

Content Standards for Digital Geospatial Metadata

Federal Geographic Data Committee

June 8, 1994

Established by Office of Management and Budget Circular A-16, the Federal Geographic Data Committee promotes the coordinated development, use, sharing, and dissemination of geographic information.

The FGDC is composed of representatives from the Departments of Agriculture, Commerce, Housing and Urban Development, the Interior, State, and Transportation; the Environmental Protection Agency; the Federal Emergency Management Agency; the Library of Congress; the National Aeronautics and Space Administration; the National Archives and Records Administration; and the Tennessee Valley Authority. Additional Federal agencies participate on FGDC subcommittees and working groups. The Department of the Interior chairs the committee.

FGDC subcommittees work on issues related to data categories coordinated under the committee's standards; establish and implement standards for data content, quality, and transfer; encourage the collection and transfer of data; and organize the collection of geographic data to reduce duplication. Working groups are established for issues that transcend data categories.

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The following is the recommended bibliographic citation for this publication:
 Federal Geographic Data Committee. 1994. Content standards for digital geospatial metadata. Washington, D.C.: Federal Geographic Data Committee.
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□ Overview

1. Name of Standard. Content Standards for Digital Geospatial Metadata.

2. Explanation. This standard specifies the information content of metadata for a The purpose of the standard is to provide a common set of terminology and definitic metadata. Metadata are data about the content, quality, condition, and other chara

The Federal Geographic Data Committee (FGDC) initiated work on the standard in June geospatial metadata. At the forum, the participants agreed on the need for a stand metadata about geospatial data. The committee accepted the offer of ASTM Section I information content standard. This draft was slightly revised, and offered for pub April 1993. Extensive comments were received from the public. The FGDC's Standard the draft. The revised draft was provided for further review and testing in July 1 for review and testing in January and March 1994.

3. Approving Authority. The Federal Geographic Data Committee approved the standa committee plans to submit the standard to the Department of Commerce for approval a Processing Standard.

4. Maintenance Authority. The current maintenance authority for the standard is t Questions concerning the standard are to be addressed to the FGDC Secretariat, in c Survey, 590 National Center, Reston, Virginia 22092. The committee plans to design the secretariat as the maintenance authority as part of the process of submitting t Federal Information Processing Standard.

5. Related Documents. A list of references is contained in Appendix C.

6. Objectives. The objectives of the standard are to provide a common set of tern documentation of digital geospatial data. The standard establishes the names of da elements (groups of data elements) to be used for these purposes, the definitions c data elements, and information about the values that are to be provided for the dat

The major uses of metadata are:

to maintain an organization's internal investment in geospatial data,

to provide information about an organization's data holdings to data c brokerages, and

to provide information needed to process and interpret data to be rece external source.

The information included in the standard was selected based on four roles that meta availability -- data needed to determine the sets of data that exist f fitness for use -- data needed to determine if a set of data meets a s

access -- data needed to acquire an identified set of data.

transfer -- data needed to process and use a set of data.

These roles form a continuum in which a user cascades through a pyramid of choices available, to evaluate the fitness of the data for use, to access the data, and to exact order in which data elements are evaluated, and the relative importance of data for all users.

7. Applicability. This standard is for the documentation of geospatial data.

Executive Order 12906, "Coordinating Geographic Data Acquisition and Access: The National Infrastructure," was signed on April 11, 1994, by President William Clinton. Section 7. Geospatial Data Clearinghouse, paragraph (b) states: "Standardized Documentation of Geospatial Data. From the date of this order, each agency shall document all new geospatial data it collects directly or indirectly, using the standard under development by the FGDC, and make the documentation electronically accessible to the Clearinghouse network. Within 1 year, all agencies shall adopt a schedule, developed in consultation with the FGDC, for documenting geospatial data previously collected or produced, either directly or indirectly, and make the documentation electronically accessible to the Clearinghouse network." This standard is referenced in the executive order.

In addition to use by the Federal Government, the FGDC invites and encourages other State, local, and tribal governments, the private sector, and non-profit organizations to share their geospatial data. A major difficulty in the geospatial data community is the inability of prospective users to determine what data exist, the fitness of existing data for particular conditions for accessing existing data, and to transfer data to a user's system. Increased broad public participation, will help to ease these problems and to develop the National

The standard was developed from the perspective of defining the information required to determine the availability of a set of geospatial data, to determine the fitness of the data for intended use, to determine the means of accessing the set of geospatial data, and to determine the geospatial data. As such, the standard establishes the names of data elements and the purposes, the definitions of these data elements and compound elements, and information that are to be provided for the data elements. The standard does not specify the means by which the information is organized in a computer system or in a data transfer, nor the means by which this information is communicated, or presented to the user.

8. Specifications. The standard provides specifications for terminology of data elements and definitions for this terminology, and information about values to be provided for data elements about terms that are mandatory, mandatory under certain conditions, and optional (per data provider) is provided by the standard.

9. Where to Obtain Copies. Copies of this publication are available from the Federal Geographic Data Committee Secretariat, in care of the U.S. Geological Survey, 590 National Center, Reston, Virginia 20192-6488; telephone (703) 648-5514; facsimile (703) 648-5755; Internet (electronic mail) gdc@usgs.gov. The standard is also available on an anonymous File Transfer Protocol (anonymous FTP) server fgdc.er.usgs.gov.□

Numbered Sections

The standard is organized in a hierarchy of data elements and compound elements that describe the content for metadata to document a set of digital geospatial data. The starting point for a compound element "metadata" is composed of other compound elements representing different data sets. Each of these compound elements has a numbered section in the standard. These compound elements are defined by other compound elements and data elements. The "Introduction" information is a special section that specifies the data elements for contacting information. This section is used by other sections, and is defined once for convenience.

Each section begins with the name and definition of the compound element that defines the data. The definition are followed by production rules (see below) that define this compound element and its data elements, either directly or by the use of intermediate compound elements. When information is used, the production rules for these elements also are provided in this part of

The production rules are followed by a list of names and definitions of compound elements in the section.

Compound Elements

A compound element is a group of data elements and other compound elements. All compound elements described by data elements, either directly or through intermediate compound elements represent higher-level concepts that cannot be represented by individual data elements. The definition of compound elements is:

```
Compound element name -- definition.
Type: compound
```

The type of "compound" uniquely identifies the compound elements in the lists of terms.

Production Rules

A production rule specifies the relationship between a compound element, and data elements and other compound elements. Each production rule has a left side (identifier) and a right side. The symbol "=", meaning that the term on the left side is replaced by or produces the term on the right side are either other compound elements or individual data elements. By using matching terms in the production rules, one can explain higher-level concepts using

The symbols used in the production rules have the following meaning:

Symbol	Meaning
=	is replaced by, produces, consists of
t	and
[]	selection - select one term from the list of enclosed terms (exclusive separated by " ").
m{}n	iteration - the term(s) enclosed is(are) repeated from "m" to "n" times
0	optional - the term(s) enclosed is(are) optional

Examples:

a = b + c	"a consists of b and c"
a = [b c]	"a consists of one of b or c"
a = 4{b}6	'a consists of four to six occurrences of b"
a = b t (c)	'a consists of b and optionally c"

Interpreting the production rules:

The terms bounded by parentheses, "(" and ")", are optional and are produced by the producer. If a producer chooses to provide information enclosed by parentheses, the production rules for the enclosed information apply. For example, if the term is optional information described in the term:

```
(a t b + c)
```

the producer shall provide a and b and c.

Only for terms bounded by parentheses does the producer have the discretion of whether to provide the information.

The variation among the ways in which geospatial data are produced and the characteristics of geospatial data do not have the same characteristics, and the issue of how to work or are planned may not be decided, caused the need to express the concept of "applicable." This concept means that if the data set exhibits (or, if it is known that the data set will exhibit) a defined characteristic, the information needed to describe that characteristic. This concept is called

0{ term }1

Data Elements

A data element is a logically primitive item of data. The entry for a data element, the definition of the data element, a description of the values that can be used to form the definition of the data elements is:

Data element name -- definition.

Type:

Domain:

The information about the values for the data elements include a description of the description of the domain of the valid values. The type of the data element description provided. The choices are "integer" for integer numbers, "real" for real numbers, "day" for day of the year, and "time" for time of the day.

