REPRESENTATION OF DATE AND TIME DATA STANDARD

Standard No.: EX000013.1

January 6, 2006

This standard has been produced through the Environmental Data Standards Council (EDSC).

This consensus standard was developed in collaboration by State, Tribal, and U. S. EPA representatives under the guidance of the Exchange Network Leadership Council and its predecessor organization, the Environmental Data Standards Council.

Foreword

The Environmental Data Standards Council (EDSC) identifies, prioritizes and pursues the creation of data standards for those areas where information exchange standards will provide the most value in achieving environmental results. The Council involves Tribes and Tribal Nations, state and federal agencies in the development of the standards and then provides the draft materials for general review. Business groups, non-governmental organizations, and other interested parties may then provide input and comment for Council consideration and standard finalization. Standards are available at http://www.epa.gov/datastandards

1.0 INTRODUCTION

This is a format standard which indicates how one displays a particular day within a Gregorian calendar month and specifies an instance of time in the day. Time is expressed in Coordinated Universal Time (UTC). UTC is the official time scale, maintained by the Bureau International des Poids et Mesures (BIPM), and the International Earth Rotation Service (IERS). Examples of the formats follow:

a. Date only format When the need is for an expression only of a calendar date, then the complete representation shall be a single numeric data element comprising eight digits, where [YYYY] represents a calendar year, [MM] the ordinal number of a calendar month within the calendar year, and [DD] the ordinal number of a day within the calendar month.

Extended format: YYYY-MM-DD EXAMPLE 1985-04-12

b. Time with difference between local time and Coordinated Universal Time. The complete representation of the time of 27 minutes 46 seconds past 15 hours locally in Geneva (normally one hour ahead of UTC), and in New York (five hours behind UTC), together with the indication of the difference between the local time and UTC, are used as examples.

Extended format: hh:mm:ss±hh:mm EXAMPLE 15:27:46+01:00 or 15:27:46–05:00

If a lesser degree of precision is needed, either two or four digits may be omitted from the representation.

Extended format: hh:mm±hh:mm EXAMPLE 15:27+01:00 or 15:27–05:00

Extended format: hh ±hh:mm EXAMPLE 15+01:00 or 15–05:00

c. Date and time example. The complete representation of the date/time of April 12, 1998 at 27 minutes 46 seconds past 15 hours locally in Geneva (normally one hour ahead of UTC), and in New York (five hours behind UTC), together with the indication of the difference between the local time and UTC, are used as examples.

Extended format: YYYY-MM-DDThh:mm:ss±hh:mm EXAMPLE 1998-04-12T15:27:46+01:00
1998-04-12T15:27:46–05:00

1.1 Scope

This standard provides and describes data groupings that are used for exchange of Date and Time data and information.

1.2 Revision History

Date	Version	Description
January 6, 2006	EX000013.1	Initial Environmental Data Standards Council Adoption. The Representation of Date and Time Data Standard supersedes the Date Data Standard [1-9934:1]. Modifications were made to accommodate the addition of Time data elements and formatting issues.

1.3 References to Other Data Standards

This data standard relies on other data standards to make it complete and to provide the necessary support. As such, users should reference the normative standards, listed below, and consider them integral to the Representation of Date and Time Standard:

- ISO 8601:2000 Data elements and interchange formats -- Information interchange -- Representation of dates and times
- ANSI INCITS 30-1997 Data elements and interchange formats -- Information interchange -- Representation of dates and times
- ANSI INCITS 310-1998 Data elements and interchange formats -- Information interchange -- Representation of dates and times
- W3C Recommendation XML Schema Part 2: Datatypes 02 May 2001

1.4 Terms and Definitions

For the purposes of this document, the following terms and definitions apply:

