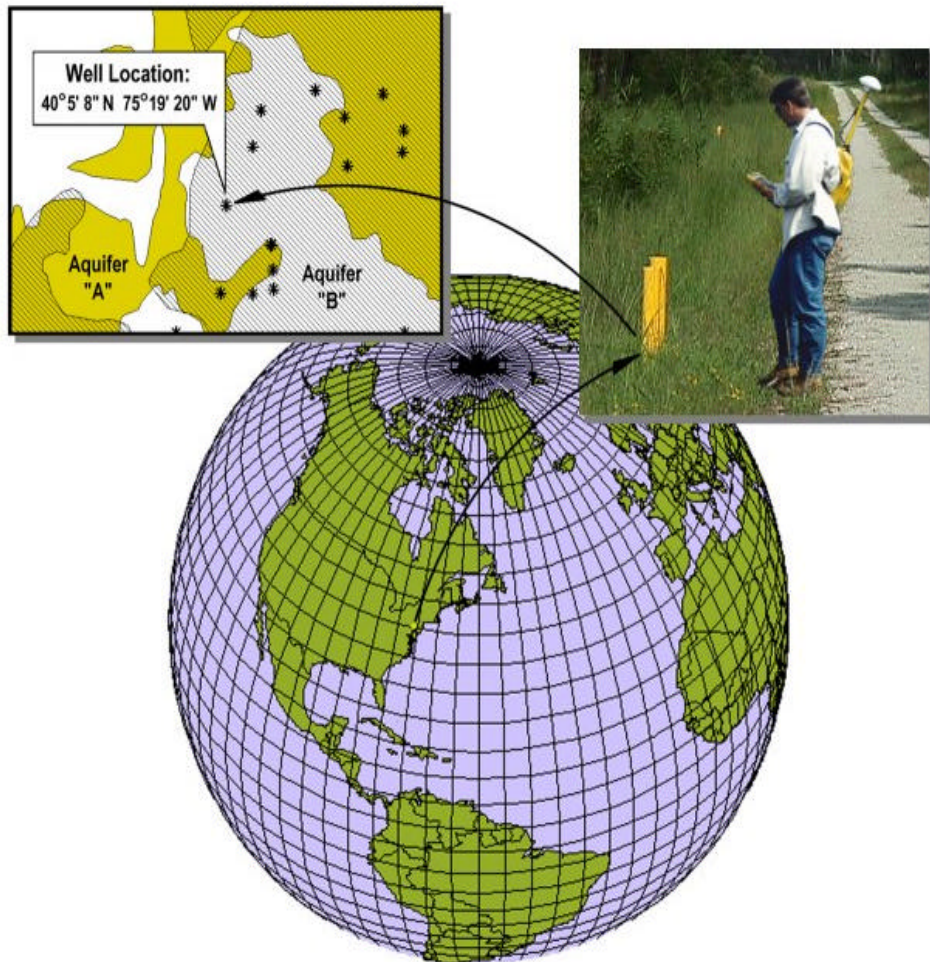




# Requirements for Locational Data in the Safe Drinking Water Information System (SDWIS)



# Contents

	Page
INTRODUCTION .....	1
USE OF LOCATIONAL DATA .....	1
REQUIRED LOCATIONAL DATA ELEMENTS .....	2
SDWIS DATA TRANSFER FORMAT (DTF) ANALYSIS .....	6
IMPLEMENTATION SCHEDULE .....	6
SUMMARY .....	6
APPENDIX A - Proposed Locational Data Element Definitions and Attributes Mandatory .....	7
APPENDIX B - Proposed Locational Data Element Definitions and Attributes Optional .....	9
SCHEMATICS .....	11 and 12

## INTRODUCTION

EPA, in recognizing the critical need for locational data, established a Locational Data Policy on May 17, 1990. It mandates the collection of accurate geographic data for all "facilities, sites, and monitoring and observation points regulated or tracked under federal environmental programs within the jurisdiction of the EPA." On April 8, 1991 the Deputy Administrator signed the Agency's Locational Data Policy (LDP), IRM Policy Manual 2100 Chapter 13, requiring geographic coordinates and associated method, accuracy, and description codes (MAD) for all environmental measurements collected by EPA employees, contractors and grantees. A key premise of this policy is that secondary use of these data in geographic information systems (GIS) and statistical mapping programs are significant to the overall mission of the Agency. To facilitate the integration of data into these systems, coding of geographic coordinates and associated attributes must be standardized.

