated or collected for, submitted to the Chesapeake Bay Program, or served on the Internet via CIMS should utilize the CBP common data dictionary for defining all data elements and units of measure. It is the, data provider's responsibility to comply with this policy. The purpose of this guideline is to create one data dictionary, to the extent possible, to reduce confusion among cooperating agencies. Updates required by data submitters to the dictionary shall be coordinated with the CIMS Workgroup to maintain one consistent data dictionary.

Common Database Design Guideline

The Chesapeake Bay Program has adopted the guideline that all data generated or collected for, submitted to the Chesapeake Bay Program, or served on the Internet via CIMS should utilize the CBP common database design for managing data. It is the data provider's responsibility to comply with this guideline. The purpose of this guideline is to use common database designs, to the extent possible, to simplify data formatting and sharing. Modifications to the common database design shall be coordinated with the CIMS Workgroup to maintain consistency in the database structure. If the Chesapeake Bay Program agencies do not have a pre-defined database that is acceptable for the work being conducted, the grantee/contractor should work with the funding agency to develop a database design that suits the requirements of the work. The database design should maintain maximum compatibility with other Chesapeake Bay Program database designs.

Calendar Date Policy

The Chesapeake Bay Program has adopted the standard that all data generated or collected for, submitted to the Chesapeake Bay Program, or served on the Internet via CIMS should adhere to the Federal Information Processing Standard, Representation for Calendar Date and Ordinal Date for Information Interchange (FIPS PUB 4- 1).

This standard states "For purposes of electronic data interchange in any recorded form among U.S. Government agencies, National Institute of Standards and Technology (NIST) highly recommends that four-digit year elements be used". The year should encompass a two-digit century that precedes, and is contiguous with, a two-digit year-of-century (e.g., 1999, 2000, etc.). In addition, optional two-digit year time elements specified in ANSI X3.30-1985(RI991) should not be used for the purposes of any data interchange among U.S. Government agencies. Therefore, it is required to report and store all dates using four digits for the year. In addition to facilitating data sharing, this requirement reduces the complications of processing date data after the millennium rollover at year 2000.

Common Method Codes Guideline

The Chesapeake Bay Program has adopted the guideline that all data generated or collected for, submitted to the CBP, or served on the Internet via CIMS should utilize the CBP Method Codes tables. The method codes are defined in the *Guide to using CBP Water Quality Monitoring Data, and The 1996 Users Guide to CBP Biological and Living Resources Monitoring Data.* It is the data provider's responsibility to comply with this guideline. The

purpose of this guideline is to use standardized method codes, to the extent possible, to simplify data coding and sharing. The methods used by monitoring agencies and analytical laboratories are critical in providing accurate measurements. Knowing the field and laboratory methods used is critical, therefore capturing the methods is a high priority during database development. Modifications to the CBP Method Codes shall be coordinated with the CIMS Workgroup to maintain consistency in the table contents. If CBP agencies do not have a pre-defined method code that is acceptable for the work being conducted, the grantee/contractor should work with the funding agency to develop method codes that suits the requirements of the work, while maintaining maximum compatibility with other CBP codes.

Numeric Data Reporting Guideline

The Chesapeake Bay Program has adopted the guideline that all data generated or collected for, submitted to the Chesapeake Bay Program, or served on the Internet via CIMS should report numeric data elements at the same level of precision as that of the original measurement. The exact precision of recorded values must be maintained. This guideline has a significant impact on data analysis and the decisions made based on these analyses.

Values should not be zero-filled to greater precision than actually recorded. For instance, if the measured value is 0. 03, then the reported value should be 0.03 @ and not 0.030, which would imply precision to the third decimal place. For values that are recorded as below or above detection, a detection flag (in a separate data field) shall be used to identify the value as below or above the detection limit of the method, and the value shall be reported as the detectable limit. Values should be reported as zero, only if the measured or recorded value is zero. Values that are missing shall be reported as missing or null or nil, to identify values that were sampled but no value was obtained. Missing, null, or nil values are different than those that were never sampled, which should be recorded as a blank field, if they are recorded at all. It is the responsibility of the data submitter to record in the metadata, how measurements are coded, as well as the accuracy of the measurements.