Term	**Definition**
Coordinated Universal Time (UTC)	The official coordinate time scale for the Earth defined on the “rotating geoid.” [Rec.ITU-R TF.1010, Relativistic Effects in a Coordinate Time System in the Vicinity of the Earth]. The time scale, maintained by the Bureau International des Poids et Mesures (BIPM), and the International Earth Rotation Service (IERS), which forms the basis of a coordinated dissemination of standard frequencies and time signals [Rec 686, Glossary].
Date	A particular day within a Gregorian calendar month.
Time	In English, ‘time’ is used to specify an instant (time of day). ”[ITU-R Recommendations, 1994 TF Series Volume, Time Signals and Frequency Standards Emissions (Recommendation 686, Glossary)].” A particular point in the stream of time of at a particular place (which may or may not be specified in terms of a particular date): a specific hour, or minute, or second, or fraction of a second in a day at a specific place.
Leap Second	A leap second is a second of time intentionally inserted in or deleted from the UTC time stream to keep it approximately compatible with the rotation of the Earth. An inserted second is called a positive leap second and an omitted second is called a negative leap second. For the purposes of this standard, a positive leap second is labeled “60” and a negative leap second is labeled “58” (there being no second with the label “59” in a minute with a negative leap second).

1.5 Implementation

Users are encouraged to use the XML registry housed on the Exchange Network Web site (http://www.exchangenetwork.net) to download schema components for the construction of XML schema flows.

1.6 Document Structure

The structure of this document is briefly described below:

a. Section 2.0 Representation of Date and Time Data Standard Diagram, illustrates the principal data groupings contained within this standard.

b. Section 3.0 Representation of Date and Time Data Standard Table, provides information on the high level, intermediate and elemental representation of date and time data groupings. Where applicable, for each level of this data standard a definition, XML tag, note(s), example list of values and format are provided. The format column may include "A" to specify alphanumeric, "N" to designate numeric, "G" to denote a grouping, and "D" for time and date formats referenced in the Representation of Date and Time Data Standard.

c. Data Element Numbering: For purposes of clarity and to enhance understanding of data standard hierarchy and relationships, each data group is numerically classified from the primary to the elemental level.

d. Code and Identifier Metadata: Metadata, defined here as data about data or data elements, includes their descriptions and/or any needed context setting information required to identify the origin, conditions of use, interpretation, or understanding the information being exchanged or transferred. (Adapted from ISO/IEC 2382-17:1999 Information Technology Vocabulary—Part 17: Databases 17.06.05 metadata). Based on the business need, additional metadata may be required to sufficiently describe an identifier or a code. A note regarding this additional metadata is included in the notes column for identifier and code elements. Additional metadata for identifiers may include:

- Code List Identifier, which is a standardized reference to the context or source of the set of codes

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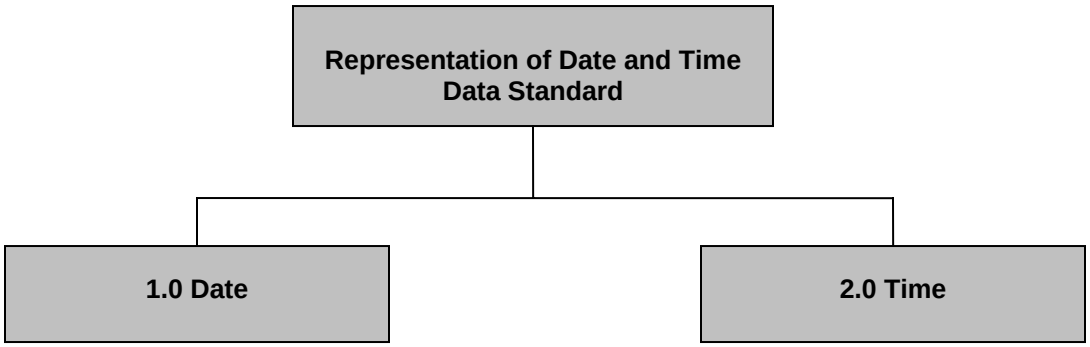
- Code List Identifier, which is a standardized reference to the context or source of the set of codes.
- Code List Version Identifier, which identifies the particular version of the set of codes.
- Code List Version Agency Identifier, which identifies the agency responsible for maintaining the set of codes.
- Code List Name, which describes the corresponding name for which the code represents.

e. Appendix A, Representation of Date and Time Data Standard Structure Diagram, illustrates the hierarchical classification of the representation of date and time data standard. This diagram enables business and technical users of this standard to quickly understand its general content and complexity. Appendix B, lists the references for the Representation of Date and Time Data Standard.