In November 1994 EPA released the information coding standards for the method, accuracy and description codes for the locational data policy (Appendices A and B). These data standards have been revised during the development of the EPA Envirofacts Warehouse Locational Reference Tables (LRT), the Environmental Data Registry (EDR) effort, and related regional work.

An early notice of these locational data requirements was given to state drinking water administrators and regional coordinators by the Director of the Office of Ground Water and Drinking Water (OGWDW) in April 1997 (*Early Notice on Revised Safe Drinking Water Information System (SDWIS) Inventory Reporting Requirements, Cynthia Dougherty, Director, April 11, 1997*). That notice was designed to provide information on tentative new reporting requirements so that states can use this information for planning purposes.

The "Revised Safe Drinking Water Information System (SDWIS) Inventory Reporting Requirements - Technical Guidance" issued on July 10, 1998 includes the technical guidance to implement locational data requirements and other revisions, additions and new reporting requirements for states under the Safe Drinking Water Act. This document was developed in parallel to this technical guidance and separated from the revised inventory reporting requirements.

## USE OF LOCATIONAL DATA

Locational data in this document are the latitude and longitude (lat/long) coordinates and the six required and eight recommended/optional method, accuracy, and description codes required under EPA's Locational Data Policy. There are many uses and needs for these data. A few of the more significant examples are presented in Exhibit 1.

The LDP recognizes that latitude and longitude (lat/long) coordinates and auxiliary data may not have been collected retrospectively and therefore does not require it.

However, it is suggested that data that have been collected in the past be submitted if the state has confidence in its quality. The policy also recognizes the variance in technologies available to capture locational data and thereby establishes an accuracy goal of 25 meters. Global Positioning Systems (GPS) is the recommended technology of use to achieve this degree of accuracy; however, where less accurate data collection methods, such as address matching, zip code centroid, map interpolation and photo interpolation were used, the lat/long data can still be of use for certain purposes. When more accurate lat/long data are collected, the older data should be replaced with the more accurate data. These determinations can only be made by the users of the data. Therefore, EPA has developed this guidance to help apply the locational data policy.

**There are many uses and needs for lat/long data. A few of the more significant examples are:**

- Latitudes and longitudes of public water supplies (PWSs) are essential to effectively share data with other federal, state and local agencies. The benefits to be realized from this type of data sharing are generally thought to outweigh the cost and any other disadvantage of reporting.
- Locational data are needed in conjunction with monitoring data for analysis of contaminant occurrence to decide on applicability of regulating given chemicals and for regulation development and verification. The need for this information is critical to successfully implement the various mandated activities in the 1996 SDWA amendments, including the national occurrence database, and making the decision on which chemicals to regulate.
- Latitude and longitude data are essential to utilize geographic information systems (GIS). The development of GIS capabilities has continued to expand and the number of real-world practical applications now available makes investing in this technology more worthwhile.
- Locational data can be used to target areas for enforcement/compliance assistance based on multiple environmental concerns. The data also can be used for siting facilities in watersheds for the purpose of conducting source water assessments and other watershed assessment activities.

**Exhibit 1:** The Need for Latitude/Longitude Data.

**REQUIRED LOCATIONAL DATA ELEMENTS**

The latitude and longitude coordinates and the six method, accuracy and description (MAD) codes under the 1994 Information Coding Standards (ICS) are to be reported for all active sources of water for all community and nontransient, noncommunity water systems (See

Exhibit 2).<sup>1</sup> This translates most commonly into all active water supply wells (wellhead) and surface water intakes.