The domain describes valid values that can be assigned to the data element. The domain describes valid values, references to lists of valid values, or restrictions on the range of values for the data element.

The domain also may note that the domain is free from restrictions, and any values of the type of the data element can be assigned. These unrestricted domains are represented by "free" followed by the type of the data element (that is, free text, free date, free time).

Some domains can be partly, but not completely, specified. For example, there are many formats, but there may be many more that are less well known. To allow a producer to specify circumstances, the convention of providing a list of values followed by the designator. In these cases, assignments of values shall be made from the provided domain when possible. Providers may create and assign their own value. A created value shall not redefine a standard.

Another issue is the representation of null values (representing such concepts as "unknown"). This is relatively simple for textual entries (one would enter the text "Unknown"), real, date, and time types (for example, which integer value means "unknown"?). Because providing this information vary among implementations, the standard specifies what to do but does not mandate a means for representing them.

In addition to the values to be represented, the form of the representation also is important that will manipulate the data elements. The following conventions for forms of values are used:

Calendar Dates (Years, Months, and Days)

A.D. Era to December 31, 9999 A.D. -- Values for day and month of year and calendar date convention (general forms of YYYY for years; YYYYMM for years and month being expressed as an integer), and YYYYMMDD for a day of the year) specified in ISO Standards Institute, 1986, Representation for calendar date and ordinal date (ANSI X3.30-1985): New York, American National Standards Institute (a Processing Standard 4-1).

B.C. Era to 9999 B.C. -- Values for day and month of year, and for year and month convention, preceded by the lower case letters "bc" (general forms of bcYYYY for year and month of a year (with month being expressed as an integer), and bcYYYYMM for year and month).

B.C. Era before 9999 B.C. -- Values for the year shall consist of as many digits as needed to represent the number of the year B.C., preceded by the lower case letters "bc" (ccYYYYYYY...).

A.D. Era after 9999 A.D. -- Values for the year shall consist of as many digits as needed to represent the number of the year A.D., preceded by the lower case letters "ad" (cdYYYYYYY...).

Time of Day (Hours, Minutes, and Seconds)

Because some geospatial data and related applications are sensitive to conventions are permitted. Only one convention shall be used for meta are:

- Local Time. For producers who wish to record time in local timekeeping system for local time of day in the hours, minutes, and fractions of a second (to the precision desired) without separator of HHMMSSSS specified in American National Standards Institute of local time of day for information interchange (ANSI X3.43-1 National Standards Institute (adopted as Federal Information Processing Standard 59).
- Local Time with Time Differential Factor. For producers who wish to record time and the relationship to Universal Time (Greenwich Mean Time) using 24-hour timekeeping system for local time of day in hours, minutes, and fractions of a second (to the resolution desired) without separator shall be followed, without separators, by the time differential factor expresses the difference in hours and minutes between local time and Universal Time. It is represented by a four-digit number preceded by a plus sign indicating the hours and minutes the local time is ahead of or behind Universal Time respectively. The general form is HHMMSSSSshhmm, where HHMMSSSS is the time of day using 24-hour timekeeping (expressed to the precision desired) for the time differential factor, and hhmm is the time differential factor. For Eastern Daylight Time has a time differential factor of -0500, Central Standard Time has a time differential factor of -0600, Eastern Standard Time has a time differential factor of -0500.) This is the standard for information interchange (ANSI X3.43-1 National Standards Institute, 1975, Representations of Universal Time and United States time zone reference for information interchange (ANSI X3.43-1 National Standards Institute (adopted as Federal Information Processing Standard 59).
- Universal Time (Greenwich Mean Time). For producers who wish to record Universal Time (Greenwich Mean Time), values shall follow the system for Universal Time of day in hours, minutes, seconds, and fractions of a second (expressed to the precision desired) without separators and a case letter "Z" directly following the low-order (or extreme) digits of the 24-hour clock time expression. The general form is HHMMSSSSSZ, where HHMMSSSS is the Universal Time using 24-hour timekeeping, and Z is the letter "Z" in American National Standards Institute, 1975, Representations of Universal Time and United States time zone reference for information interchange (ANSI X3.51-1975): New York, American National Standards Institute (adopted as Federal Information Processing Standard 59).

Latitude and Longitude

Values for latitude and longitude shall be expressed as decimal fractions. Latitude shall be represented by a two-digit decimal number ranging from 00 to 99. Longitude shall be represented by a three-digit decimal number ranging from 000 to 999. If a decimal fraction of a degree is specified, it shall be separated from the integer part by a decimal point. Decimal fractions of a degree may be expressed to the

- Latitudes north of the equator shall be specified by a plus sign (+), and latitudes south of the equator shall be designated by a minus sign (-) preceding the two digits designating degrees. Latitudes on the Equator shall be assigned to the Northern Hemisphere.
- Longitudes east of the prime meridian shall be specified by a plus sign (+), and longitudes west of the meridian shall be designated by minus sign (-) preceding the three digits designating degrees.

designating degrees. A point on the prime meridian shall be a Hemisphere. A point on the 180th meridian shall be assigned to One exception to this last convention is permitted. For the s band of latitude around the earth, the East Bounding Coordinate assigned the value +180 (180) degrees.

- Any spatial address with a latitude of +90 (90) or -90 degrees North or South Pole, respectively. The component for longitude

With the exception of the special condition described above, this form is specified in the Federal Information Processing Standard (FIPS) 1986, Representation of geographic point locations for information interchange (Information Processing Standard 70-1): Washington, Department of Commerce, National Standards and Technology.

Network Addresses and File Names

values for file names, network addresses for computer systems, and relative Uniform Resource Locator convention of the Internet when possible. See <http://www.ncsa.uiuc.edu/demoweb/url-primer.html> for additional details on the Uniform Resource Locator.

□ Metadata

0 Metadata -- data about the content, quality, condition, and other characteristics
Type: compound

Metadata =

```

Identification_Information +
O{Data_Quality_Information}1 +
O{Spatial_Data_Organization_Information}1 +
O{Spatial_Reference_Information}1 t
O{Entity_and_Attribute_Information}1 t
O{Distribution_Information}1 +
Metadata Reference Information

```

(Sections 1 through 7 define the terms on the right side of the production rule.)

□ Identification Information

1 Identification Information -- basic information about the data set.
Type: compound

Identification Information =

```

Citation t
Description +
Time_Period_of_Content t
Status +
Spatial-Domain t
Keywords +
Access_Constraints t
Use_Constraints t
(Point_of_Contact) +
(1{Browse_Graphic}n) +
(Data-Set-Credit) +
(Security_Information) +
(Native_Data_Set_Environment) +
(1{Cross_Reference}n)

```

Citation =

Citation Information (see section 8 for production rules)

Description =

```

Abstract t
Purpose t
(Supplemental_Information)

```

```

Time Period of Content =
    Time_Period_Information (see section 9 for production rules) t
    Currentness Reference

Status =
    Progress +
    Maintenance-and-Update-Frequency

Spatial-Domain =
    Bounding_Coordinates +
    (1{Data_Set_G-Polygon}n)

    Bounding_Coordinates =
        West_Bounding_Coordinate +
        East-Bounding-Coordinate +
        North_Bounding_Coordinate +
        South_Bounding_Coordinate

    Data_Set_G-Polygon =
        Data-Set-G-Polygon_Outer_G-Ring t
        0{Data_Set_G-Polygon_Exclusion_G-Ring}n

        Data_Set_G-Polygon_Outer_G-Ring =
            4{G-Ring_Latitude +
              G-Ring_Longitude}n

        Data-Set-G-Polygon_Exclusion_G-Ring =
            4{G-Ring_Latitude +
              G-Ring_Longitude}n

Keywords =
    Theme +
    (Place) +
    (Stratum) +
    (Temporal)

    Theme =
        1{Theme_Keyword_Thesaurus t
          1{Theme Keyword}n }n

    Place =
        1{Place_Keyword_Thesaurus +
          1{Place Keyword}n }n

    Stratum =
        1{Stratum_Keyword_Thesaurus t
          1{Stratum Keyword}n }n

    Temporal =
        1{Temporal_Keyword_Thesaurus +
          1{Temporal_Keyword}n }n

Point of Contact =
    Contact Information (see section 10 for production rules)

Browse Graphic =
    Browse_Graphic_File_Name t
    Browse_Graphic_File_Description t
    Browse_Graphic_File_Type

Security_Information =
    Security_Classification_System t
    Security_Classification +