2.0 REPRESENTATION OF DATE AND TIME DATA STANDARD DIAGRAM

This diagram specifies the major data groups that may be used to identify the characteristics and/or to catalog a date and time.



3.0 REPRESENTATION OF DATE AND TIME DATA STANDARD TABLE

1.0 Date

Definition: A particular year, month, and day of the Gregorian calendar.
Relationship: Calendar date data is represented as an eight-digit sequence, composed of numeric characters in the format YYYY-MM-DD, where
YYYY represents the calendar year,
MM represents the calendar month of the year, and
DD represents the calendar day of the month,
sequenced from high order to low order (i.e. year, month, day, from left to right, as shown above).
Separators are used between the elements for the interchange of date. This is the "extended" representation in ISO 8601 to separate the elements "year" and "month", "month" and "day" the separator is "-". To separate date and time the separator is "T".
Note: None.
XML Tag: Date.

Name	Definition	Notes	Format	XML Tags
1.1 Year Code	A code representing a particular year according to the Gregorian calendar.	The numbers that represent year shall include leading zeros whenever their respective values are less than 1000.	N(4)	YYYY
1.2 Month Code	A code representing a particular month within a Gregorian calendar year.	The beginning of a month within a year shall be represented by a two-digit decimal number ranging from 01 through 12. The numbers that represent the month of a year shall include leading zeros whenever their respective values contain only one digit.	N(2)	MM
1.3 Day Code	A code representing a particular day within a Gregorian calendar month.	The beginning of a day within a month shall be represented by a two-digit decimal number ranging from 01 through 31 depending upon the number of days in the month. The numbers that represent the day of the month shall include leading zeros whenever their respective values contain only one digit.	N(2)	DD

2.0 Time

Definition: A particular point in the stream of time at a particular place (which may or may not be specified in terms of a particular date): a specific hour, or minute, or second in a day at a specific place.

Relationship: Time data is represented as an eight-14-character sequence, in the format hh:mm:ss±hh:mm. Where hh represents the hour; mm represents the minute; ss represents the second; ±hh:mm represents the difference with UTC. To separate date and time the separator is "T".
Separators are used between the elements for the interchange of time. This is the "extended" representation in ISO 8601. To separate the elements "hour" and "minute", and "minute" and "second" the separator is ":"

Note: To indicate local time and the difference between local time and UTC, the representation of the difference shall be appended to the representation of the local time following immediately, without space, the lowest order (extreme right-hand) component of the local time expression, which, in this case, shall always include hours, minutes, and seconds. The difference between local time and UTC shall be expressed in hours-and-minutes.