It is important to note that some software tools used in data processing may represent the data internally with more precision than the original measurement, and/or may round the value. For instance even though a value of 0.3 was entered, the value may be stored and reported as 0.299999.

ITIS Biological Nomenclature Policy

The Chesapeake Bay Program has adopted the policy that all data generated or collected for, submitted to the Chesapeake Bay Program, or served on the Internet via CIMS should utilize the ITIS (www.itis.usda.gov/). biological names for identifying and reporting species. It is the data provider's responsibility to comply with this policy. The purpose of this policy is to create one master table of species names, to the extent possible, to reduce confusion among cooperating agencies. The ITIS taxonomy table, maintained on the ITIS web site, should serve as the master list. Updates to this table that are required by data submitters shall be coordinated with the CIMS Workgroup to maintain one consistent species name list.

DELIVERABLES TEMPLATE FOR DATA MANAGEMENT

Grantee: _____

Timeframe for deliverable: _____

Type of deliverable as stated in the work plan:

Booklet	☐
Brochure	☐
Fact Sheet	☐
Plan	☐
Report	☐
Quality Assurance Plan	☐
Curriculum Materials	☐
Image	☐
Workshop	☐
Multimedia Presentation	☐
Video	☐
HTML File	☐
Software Tool	☐
Data Documentation	☐
Data Set	☐
*including SAS Transport, DBASE, Flat ASCII (fixed) and Flat ASCII (character delimited) files	
Spatial Data Set	☐
Database	☐
Spatial Database	☐
GIS Coverage	☐
Map	☐

Each deliverable mandates a **metadata** record be placed in COMET and will include:

Project Record	☐
Metadata Record for Deliverable	☐

If the deliverable is **text,** will it be:

Word Perfect (preferred)	☐
Microsoft Word	☐
Page Maker	☐
Adobe Acrobat (pdf)	☐

 If the deliverable is an image, will it be:

TIFF (preferred for reports)	☐
GIF (preferred for Web publications)	☐
JPEG (preferred for Web publications)	☐

If the deliverable is a **GIS** file, will it be:

ArcInfo non-compressed export (.E00)	☐
ArcView (shape)	☐

Will it utilize the North American Datum 1983 (NAD83) or World Geodetic System 1984 (WGS84) horizontal reference? ☐

Will it utilize the North American Vertical Datum 1988 (NAVD88)? ☐

Will the standard projection of the GIS file be UTM Zone 18 (meters) for all data? ☐

Will the standard projection be Albers Conical Equal Area (meters) for all larger or national GIS data files? ☐

If the deliverable is a **graph or chart**, will it be:
- Microsoft Access ☐
- Microsoft Excel ☐
- Microsoft Power Point ☐
- Office Web Chart ☐
- Dundas Chart ☐

If the deliverable contains **spatial and/or geographic locations** or projects not creating or reporting special data, but **confined to a given project location**, will it include:
- Latitude information for each entity ☐
- Longitude information for each entity ☐

If the data involves **monitoring station locations**, will it comply with the CBP's Common Station Names Guideline? ☐

If the deliverable is a **spreadsheet, a data set, or a database**, will it utilize the CBP Common Data Dictionary for defining all data elements and units of measure? ☐

If the deliverable is a **database**, will it comply with the Common Database Design Guideline to simplify data formatting? ☐

If modifications will be made to the common database design, has the grantee coordinated with the CBP? ☐

If the deliverable **holds dates**, will it adhere to the Federal Information Processing Standard Representation for Calendar Date and Ordinal Date for Information Interchange? ☐

If the deliverable provides **monitoring data**, will it be in accordance with the Common Method Codes Guideline that provides standardized Method Accuracy Description (MAD) codes? ☐

If the deliverable contains **numeric data**, will it report all numeric data elements at the same level of precision as that of the original measurement? ☐

If the deliverable has **Toxics data**, will it comply with the Toxics Data Acquisition Specifications? ☐

If the deliverable includes the **collection of groundwater, surface water quality, sediment, atmospheric, living resource, remotely sensed data**, will it include a Quality Assurance Plan that is in accordance with the EPA requirements and approved by the EPA Project Officer? ☐

If the deliverable contains **species data**, will it comply with the National Integrated Taxonomic Information System (IT IS) nomenclature? ☐

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