```

Security_Handling_Description

Cross Reference =

- Citation Information (see section 8 for production rules)
- 1.1 Citation -- information to be used to reference the data set.
Type: compound
 - 1.2 Description -- a characterization of the data set, including its inter
Type: compound
 - 1.2.1 Abstract -- a brief narrative summary of the data set.
Type: text
Domain: free text
 - 1.2.2 Purpose -- a summary of the intentions with which the data set was
Type: text
Domain: free text
 - 1.2.3 Supplemental Information -- other descriptive information about th
Type: text
Domain: free text
 - 1.3 Time Period of Content -- time period(s) for which the data set corres
Type: compound
 - 1.3.1 Currentness Reference -- the basis on which the time period of cor
is determined.
Type: text
Domain: "ground condition" "publication date" free text
 - 1.4 Status -- the state of and maintenance information for the data set.
Type: compound
 - 1.4.1 Progress -- the state of the data set.
Type: text
Domain: "Complete" "In work" "Planned"
 - 1.4.2 Maintenance and Update Frequency -- the frequency with which chang
additions are made to the data set after the initial data set is c
Type: text
Domain: "Continually" "Daily" "Weekly" "Monthly" "Annually"
"Unknown" "As needed" "Irregular" "None planned" free
 - 1.5 Spatial Domain - the geographic areal domain of the data set.
Type: compound
 - 1.5.1 Bounding Coordinates - the limits of coverage of a data set expres
and longitude values in the order western-most, eastern-most, nort
southern-most. For data sets that include a complete band of lati
earth, the West Bounding Coordinate shall be assigned the value -1
East Bounding Coordinate shall be assigned the value 180.0
Type: compound
 - 1.5.1.1 West Bounding Coordinate -- western-most coordinate of the limi
coverage expressed in longitude.
Type: real
Domain: -180.0 <= West Bounding Coordinate < 180.0
 - 1.5.1.2 East Bounding Coordinate -- eastern-most coordinate of the limi
expressed in longitude.
Type: real
Domain: -180.0 <= East Bounding Coordinate <= 180.0

- 1.5.1.3 North Bounding Coordinate -- northern-most coordinate of the li coverage expressed in latitude.
 Type: real
 Domain: -90.0 <= North Bounding Coordinate <= 90.0;
 North Bounding Coordinate >= South Bounding Coord
- 1.5.1.4 South Bounding Coordinate -- southern-most coordinate of the li coverage expressed in latitude.
 Type: real
 Domain: -90.0 <= South Bounding Coordinate <= 90.0;
 South Bounding Coordinate <= North Bounding Coord
- 1.5.2 Data Set G-Polygon -- coordinates defining the outline of an area set.
 Type: compound
- 1.5.2.1 Data Set G-Polygon Outer G-Ring -- the closed nonintersecting b an interior area.
 Type: compound
- 1.5.2.1.1 G-Ring Latitude -- the latitude of a point of the g-ring.
 Type: real
 Domain: -90.0 <= G-Ring Latitude <= 90.0
- 1.5.2.1.2 G-Ring Longitude -- the longitude of a point of the g-ring.
 Type: real
 Domain: -180.0 <= G-Ring Longitude < 180.0
- 1.5.2.2 Data Set G-Polygon Exclusion G-Ring -- the closed nonintersecti of a void area (or "hole") in an interior area.
 Type: compound
- 1.6 Keywords -- words or phrases summarizing an aspect of the data set.
 Type: compound
- 1.6.1 Theme -- subjects covered by the data set (for a list of some comm thesauri, see Part IV: Subject/index term sources in Network Deve MARC Standards Office, 1988, USMARC code list for relators, source description conventions: Washington, Library of Congress).
 Type: compound
- 1.6.1.1 Theme Keyword Thesaurus -- reference to a formally registered t similar authoritative source of theme keywords.
 Type: text
 Domain: "None" free text
- 1.6.1.2 Theme Keyword -- common-use word or phrase used to describe the of the data set.
 Type: text
 Domain: free text
- 1.6.2 Place -- geographic locations characterized by the data set.
 Type: compound
- 1.6.2.1 Place Keyword Thesaurus -- reference to a formally registered t similar authoritative source of place keywords.
 Type: text
 Domain: "None" "Geographic Names Information System" free
- 1.6.2.2 Place Keyword -- the geographic name of a location covered by a
 Type: text
 Domain: free text
- 1.6.3 Stratum -- layered, vertical locations characterized by the data s

- Type: compound
- 1.6.3.1 Stratum Keyword Thesaurus -- reference to a formally registered a similar authoritative source of stratum keywords.
Type: text
Domain: "None" free text
- 1.6.3.2 Stratum Keyword -- the name of a vertical location used to desc locations covered by a data set.
Type: text
Domain: free text
- 1.6.4 Temporal -- time period(s) characterized by the data set.
Type: compound
- 1.6.4.1 Temporal Keyword Thesaurus -- reference to a formally registerf or a similar authoritative source of temporal keywords.
Type: text
Domain: "None" free text
- 1.6.4.2 Temporal Keyword -- the name of a time period covered by a data
Type: text
Domain: free text
- 1.7 Access Constraints -- restrictions and legal prerequisites for accessi include any access constraints applied to assure the protection of pri property, and any special restrictions or limitations on obtaining the
Type: text
Domain: "None" free text
- 1.8 Use Constraints -- restrictions and legal prerequisites for using the granted. These include any access constraints applied to assure the p or intellectual property, and any special restrictions or limitations set.
Type: text
Domain: "None" free text
- 1.9 Point of Contact -- contact information for an individual or organizat knowledgeable about the data set.
Type: compound
- 1.10 Browse Graphic -- a graphic that provides an illustration of the data should include a legend for interpreting the graphic.
Type: compound
- 1.10.1 Browse Graphic File Name -- name of a related graphic file that pr illustration of the data set.
Type: text
Domain: free text
- 1.10.2 Browse Graphic File Description -- a text description of the illus
Type: text
Domain: free text
- 1.10.3 Browse Graphic File Type -- graphic file type of a related graphic
Type: text
Domain: domain values in the table below; free text

Domain Value	Definition
"CGM"	Computer Graphics Metafile
"EPS"	Encapsulated Postscript format
"GIF"	Graphic Interchange Format

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"JPEG"      Joint Photographic Experts Group format
"PBM"       Portable Bit Map format
"PS"        Postscript format
"TIFF"      Tagged Image File Format
"XWD"       X-Windows Dump

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- 1.11 Data Set Credit -- recognition of those who contributed to the data set
Type: text
Domain: free text
- 1.12 Security Information -- handling restrictions imposed on the data set security, privacy, or other concerns.
Type: compound
- 1.12.1 Security Classification System -- name of the classification system
Type: text
Domain: free text
- 1.12.2 Security Classification -- name of the handling restrictions on the data set
Type: text
Domain: "Top secret" "Secret" "Confidential" "Restricted" "Unclassified" "Sensitive" free text
- 1.12.3 Security Handling Description -- additional information about the handling the data set.
Type: text
Domain: free text
- 1.13 Native Data Set Environment -- a description of the data set in the production environment, including items such as the name of the software (including computer operating system, file name (including host-, path-, and file set size).
Type: text
Domain: free text
- 1.14 Cross Reference -- information about other, related data sets that are of interest.
Type: compound
- Data Quality Information
- 2 Data Quality Information -- a general assessment of the quality of the data (Recommendations on information to be reported and tests to be performed "Data Quality," which is chapter 3 of part 1 in Department of Commerce, 1995 Transfer Standard (SDTS) (Federal Information Processing Standard 173): Department of Commerce, National Institute of Standards and Technology.)
Type: compound

```

Data Quality_Information =
  0{Attribute_Accuracy}1 +
  Logical_Consistency_Report +
  Completeness_Report +
  0{Positional_Accuracy}1 +
  Lineage +
  (Cloud_Cover)

```

```

Attribute_Accuracy =
  Attribute_Accuracy_Report +
  (1{Quantitative_Attribute_Accuracy_Assessment}n)

```

```

Quantitative_Attribute_Accuracy_Assessment =
  Attribute_Accuracy_Value +
  Attribute_Accuracy_Explanation