XML Tag: Time

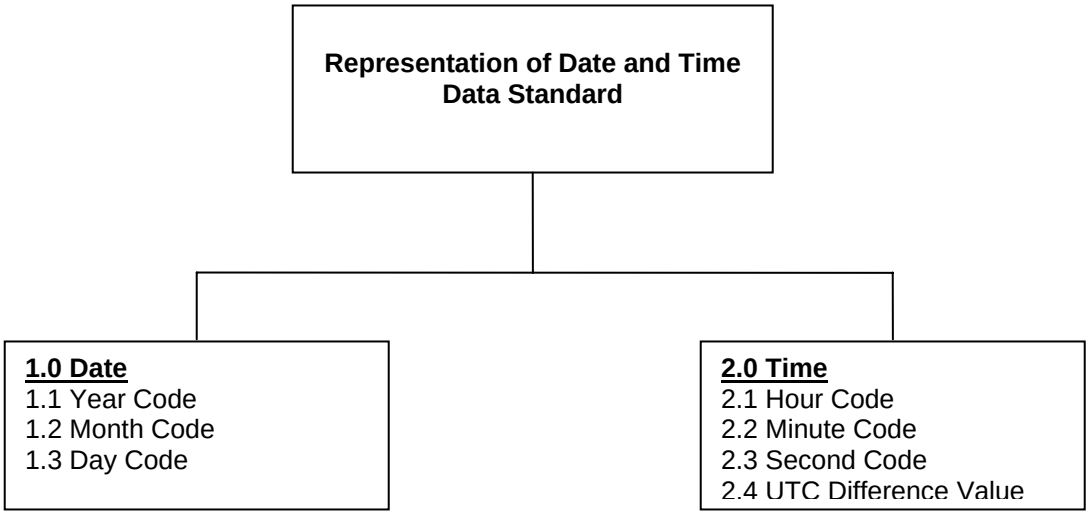
Name	Definition	Notes	Format	XML Tags
2.1 Hour Code	A code representing 60 minutes, each labeled consecutively in the 24-hour timekeeping system from 0 through 23 beginning with the start of the first minute after the beginning of the hour. Ordinarily, an hour is one 24^{th} of a day.	The beginning of an hour of day shall be represented using the 24- hour timekeeping system by recording a two-digit decimal number ranging from 00 through 23. The numbers that represent hour shall include leading zeros whenever their respective values contain only one digit. An hour which contains a leap second will have one extra or one less second, depending upon whether the leap second is positive or negative, respectively.	N(2)	hh

Name	Definition	Notes	Format	XML Tags
2.2 Minute Code	A code representing 60 seconds, each labeled consecutively in the 24-hour timekeeping system from 0 through 59 beginning with the start of the first second after the beginning of the minute. Ordinarily, a minute is one 60^{th} of an hour.	The beginning of a minute within an hour of the day shall be represented by a two-digit decimal number ranging from 00 through 59. The numbers that represent a minute shall include leading zeros whenever their respective values contain only one digit. A minute which contains a leap second will have 61 or 59 seconds, depending upon whether the leap second is positive or negative, respectively.	N(2)	mm
2.3 Second Code	Ordinarily, a code representing second is one 60^{th} of a minute. A code representing "the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium atom-133." ($XIII^{e}$ Conférence Générale des Poids et Mesures, 1967.)	The allowable two-digit decimal numbers for seconds ordinarily range from 00 through 59. The numbers that represent a second shall include leading zeros whenever their respective values contain only one digit. If the magnitude of the number is less than unity, the decimal sign shall be preceded by two zeros. The number of digits in the decimal fraction shall be determined by the interchange parties, dependent upon the application. The format shall be [hhmmss.ss] as appropriate with as many digits as necessary following the decimal sign. A decimal fraction shall have at least one digit. The two-digit decimal number 60 is reserved for representing a positive leap second. The allowed two-digit decimal numbers range from 00 to only 58 in the last minute of a day having a negative leap second. Information systems may be recording time with leap seconds if, for example, they synchronize with atomic clocks such as those managed at NIST or the Naval Observatory.	N(2).(n)	ss.ssss

Name	Definition	Notes	Format	XML Tags
2.4 UTC Difference Value	The signed difference between local time and Coordinated Universal Time (UTC).	The difference between local time and UTC shall be expressed in hours and minutes, with a ":" separating the hours and minutes. It shall be expressed as positive (i.e. with the leading plus sign [+]) if the local time is ahead of or equal to UTC and as negative (i.e. with the leading minus sign [–]) if it is behind UTC.	±nn:nn	UTCDifference Value

APPENDIX A

Representation of Date and Time Data Standard Structure Diagram



Appendix B
References

i. *ISO/IEC 2382-17:1999 Information Technology Vocabulary—Part 17: Databases 17.06.*