In addition, the EPA Facility Identification Initiative (FII) Interim Data Standard (EPA Order 2180.3) requires and the locational data policy suggests that the physical location (lat/long coordinates or address) of the water treatment plant(s) also be obtained. Therefore either the latitude/longitude of the treatment plants, OR the physical address needs to be reported as part of the Core Data Set in SDWIS/FED.<sup>2</sup>

**The following WSF types are considered to be sources of water:**

- CC (Consecutive Connection)
- IN (Intake)
- RC (Roof Catchment)
- SP (Spring)
- IG (Infiltration Gallery)
- NP (Non-Piped)
- RS (Reservoir)
- WL (Well)

**Exhibit 2:** Various WSF Types Considered to be Sources of Water

Under the FII, EPA has developed a multi-relational entity “facility” concept to accommodate complex facilities such as PWSs that may or may not be geographically contiguous and may require multiple environmental permits. EPA, through Envirofacts, will assign a facility identifier to all PWSs. When a PWS owns treatment facilities, which are not geographically contiguous with the PWS, an additional FII number will be assigned to each treatment facility. Since the number will be assigned and maintained by EPA, the states are not required to submit this information to SDWIS/FED under any of the time frames found in this document. The FII requirements as they pertain to the drinking water program have not been finalized, so this guidance document attempts to establish reporting requirements that will satisfy the general initiative while at the same time not adding significantly to the SDWIS/FED reporting requirements. States will be notified of this requirement at a later time. **The FII information contained in this document is for information only at this time.**

The **required** locational data fields and their definitions are the following:

1. **Latitude** - The measure in decimal degrees of the angular distance on a meridian north or south of the equator.

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<sup>1</sup>Water System Facility (WSF) data includes such entities as sources of water (wells and intakes), treatment plants, entry points and storage tanks.

<sup>2</sup>For more information the reader is directed to Section 4 of the full Reporting Guidance issued on July 10, 1998. To meet the minimum reporting requirements of the Core Data Set, the following WSF information must be reported: all active sources of water for all PWSs; the treatment data associated to these sources; and the locational coordinates of these sources.

2. **Longitude** - The measure in decimal degrees of the angular distance on a meridian east or west of the prime meridian.
3. **Method of Collection** - The text or code that describes or identifies the method used to determine the latitude and longitude coordinates for a point on the earth [address matching; GPS, map interpolation].
4. **Accuracy Value & Unit** - The measure of accuracy (in meters) of the latitude and longitude. Given in a range of +/- meter units.
5. **Description Category** - The text or code that identifies or represents the place for which the geographic coordinates were established [plant entrance; well; intake; center of facility].
6. **Horizontal Datum** - The name or code that describes or represents the reference datum used in determining latitude and longitude coordinates [NAD27; NAD83; Unknown].
7. **Source Scale** - The number that represents the proportional distance on the ground for one unit of measure on the map or photo [1:24,000; 1:250,000; etc.].
8. **Point-Line-Area** - The name or code that identifies or represents the geometric entity represented by one point or sequence of latitude and longitude points.

The information coding standards (ICS) for these elements are found in Appendix A. It should be noted that if the locational feature is a polygon (e.g. treatment plant or well field) or linear (a series of intakes in close proximity) under required element number (8) above, then the optional element Data-Point-Sequence is required.

The **recommended/optional** data elements and their definitions are the following:

1. **Date of Collection** - The calendar date when data were collected.
2. **Source** - The name or code of the party responsible for providing the latitude and longitude coordinates [state FIPS code; region; contractor, etc.].
3. **Description Comments** - The text that provides additional information about the geographic coordinates [150-length character field to give more detail on the facility described; the data collection; or post-processing].
4. **Vertical Measure** - The measure of elevation (i.e. altitude) in meters above or below

a reference datum [e.g. measuring point of a well; intake point; ground surface at sampling point].