```

```

Positional_Accuracy =

```

```

0{Horizontal_Positional_Accuracy}1 t
0{Vertical_Positional_Accuracy}1

Horizontal_Positional_Accuracy =
  Horizontal_Positional_Accuracy_Report +
  (1{Quantitative_Horizontal_Positional_Accuracy_Assessment}n)

  Quantitative_Horizontal_Positional_Accuracy_Assessment =
    Horizontal_Positional_Accuracy_Value +
    Horizontal-Positional-AccuracyIExplanation

Vertical_Positional_Accuracy =
  Vertical_Positional_Accuracy_Report +
  (1{Quantitative_Vertical_Positional_Accuracy_Assessment}n)

  Quantitative_Vertical_Positional_Accuracy_Assessment =
    Vertical_Positional_Accuracy_Value +
    Vertical-Positional-Accuracy-Explanation

Lineage =
  0{Source_Information}n +
  1{Process_Step}n

Source_Information =
  Source_Citation +
  0{Source_Scale_Denominator}1 t
  Type_of_Source_Media +
  Source_Time_Period_of_Content t
  Source-Citation_Abbreviation t
  Source-Contribution

Source_Citation =
  Citation_Information (see section 8 for production rules)

Source_Time_Period_of_Content =
  Time_Period-Information (see section 9 for production rules) t
  Source_Currentness_Reference

Process_Step =
  Process_Description +
  0{Source_Used_Citation_Abbreviation}n +
  Process_Date +
  (Process_Time) +
  0{Source_Produced_Citation_Abbreviation}n +
  (Process_Contact)

Process_Contact =
  Contact_Information (see section 10 for production rules)

```

2.1 Attribute Accuracy -- an assessment of the accuracy of the identification of attribute values in the data set.
Type: compound

2.1.1 Attribute Accuracy Report -- an explanation of the accuracy of the the entities and assignments of values in the data set and a description used.
Type: text
Domain: free text

2.1.2 Quantitative Attribute Accuracy Assessment -- a value assigned to accuracy of the identification of the entities and assignments of and the identification of the test that yielded the value.
Type: compound

- 2.1.2.1 Attribute Accuracy Value -- an estimate of the accuracy of the of the entities and assignments of attribute values in the data
Type: text
Domain: "Unknown" free text
- 2.1.2.2 Attribute Accuracy Explanation -- the identification of the tes Attribute Accuracy Value.
Type: text
Domain: free text
- 2.2 Logical Consistency Report -- an explanation of the fidelity of the re set and the tests used.
Type: text
Domain: free text
- 2.3 Completeness Report -- information about omissions, selection criteria definitions used, and other rules used to derive the data set.
Type: text
Domain: free text
- 2.4 Positional Accuracy -- an assessment of the accuracy of the positions
Type: compound
 - 2.4.1 Horizontal Positional Accuracy -- an estimate of accuracy of the h positions of the spatial objects.
Type: compound
 - 2.4.1.1 Horizontal Positional Accuracy Report -- an explanation of the the horizontal coordinate measurements and a description of the
Type: text
Domain: free text
 - 2.4.1.2 Quantitative Horizontal Positional Accuracy Assessment -- numer assigned to summarize the accuracy of the horizontal coordinate measurements and the identification of the test that yielded th
Type: compound
 - 2.4.1.2.1 Horizontal Positional Accuracy Value -- an estimate of the a the horizontal coordinate measurements in the data set expre (ground) meters.
Type: real
Domain: free real
 - 2.4.1.2.2 Horizontal Positional Accuracy Explanation -- the identifica test that yielded the Horizontal Positional Accuracy Value.
Type: text
Domain: free text
 - 2.4.2 Vertical Positional Accuracy -- an estimate of accuracy of the ver the data set.
Type: compound
 - 2.4.2.1 Vertical Positional Accuracy Report -- an explanation of the ac vertical coordinate measurements and a description of the tests
Type: text
Domain: free text
 - 2.4.2.2 Quantitative Vertical Positional Accuracy Assessment -- numeric assigned to summarize the accuracy of vertical coordinate measu the identification of the test that yielded the value.
Type: compound
 - 2.4.2.2.1 Vertical Positional Accuracy Value -- an estimate of the acc vertical coordinate measurement in the data set expressed ir

- meters.
 Type: real
 Domain: free real
- 2.4.2.2.2 Vertical Positional Accuracy Explanation -- the identification that yielded the Vertical Positional Accuracy Value.
 Type: text
 Domain: free text
- 2.5 Lineage -- information about the events, parameters, and source data within the data set, and information about the responsible parties.
 Type: compound
- 2.5.1 Source Information -- list of sources and a short discussion of those contributed by each.
 Type: compound
- 2.5.1.1 Source Citation -- reference for a source data set.
 Type: compound
- 2.5.1.2 Source Scale Denominator -- the denominator of the representation on a map (for example, on a 1:24,000-scale map, the Source Scale Denominator is 24000).
 Type: integer
 Domain: Source Scale Denominator > 1
- 2.5.1.3 Type of Source Media -- the medium of the source data set.
 Type: text
 Domain: "paper" "stable-base material" "microfiche" "microfilm" "audiocassette" "chart" "filmstrip" "transparency" "videocassette" "videodisc" "videotape" "physical" "computer program" "disc" "cartridge tape" "magnetic tape" "online" "CD-ROM" "electronic bulletin board" "electronic mail system" free text
- 2.5.1.4 Source Time Period of Content -- time period(s) for which the source corresponds to the ground.
 Type: compound
- 2.5.1.4.1 Source Currentness Reference -- the basis on which the source period of content information of the source data set is determined.
 Type: text
 Domain: "ground condition" "publication date" free text
- 2.5.1.5 Source Citation Abbreviation -- short-form alias for the source.
 Type: text
 Domain: free text
- 2.5.1.6 Source Contribution -- brief statement identifying the information by the source to the data set.
 Type: text
 Domain: free text
- 2.5.2 Process Step -- information about a single event.
 Type: compound
- 2.5.2.1 Process Description -- an explanation of the event and related tolerances.
 Type: text
 Domain: free text
- 2.5.2.2 Source Used Citation Abbreviation -- the Source Citation Abbreviation data set used in the processing step.
 Type: text

- Domain: Source Citation Abbreviations from the Source Inf entries for the data set.
- 2.5.2.3 Process Date -- the date when the event was completed.
Type: date
Domain: "Unknown" "Not complete" free date
- 2.5.2.4 Process Time -- the time when the event was completed.
Type: time
Domain: free time
- 2.5.2.5 Source Produced Citation Abbreviation -- the Source Citation At an intermediate data set that (1) is significant in the opinion producer, (2) is generated in the processing step, and (3) is u processing steps.
Type: text
Domain: Source Citation Abbreviations from the Source Inf entries for the data set.
- 2.5.2.6 Process Contact -- the party responsible for the processing ste
Type: compound
- 2.6 Cloud Cover -- area of a data set obstructed by clouds, expressed as a spatial extent.
Type: integer
Domain: 0 <= Cloud Cover <= 100 "Unknown"
- ⌈ Spatial Data Organization Information
- 3 Spatial Data Organization Information -- the mechanism used to represent the data set.
Type: compound

```
Spatial_Data_Organization_Information =
  0{Indirect_Spatial_Reference}1 t
  0{Direct Spatial Reference Method +
    ( [Point and Vector_Object_Information|
      Raster_Object_Information] )}1
```

```
Point and Vector_Object_Information =
  [SDTS_Terms_Description |
  VPF Terms Description]
```

```
SDTS Terms-Description =
  1{ SDTS_Point_and_Vector_Object_Type +
    (Point_and_Vector_Object_Count) }n
```

```
VPF Terms Description =
  VPF_Topology_Level t
  1{ VPF_Point_and_Vector_Object_Type +
    (Point_and_Vector_Object_Count) }n
```

```
Raster Object Information =
  Raster Object-Type +
    (Row Count t
     Column_Count t
     0{Vertical_Count}1 )
```

- 3.1 Indirect Spatial Reference -- name of types of geographic features, ac other means through which locations are referenced in the data set.
Type: text
Domain: free text
- 3.2 Direct Spatial Reference Method -- the system of objects used to repre data set.

- Type: text
Domain: "Point" "Vector" "Raster"
- 3.3 Point and Vector Object Information -- the types and numbers of vector point spatial objects in the data set.
Type: compound
- 3.3.1 SDTS Terms Description -- point and vector object information using terminology and concepts from "Spatial Data Concepts," which is chapter 1 in Department of Commerce, 1992, Spatial Data Transfer Standard (Federal Information Processing Standard 173): Washington, Department of Commerce, National Institute of Standards and Technology. (Note that reference to the SDTS is used ONLY to provide a set of terminology and vector objects.)
Type: compound
- 3.3.1.1 SDTS Point and Vector Object Type -- name of point and vector spatial objects used to locate zero-, one-, and two-dimensional spatial data set.
Type: text
Domain: (The domain is from "Spatial Data Concepts," which is chapter 2 of part 1 in Department of Commerce, 1992, Spatial Data Transfer Standard (SDTS) (Federal Information Processing Standard 173): Washington, Department of Commerce, National Institute of Standards and Technology):
"Point" "Entity point" "Label point" "Area point" "Nonplanar graph" "Node, network" "String" "Link" "Complete chain" "Area chain" "Network chain, planar graph" "Network chain, nonplanar graph" "Circular arc, three point center" "Elliptical arc" "Uniform B-spline" "Piecewise Bezier" "Ring with mixed composition" "Ring composed of strings" "Ring composed of chains" "Ring composed of arcs" "G-polygon" "GT-polygon composed of rings" "GT-polygon composed of chains" "Universe polygon composed of rings" "Universe polygon composed of chains" "Void polygon composed of rings" "Void polygon composed of chains"
- 3.3.1.2 Point and Vector Object Count -- the total number of the point object type occurring in the data set.
Type: integer
Domain: Point and Vector Object Count > 0
- 3.3.2 VPF Terms Description -- point and vector object information using terminology and concepts from Department of Defense, 1992, Vector Product Format (MIL-STD-600006): Philadelphia, Department of Defense, Defense Printing Service Detachment Office. (Note that this reference to VPF is used ONLY to provide a set of terminology for the point and vector objects.)
Type: compound
- 3.3.2.1 VPF Topology Level -- the completeness of the topology carried in the data set. The levels of completeness are defined in Department of Defense, 1992, Vector Product Format (MIL-STD-600006): Philadelphia, Department of Defense, Defense Printing Service Detachment Office.
Type: integer
Domain: 0 <= VPF Topology Level <= 3
- 3.3.2.2 VPF Point and Vector Object Type -- name of point and vector spatial objects used to locate zero-, one-, and two-dimensional spatial locations in the data set.
Type: text

- Domain: (The domain is from Department of Defense, 1992, Product Format (MIL-STD-60006): Philadelphia, Department of Defense, Defense Printing Service Detachment Office):
"Node" "Edge" "Face" "Text"
- 3.4 Raster Object Information -- the types and numbers of raster spatial c
Type: compound
- 3.4.1 Raster Object Type -- raster spatial objects used to locate zero-,
dimensional locations in the data set.
Type: text
Domain: (With the exception of "voxel", the domain is from "S
Concepts," which is chapter 2 of part 1 in Department
Commerce, 1992, Spatial Data Transfer Standard (SDTS)
(Federal Information Processing Standard 173): Washi
Department of Commerce, National Institute of Standar
Technology):
"Point" "Pixel" "Grid Cell" "Voxel"
- 3.4.2 Row Count -- the maximum number of raster objects along the ordina
For use with rectangular raster objects.
Type: Integer
Domain: Row Count > 0
- 3.4.3 Column Count -- the maximum number of raster objects along the abs
For use with rectangular raster objects.
Type: Integer
Domain: Column Count > 0
- 3.4.4 Vertical Count -- the maximum number of raster objects along the v
For use with rectangular volumetric raster objects (voxels).
Type: Integer
Domain: Depth Count > 0
- 4 Spatial Reference Information -- the description of the reference frame f
encode, coordinates in the data set.
Type: compound
- Spatial_Reference_Information =
0{Horizontal_Coordinate_System_Definition}1 +
0{Vertical_Coordinate_System_Definition}1
- Horizontal_Coordinate_System_Definition =
[Geographic |
1{Planar}n |
Local] +
0{Geodetic_Model}1
- Geographic =
Latitude_Resolution +
Longitude_Resolution +
Geographic_Coordinate_Units
- Planar =
[Map_Projection |
Grid_Coordinate_System |
Local_Planar] +
Planar_Coordinate_Information
- Map_Projection =
Map_Projection_Name +
[Albers_Conical_Equal_Area |
Azimuthal_Equidistant |

```

Equidistant-Conic |
Equirectangular |
General Vertical Near-sided Perspective |
Gnomonic |
Lambert_Azimuthal_Equal_Area |
Lambert Conformal Conic |
Mercator |
Modified Stereographic_for_Alaska |
Miller_Cylindrical |
Oblique_Mercator |
Orthographic |
Polar_Stereographic |
Polyconic |
Robinson |
Sinusoidal |
Space_Oblique_Mercator_(Landsat) |
Stereographic |
Transverse Mercator |
van_der_Grinten|
Other_Projection's Definition]

Albers Conical_Equal_Area =
  1{Standard_Parallel}2 +
  Longitude_of_Central_Meridian +
  Latitude_of_Projection_Origin t
  False_Easting t
  False_Northing

Azimuthal_Equidistant =
  Longitude_of_Central_Meridian +
  Latitude_of_Projection_Origin +
  False_Easting t
  False_Northing

Equidistant_Conic =
  1{Standard_Parallel}2 +
  Longitude_of_Central_Meridian +
  Latitude_of_Projection_Origin +
  False_Easting +
  False_Northing

Equirectangular =
  Standard_Parallel +
  Longitude_of_Central_Meridian +
  False_Easting t
  False_Northing

General_Vertical_Near-sided_Perspective =
  -Height_of_Perspective_Point_Above_Surface t
  Longitude_of_Projection_Center t
  Latitude_of_Projection_Center t
  False_Easting +
  False_Northing

Gnomonic =
  Longitude_of_Projection_Center t
  Latitude_of_Projection_Center t
  False_Easting +
  False_Northing

Lambert_Azimuthal_Equal-Area =
  Longitude_of_Projection_Center t
  Latitude_of_Projection_Center t
  False_Easting +

```

False Northing

```

Lambert_Conformal_Conic =
  1{Standard_Parallel}2 +
  Longitude_of_Central_Meridian t
  Latitude_of_Projection_Origin +
  False_Easting +
  False_Northing

Mercator =
  [Standard-Parallel |
  Scale_Factor_at_Equator] +
  Longitude_of_Central_Meridian t
  False_Easting t
  False_Northing

Modified-stereographic_for_Alaska =
  False_Easting +
  False-Northing

Miller_Cylindrical =
  Longitude_of_Central_Meridian t
  False_Easting t
  False-Northing

Oblique_Mercator =
  -Scale_Factor_at_Center_Line +
  [Oblique_Line_Azimuth |
  Oblique_Line_Point] +
  Latitude_of_Projection_Origin t
  False_Easting +
  False_Northing

  Oblique_Line-Azimuth =
  Azimuthal_Angle t
  Azimuth_Measure_Point Longitude

  Oblique_Line_Point =
  2{Oblique_Line_Latitude +
  Oblique_Line_Longitude}2

Orthographic =
  Longitude_of_Projection_Center +
  Latitude_of_Projection_Center t
  False_Easting +
  False_Northing

Polar_Stereographic =
  Straight-Vertical Longitude from Pole +
  [Standard-Parallel |
  Scale_Factor_at_Projection_Origin] +
  False_Easting t
  False_Northing

Polyconic =
  Longitude_of_Central_Meridian +
  Latitude_of_Projection_Origin t
  False_Easting t
  False_Northing

Robinson =
  Longitude_of_Projection_Center +
  False_Easting +
  False_Northing