5. **Vertical Measure Method of Collection** - The text or code that describes or represents the method used to collect the vertical measure of a reference point [several types of GPS measurements; trigonometric leveling; surveying techniques].
6. **Vertical Measure Accuracy** - The measure of accuracy (in meters) of the vertical measure of a reference point. Given in a range of +/- meter units.
7. **Vertical Datum** - The name or code of the reference datum used to determine the vertical measure [NAVD88; MSL; Unknown].
8. **Verification** - The text or code that describes or represents the process used to verify the latitude and longitude coordinates [point in polygon(county); ground truth conducted; verified relative to map features].

The information coding standards (ICS) for these elements are found in Appendix B.

The ICS are still undergoing some revisions, so even though these “standards” are proposed, this guidance establishes the requirements under the 1991 policy and the 1994 release of the method, accuracy and description codes. Some additional revisions are anticipated during future development of the EPA Envirofacts Warehouse Locational Reference Tables (LRT), the Environmental Data Registry (EDR) effort, and related regional work. Other agency programs like the Reinventing Environmental Information (REI) are designed to improve data quality and integration and may result in further changes to the data standards at a later time.

A water treatment plant can generally be considered the facility(s) at which a variety of treatment processes take place to remove contaminants from source water. Individual treatment processes may be used in a “treatment train” to remove unwanted contaminants or decrease the contaminant concentration. The most commonly used processes include filtration, coagulation and flocculation, sedimentation, and disinfection. Some small treatment systems may not contain any of these processes or may have only disinfection before distribution.

Examples of the required assignment of latitude and longitude coordinates to *facilities* of PWSs are given in the two attached schematics.

## SDWIS DATA TRANSFER FORMAT (DTF) ANALYSIS

A technical appendix is available to provide the technical detail for reporting locational information in data transfer format to SDWIS/FED. This appendix is an analysis of SDWIS for modifying the DTF to fully support the reporting of the latitude and longitude coordinates and the MAD codes. This Appendix outlines the descriptions, formats, and permitted values for each of the above locational data elements and provides examples as to the data element values. The DTF supports the reporting of latitude and longitude data in either the traditional degrees/minutes/seconds format or the decimal degrees format. SDWIS/FED will store in its database the latitude and longitude data in the format in which it is reported as well as convert the input into the other format.

### IMPLEMENTATION SCHEDULE

The following implementation schedule dates apply to the reporting requirements for locational data.

- |   |  |  |
|---|--|--|
| * | Community Water Systems<br>(CWS)                     | January 1, 2000  |
| * | Nontransient, noncommunity water systems<br>(NTNCWS) | 20% of the data are due by<br>January 1, 2001 and 20% more<br>per year until January 1, 2005 |
| * | Transient, noncommunity water systems<br>(TNCWS)     | Currently a Data Sharing Goal  |

States are encouraged to submit data for transient systems even though this is a goal at this time. States are also encouraged to submit locational data before the scheduled due dates above.

### SUMMARY

The use of geographic data is critical to many of the activities in the OGWDW and the interrelationship among many of EPA's media programs. The geo-referencing of data is necessary for cooperation among federal and state environmental programs and critical for effectively linking and sharing data across all programs and information management systems.