```

```

Sinusoidal =
    Longitude_of_Central_Meridian t
    False_Easting t
    False_Northing

Space_Oblique_Mercator_(Landsat) =
    Landsat_Number +
    Path_Number +
    False_Easting t
    False_Northing

Stereographic =
    Longitude_of_Projection_Center +
    Latitude_of_Projection_Center +
    False_Easting +
    False_Northing

Transverse_Mercator =
    Scale_Factor_at_Central_Meridian t
    Longitude_of_Central_Meridian t
    Latitude_of_Projection_Origin t
    False_Easting t
    False_Northing

van_der_Grinten =
    -Longitude_of_Central_Meridian +
    False_Easting +
    False-Northing

Grid_Coordinate_System =
    Grid_Coordinate_System_Name +
    [Universal_Transverse_Mercator |
     Universal_Polar_Stereographic |
     State-Plane_Coordinate_System |
     ARC_Coordinate_System |
     Other_Grid_System's_Definition]

Universal_Transverse_Mercator =
    UTM_Zone_Number +
    Transverse_Mercator

Universal_Polar_Stereographic =
    UPS_Zone_Identifier +
    Polar_Stereographic

State_Plane_Coordinate_System =
    SPCS_Zone_Identifier t
    [Lambert_Conformal_Conic |
     Transverse_Mercator |
     Oblique_Mercator |
     Polyconic]

ARC_Coordinate_System =
    ARC_System_Zone_Identifier +
    [Equirectangular |
     Azimuthal_Equidistant]

Local_Planar =
    Local-Planar_Description +
    Local_Planar-Georeference_Information

Planar_Coordinate_Information =
    Planar_Coordinate_Encoding_Method +

```

```

    [Coordinate Representation |
      Distance and Bearing-Representation] +
    Planar Distance Units

Coordinate Representation =
  Abscissa Resolution +
  Ordinate-Resolution

Distance and Bearing Representation =
  Distance Resolution +
  Bearing_Resolution +
  Bearing_Units +
  Bearing_Reference_Direction +
  Bearing_Reference_Meridian

Local =
  Local_Description t
  Local_Georeference_Information

Geodetic Model =
  0{Horizontal_Datum_Name}1 +
  Ellipsoid Name +
  Semi-major Axis t
  Denominator of Flattening Ratio

Vertical Coordinate System Definition =
  0{Altitude_System_Definition}1 t
  0{Depth_System_Definition}1

Altitude_System_Definition =
  Altitude_Datum_Name +
  1{Altitude_Resolution}n t
  Altitude Distance Units t
  Altitude-Encoding-Method

Depth System-Definition =
  Depth-Datum_Name +
  1{Depth_Resolution}n t
  Depth_Distance Units +
  Depth_Encoding-Method

4.1 Horizontal Coordinate System Definition -- the reference frame or syst
linear or angular quantities are measured and assigned to the positior
occupies.
  Type: compound

4.1.1 Geographic -- the quantities of latitude and longitude which defir
point on the Earth's surface with respect to a reference spheroid.
  Type: compound

4.1.1.1 Latitude Resolution -- the minimum difference between two adjac
values expressed in Geographic Coordinate Units of measure.
  Type: real
  Domain: Latitude Resolution > 0.0

4.1.1.2 Longitude Resolution -- the minimum difference between two adja
longitude values expressed in Geographic Coordinate Units of me
  Type: real
  Domain: Longitude Resolution > 0.0

4.1.1.3 Geographic Coordinate Units -- units of measure used for the la
longitude values.
  Type: text
  Domain: "Decimal degrees" "Decimal minutes" "Decimal secc

```

"Degrees and decimal minutes" "Degrees, minutes,
decimal seconds" "Radians" "Grads"

- 4.1.2 Planar -- the quantities of distances, or distances and angles, with position of a point on a reference plane to which the surface of the Earth is projected.
Type: compound
- 4.1.2.1 Map Projection -- the systematic representation of all or part of the Earth on a plane or developable surface.
Type: compound
- 4.1.2.1.1 Map Projection Name -- name of the map projection.
Type: text
Domain: "Albers Conical Equal Area"
"Azimuthal Equidistant" "Equidistant Conic"
"Equirectangular" "General Vertical Near-sided
Projection" "Gnomonic" "Lambert Azimuthal Equal
Area" "Lambert Conformal Conic" "Mercator"
"Modified Stereographic for Alaska"
"Miller Cylindrical" "Oblique Mercator"
"Orthographic" "Polar Stereographic" "Polyconic"
"Robinson" "Sinusoidal" "Space Oblique Mercator"
"Stereographic" "Transverse Mercator"
"van der Grinten" "other projection"
- 4.1.2.1.2 (map projection parameters for:) Albers Conical Equal Area, Azimuthal Equidistant, Equidistant Conic, Equirectangular, General Vertical Near-sided Projection, Gnomonic, Lambert Azimuthal Equal Area, Lambert Conformal Conic, Mercator, Modified Stereographic for Alaska, Miller Cylindrical, Oblique Mercator, Orthographic, Stereographic, Polyconic, Robinson, Sinusoidal, Space Oblique Mercator (Landsat), Stereographic, Transverse Mercator, van der Grinten -- parameters for a specific map projection, each having a unique mathematical relationship between the Earth and the plane or developable surface.
Type: compound
(The data elements 4.1.2.1.2.1 through 4.1.2.1.2.17 are map projection parameters. Each map projection has a specific set of defining parameters. These sets of parameters are provided in the system metadata for each projection.)
- 4.1.2.1.2.1 Standard Parallel -- line of constant latitude at which the Earth and the plane or developable surface intersect.
Type: real
Domain: -90.0 <= Standard Parallel <= 90.0
- 4.1.2.1.2.2 Longitude of Central Meridian -- the line of longitude at the center of a map projection generally used as the basis for constructing the projection.
Type: real
Domain: -180.0 <= Longitude of Central Meridian <= 180.0
- 4.1.2.1.2.3 Latitude of Projection Origin -- latitude chosen as the origin of rectangular coordinates for a map projection.
Type: real
Domain: -90.0 <= Latitude of Projection Origin <= 90.0
- 4.1.2.1.2.4 False Easting -- the value added to all "x" values in rectangular coordinates for a map projection. This value is frequently assigned to eliminate negative numbers. The unit of measure identified in Planar Coordinate System.
Type: real

Domain: free real

4.1.2.1.2.5 False Northing -- the value added to all "y" values in rectangular coordinates for a map projection. This value frequently is assigned to eliminate negative numbers. in the unit of measure identified in Planar Coordinate
Type: real
Domain: free real

4.1.2.1.2.6 Scale Factor at Equator -- a multiplier for reducing distance obtained from a map by computation or scaling to the distance along the equator.
Type: real
Domain: Scale Factor at Equator > 0.0

4.1.2.1.2.7 Height of Perspective Point Above Surface -- height of the point above the Earth, expressed in meters.
Type: real
Domain: Height of Perspective Point Above Surface > 0

4.1.2.1.2.8 Longitude of Projection Center -- longitude of the projection center for azimuthal projections.
Type: real
Domain: $-180.0 \leq \text{Longitude of Projection Center} < 180.0$

4.1.2.1.2.9 Latitude of Projection Center -- latitude of the projection center for azimuthal projections.
Type: real
Domain: $-90.0 \leq \text{Latitude of Projection Center} \leq 90.0$

4.1.2.1.2.10 Scale Factor at Center Line -- a multiplier for reducing distance obtained from a map by computation or scaling to the distance along the center line.
Type: real
Domain: Scale Factor at Center Line > 0.0

4.1.2.1.2.11 Oblique Line Azimuth -- method used to describe the line of which an oblique mercator map projection is centered on the map projection origin and an azimuth.
Type: compound

4.1.2.1.2.11.1 Azimuthal Angle -- angle measured clockwise from the projection origin and expressed in degrees.
Type: real
Domain: $0.0 \leq \text{Azimuthal Angle} < 360.0$

4.1.2.1.2.11.2 Azimuth Measure Point Longitude -- longitude of the projection origin.
Type: real
Domain: $-180.0 \leq \text{Azimuth Measure Point Longitude} < 180.0$

4.1.2.1.2.12 Oblique Line Point -- method used to describe the line of which an oblique mercator map projection is centered on the points near the limits of the mapped region that define the line.
Type: compound

4.1.2.1.2.12.1 Oblique Line Latitude -- latitude of a point defined on the oblique line.
Type: real
Domain: $-90.0 \leq \text{Oblique Line Latitude} \leq 90.0$

- 4.1.2.1.2.12.2 Oblique Line Longitude -- longitude of a point oblique line.
 Type: real
 Domain: -180.0 <= Oblique Line Longitude < 180.0
- 4.1.2.1.2.13 Straight Vertical Longitude from Pole -- longitude to straight up from the North or South Pole.
 Type: real
 Domain: -180.0 <= Straight Vertical Longitude from < 180.0
- 4.1.2.1.2.14 Scale Factor at Projection Origin -- a multiplier for distance obtained from a map by computation or scalar actual distance at the projection origin.
 Type: real
 Domain: Scale Factor at Projection Origin > 0.0
- 4.1.2.1.2.15 Landsat Number -- number of the Landsat satellite. (data element exists solely to provide a parameter needed to define the space oblique mercator projection. It is not used for data originating from a remote sensing vehicle.)
 Type: Integer
 Domain: 0 < Landsat Number < 5
- 4.1.2.1.2.16 Path Number -- number of the orbit of the Landsat satellite (Note: This data element exists solely to provide a parameter needed to define the space oblique mercator projection used to identify data originating from a remote sensing vehicle.)
 Type: integer
 Domain: 0 < Path Number < 251 for Landsats 1, 2, or 5
 0 < Path Number < 233 for Landsats 4 or 5
- 4.1.2.1.2.17 Scale Factor at Central Meridian -- a multiplier for distance obtained from a map by computation or scalar actual distance along the central meridian.
 Type: real
 Domain: Scale Factor at Central Meridian > 0.0
- 4.1.2.1.3 Other Projection's Definition -- a complete description of a projection not defined elsewhere in this standard, that was used for the data set. The information provided shall include the name of the projection, the names of the parameters and values used for the data set, and a citation of the specification for the algorithms that describe the mathematical relationship between the Earth and the plane or developable surface for the projection.
 Type: text
 Domain: free text
- 4.1.2.2 Grid Coordinate System -- a plane-rectangular coordinate system based on, and mathematically adjusted to, a map projection so that positions can be readily transformed to and from plane coordinates.
 Type: compound
- 4.1.2.2.1 Grid Coordinate System Name -- name of the grid coordinate system
 Type: text
 Domain: "Universal Transverse Mercator"
 "Universal Polar Stereographic"
 "State Plane Coordinate System 1927"
 "State Plane Coordinate System 1983"
 "ARC Coordinate System" "other grid system"
- 4.1.2.2.2 Universal Transverse Mercator (UTM) -- a grid system based on a transverse mercator projection, applied between latitudes 84

north and 80 degrees south on the Earth's surface.

Type: compound

- 4.1.2.2.2.1 UTM Zone Number -- identifier for the UTM zone.
 Type: integer
 Domain: 1 <= UTM Zone Number <= 60 for the northern hemisphere;
 -60 <= UTM Zone Number <= -1 for the southern hemisphere
- 4.1.2.2.3 Universal Polar Stereographic (UPS) -- a grid system based on a stereographic projection, applied to the Earth's polar region degrees north and south of 80 degrees south.
 Type: compound
- 4.1.2.2.3.1 UPS Zone Identifier -- identifier for the UPS zone.
 Type: text
 Domain: "A" "B" "Y" "Z"
- 4.1.2.2.4 State Plane Coordinate System (SPCS) -- a plane-rectangular system established for each state in the United States by the Geodetic Survey.
 Type: compound
- 4.1.2.2.4.1 SPCS Zone Identifier -- identifier for the SPCS zone.
 Type: text
 Domain: Four-digit numeric codes for the State Plane Coordinate Systems based on the North American Datum of 1927 are found in Department of Commerce, 1986, Representation of geographic point locations for information interchange (Federal Information Processing Standard 70-1): Washington: Department of Commerce, National Institute of Standards and Technology. Codes for the State Plane Coordinate Systems based on the North American Datum of 1983 are found in Department of Commerce, 1989 (January), State Plane Coordinate System of 1983 (National Oceanic and Atmospheric Administration Manual NOS NGS 5): Silver Spring, Maryland National Oceanic and Atmospheric Administration, National Ocean Service, Coast and Geodetic Survey.
- 4.1.2.2.5 ARC Coordinate System -- the Equal Arc-second Coordinate System plane-rectangular coordinate system established in Department of Defense, 1990, Military specification ARC Digitized Raster Graphic (ADRG) (MIL-A-89007): Philadelphia, Department of Defense, Defense Printing Service Detachment Office.
 Type: compound
- 4.1.2.2.5.1 ARC System Zone Identifier -- identifier for the ARC System Zone.
 Type: integer
 Domain: 1 <= ARC System Zone Identifier <= 18
- 4.1.2.2.6 Other Grid System's Definition -- a complete description of a system, not defined elsewhere in this standard, that was used for a data set. The information provided shall include the name of the system, the names of the parameters and values used for the system, and the citation of the specification for the algorithms that define the mathematical relationship between the Earth and the coordinate system.

- grid system.
 Type: text
 Domain: free text
- 4.1.2.3 Local Planar -- any right-handed planar coordinate system of which coincides with a plumb line through the origin that locally is surface of the Earth.
 Type: compound
- 4.1.2.3.1 Local Planar Description -- a description of the local planar
 Type: text
 Domain: free text
- 4.1.2.3.2 Local Planar Georeference Information -- a description of the information provided to register the local planar system to (e.g. control points, satellite ephemeral data, inertial navigation)
 Type: text
 Domain: free text
- 4.1.2.4 Planar Coordinate Information -- information about the coordinate system developed on the planar surface.
 Type: compound
- 4.1.2.4.1 Planar Coordinate Encoding Method -- the means used to represent horizontal positions.
 Type: text
 Domain: "coordinate pair" "distance and bearing" "row and column"
- 4.1.2.4.2 Coordinate Representation -- the method of encoding the position of a point by measuring its distance from perpendicular reference (e.g. "coordinate pair" and "row and column" methods).
 Type: compound
- 4.1.2.4.2.1 Abscissa Resolution -- the (nominal) minimum distance between the "x" or column values of two adjacent points, expressed in Planar Distance Units of measure.
 Type: real
 Domain: Abscissa Resolution > 0.0
- 4.1.2.4.2.2 Ordinate Resolution -- the (nominal) minimum distance between the "y" or row values of two adjacent points, expressed in Planar Distance Units of measure.
 Type: real
 Domain: Ordinate Resolution > 0.0
- 4.1.2.4.3 Distance and Bearing Representation -- a method of encoding the position of a point by measuring its distance and direction (e.g. distance and bearing angle) from another point.
 Type: compound
- 4.1.2.4.3.1 Distance Resolution -- the minimum distance measurable between two points, expressed in Planar Distance Units of measure.
 Type: real
 Domain: Distance Resolution > 0.0
- 4.1.2.4.3.2 Bearing Resolution -- the minimum angle measurable between two points, expressed in Bearing Units of measure.
 Type: real
 Domain: Bearing Resolution > 0.0
- 4.1.2.4.3.3 Bearing Units -- units of measure used for angles.
 Type: text
 Domain: "Decimal degrees" "Decimal minutes" "Decimal seconds"

- seconds" "Degrees and decimal minutes"
 "Degrees, minutes, and decimal seconds"
 "Radians" "Grads"
- 4.1.2.4.3.4 Bearing Reference Direction -- direction from which t
 is measured.
 Type: text
 Domain: "North" "South"
- 4.1.2.4.3.5 Bearing Reference Meridian -- axis from which the bea
 measured.
 Type: text
 Domain: "Assumed" "Grid" "Magnetic" "Astronomic"
 "Geodetic"
- 4.1.2.4.4 Planar Distance Units -- units of measure used for distances
 Type: text
 Domain: "meters" "international feet" "survey feet" fre
- 4.1.3 Local -- a description of any coordinate system that is not aligne
 of the Earth.
 Type: compound
- 4.1.3.1 Local Description -- a description of the coordinate system anc
 to the surface of the Earth.
 Type: text
 Domain: free text
- 4.1.3.2 Local Georeference Information -- a description of the informat
 to register the local system to the Earth (e.g. control points,
 ephemeral data, inertial navigation data).
 Type: text
 Domain: free text
- 4.1.4 Geodetic Model -- parameters for the shape of the earth.
 Type: compound
- 4.1.4.1 Horizontal Datum Name -- the identification given to the refere
 used for defining the coordinates of points.
 Type: text
 Domain: "North American Datum of 1927" "North American Da
 of 1983" free text
- 4.1.4.2 Ellipsoid Name -- identification given to established represent
 Earth's shape.
 Type: text
 Domain: "Clarke 1866" "Geodetic Reference System 80" free
- 4.1.4.3 Semi-major Axis -- radius of the equatorial axis of the ellipsc
 Type: real
 Domain: Semi-major Axis > 0.0
- 4.1.4.4 Denominator of Flattening Ratio -- the denominator of the ratic
 difference between the equatorial and polar radii of the ellips
 numerator is set to 1.
 Type: real
 Domain: Denominator of Flattening > 0.0
- 4.2 Vertical Coordinate System Definition -- the reference frame or system
 vertical distances (altitudes or depths) are measured.
 Type: compound
- 4.2.1 Altitude System Definition -- the reference frame or system from w
 (elevations) are measured. The term "altitude" is used instead c

"elevation" to conform to the terminology in Federal Information E Standards 70-1 and 173.