# Appendix A

## Proposed Locational Data Elements Definitions and Attributes

June  
1998

MAD Codes	EDR Data Elements	Proposed Definitions	Length	Code Set
<b>Mandatory</b>				
Latitude	Latitude Measure (DE 5518:1)	The measure of the angular distance on a meridian north or south of the equator.	10	No
Longitude	Longitude Measure (DE 5520:1)	The measure of the angular distance on a meridian east or west of the prime meridian.	11	No
Method of collection	Horizontal Collection Method Text (DE 5731:1)	The text that describes the method used to determine the latitude and longitude coordinates for a point on the earth.	40	Yes
	Textual Data <u>or</u> Code Data for this Element			
	Horizontal Collection Method Code (DE 5238:1)	The code that represents the method used to determine the latitude and longitude coordinates for a point on the earth.	3	Yes
Accuracy Value and Unit	Horizontal Accuracy Measure (DE 5264:1)	The measure of the accuracy (in meters) of the latitude and longitude coordinates.	6	No
Description Category	Reference Point Text (DE 5288:1)	The text that identifies the place for which geographic coordinates were established.	50	Yes
	Textual Data <u>or</u> Code Data for this Element			
	Reference Point Code (DE 5608:1)	The code that represents the place for which geographic coordinates were established.	3	Yes
Horizontal Datum	Horizontal Reference Datum Name (DE 5292:1)	The name that describes the reference datum used in determining latitude and longitude coordinates	7	Yes

MAD Codes	EDR Data Elements	Proposed Definitions	Length	Code Set
	Textual Data <u>or</u> Code Data for this Element			
	Horizontal Reference Datum Code (DE 5308:1)	The code that represents the reference datum used in determining latitude and longitude coordinates.	3	Yes
Source Scale	Source Map Scale Number (DE 5318:1)	The number that represents the proportional distance on the ground for one unit of measure on the map or photo.	19	No
Point-Line-Area	Geometric Type Name (DE 5761:1)	The name that identifies the geometric entity represented by one point or a sequence of latitude and longitude points.	6	Yes
	Textual Data <u>or</u> Code Data for this Element			
	Geometric Type Code (DE 5614:1)	The code that represents the geometric entity represented by one point or a sequence of latitude and longitude points.	3	Yes

## Appendix B

### Proposed Locational Data Elements Definitions and Attributes

June  
1998

MAD Codes	EDR Data Elements	Proposed Definitions	Length	Code Set
<b>Optional</b>				
Date of Collection	Data Collection Date (DE 5296:1)	The calendar date when data were collected.	8	No
Source	Coordinate Data Source Name (DE 5322:1)	The name of the party responsible for providing the latitude and longitude coordinates.	35	Yes
	<b>Textual Data or Code Data for this Element</b>			
	Coordinate Data Source Code (DE 5310:1)	The code that represents the party responsible for providing the latitude and longitude coordinates.	3	Yes
Description Comments	Location Comments (DE 5616:1)	The text that provides additional information about the geographic coordinates.	150	No
Vertical Measure	Vertical Measure (DE 5612:1)	The measure of elevation (i.e., the altitude), in meters, above or below a reference datum.	10	No
Vertical Measure Method of Collection	Vertical Collection Method Text (DE 5326:1)	The text that describes the method used to collect the vertical measure (i.e., the altitude) of a reference point.	41	Yes
	<b>Textual Data or Code Data for this Element</b>			
	Vertical Collection Method Code (DE 5314:1)	The code that represents the method used to collect the vertical measure (i.e., the altitude) of a reference point.	2	Yes
Vertical Measure Accuracy	Vertical Measure Accuracy (DE 5312:1)	The measure of the accuracy (in meters) of the vertical measure (i.e., the altitude) of a reference point.	8	No

MAD Codes	EDR Data Elements	Proposed Definitions	Length	Code Set
Vertical Datum	Vertical Reference Datum Name (DE 5324:1)	The name of the reference datum used to determine the vertical measure (i.e., the altitude).	17	Yes
	<b>Textual Data <u>or</u> Code Data for this Element</b>			
	Vertical Reference Datum Code (DE 5306:1)	The code that represents the reference datum used to determine the vertical measure (i.e., the altitude).	2	Yes
Verification	Verification Method Text (DE 5737:1)	The text that describes the process used to verify the latitude and longitude coordinates.	40	Yes
	<b>Textual Data <u>or</u> Code Data for this Element</b>			
	Verification Method Code (DE 5268:1)	The code that represents the process used to verify the latitude and longitude coordinates.	2	Yes