Type: compound

- 4.2.1.1 Altitude Datum Name -- the identification given to the level su the surface of reference from which altitudes are measured.
Type: text
Domain: 'National Geodetic Vertical Datum of 1929'
"North American Vertical Datum of 1988" free text
- 4.2.1.2 Altitude Resolution -- the minimum distance possible between tw altitude values, expressed in Altitude Distance Units of measur
Type: real
Domain: Altitude Resolution > 0.0
- 4.2.1.3 Altitude Distance Units -- units in which altitudes are recorde
Type: text
Domain: "meters" "feet" free text
- 4.2.1.4 Altitude Encoding Method -- the means used to encode the altitc
Type: text
Domain: 'Explicit elevation coordinate included with hori coordinates' "Implicit coordinate" "Attribute val
- 4.2.2 Depth System Definition -- the reference frame or system from whic measured.
Type: compound
- 4.2.2.1 Depth Datum Name -- the identification given to surface of refe which depths are measured.
Type: text
Domain: "Local surface" "Chart datum; datum for sounding reduction" "Lowest astronomical tide"
"Highest astronomical tide" "Mean low water" "Mea water" "Mean sea level" "Land survey datum"
"Mean low water springs" "Mean high water springs" "Mean low water neap" "Mean high water neap"
"Mean lower low water" "Mean lower low water spri" "Mean higher high water" "Mean higher low water"
"Mean lower high water" "Spring tide" "Tropic low water" "Neap tide" "High water" "Higher high wate"
"Low water" "Low-water datum" "Lowest low water" "Lower low water" "Lowest normal low water" "Mea level" "Indian spring low water"
'High-water full and charge' 'Low-water full and' "Columbia River datum" "Gulf Coast low water datu" "Equatorial springs low water" "Approximate lowes astronomical tide" "No correction" free text
- 4.2.2.2 Depth Resolution -- the minimum distance possible between two a depth values, expressed in Depth Distance Units of measure.
Type: real
Domain: Depth Resolution > 0.0
- 4.2.2.3 Depth Distance Units -- units in which depths are recorded.
Type: text
Domain: "meters" "feet" free text
- 4.2.2.4 Depth Encoding Method -- the means used to encode depths.
Type: text
Domain: "Explicit depth coordinate included with horizont coordinates" "Implicit coordinate" "Attribute val
- Entity and Attribute Information

5 Entity and Attribute Information -- information about the information cor including the entities types, their attributes, and the domains from whic assigned.

Type: compound

```
Entity and Attribute Information =
    [Detailed_Description |
     Overview_Description |
     Detailed_Description +
     Overview_Description]
```

```
Detailed_Description =
    1{Entity_Type t
     0{Attribute}n }n
```

```
Entity-Type =
    Entity-Type_Label +
    Entity_Type-Definition +
    Entity-Type-Definition__Source
```

```
Attribute =
    Attribute_Label +
    Attribute-Definition +
    Attribute-Definition__Source
    1{Attribute_Domain_Values}n +
    0{Attribute_Units_of_Measure}1 t
    (Attribute_Measurement_Resolution) t
    ( 1{Beginning_Date_of_Attribute_Values t
     0{Ending_Date_of_Attribute_Values}1 }n )+
    (Attribute_Value_Accuracy_Information) t
    (Attribute-Measurement-Frequency)
```

```
Attribute_Domain_Values =
    -[Enumerated_Domain |
     Range-Domain |
     Codeset_Domain |
     Unrepresentable_Domain]
```

```
Enumerated_Domain =
    1{Enumerated_Domain_Value t
     Enumerated-Domain-Value_Definition t
     Enumerated-Domain-Value-Definition__Source t
     0{Attribute}n }n
```

```
Range-Domain =
    Range_Domain_Minimum t
    Range-Domain-Maximum t
    0{Attribute}n
```

```
Codeset_Domain=
    Codeset_Name t
    Codeset-Source
```

```
Attribute_Value_Accuracy_Information =
    Attribute_Value_Accuracy t
    Attribute-Value-Accuracy__Explanation
```

```
Overview_Description =
    1{Entity_and_Attribute_Overview t
     1{Entity_and_Attribute_Detail_Citation}n }n
```

5.1 Detailed Description -- description of the entities, attributes, attri characteristics encoded in the data set.

Type: compound

- 5.1.1 Entity Type -- the definition and description of a set into which instances are classified.
Type: compound
- 5.1.1.1 Entity Type Label -- the name of the entity type.
Type: text
Domain: free text
- 5.1.1.2 Entity Type Definition -- the description of the entity type.
Type: text
Domain: free text
- 5.1.1.3 Entity Type Definition Source -- the authority of the definitic
Type: text
Domain: free text
- 5.1.2 Attribute -- a defined characteristic of an entity.
Type: compound
- 5.1.2.1 Attribute Label -- the name of the attribute.
Type: text
Domain: free text
- 5.1.2.2 Attribute Definition -- the description of the attribute.
Type: text
Domain: free text
- 5.1.2.3 Attribute Definition Source -- the authority of the definition.
Type: text
Domain: free text
- 5.1.2.4 Attribute Domain Values -- the valid values that can be assigne
attribute.
Type: compound
- 5.1.2.4.1 Enumerated Domain -- the members of an established set of va
values.
Type: compound
- 5.1.2.4.1.1 Enumerated Domain Value -- the name or label of a mem
the set.
Type: text
Domain: free text
- 5.1.2.4.1.2 Enumerated Domain Value Definition -- the description
value.
Type: text
Domain: free text
- 5.1.2.4.1.3 Enumerated Domain Value Definition Source -- the aut
the definition.
Type: text
Domain: free text
- 5.1.2.4.2 Range Domain -- the minimum and maximum values of a continu
valid values.
Type: compound
- 5.1.2.4.2.1 Range Domain Minimum -- the least value that the attr
be assigned.
Type: text
Domain: free text

- 5.1.2.4.2.2 Range Domain Maximum -- the greatest value that the a can be assigned.
Type: text
Domain: free text
- 5.1.2.4.3 Codeset Domain -- reference to a standard or list which cont members of an established set of valid values.
Type: compound
- 5.1.2.4.3.1 Codeset Name -- the title of the codeset.
Type: text
Domain: free text
- 5.1.2.4.3.2 Codeset Source -- the authority for the codeset.
Type: text
Domain: free text
- 5.1.2.4.4 Unrepresentable Domain -- description of the values and reas they cannot be represented.
Type: text
Domain: free text
- 5.1.2.5 Attribute Units of Measurement -- the standard of measurement f attribute value.
Type: text
Domain: free text
- 5.1.2.6 Attribute Measurement Resolution -- the smallest unit increment attribute value is measured.
Type: real
Domain: Attribute Measurement Resolution > 0.0
- 5.1.2.7 Beginning Date of Attribute Values -- earliest or only date for attribute values are current. In cases when a range of dates a is the earliest date for which the information are valid.
Type: date
Domain: free date
- 5.1.2.8 Ending Date of Attribute Values -- latest date for which the ir current. Used in cases when a range of dates are provided.
Type: date
Domain: free date
- 5.1.2.9 Attribute Value Accuracy Information -- an assessment of the ac assignment of attribute values.
Type: compound
- 5.1.2.9.1 Attribute Value Accuracy -- an estimate of the accuracy of t assignment of attribute values.
Type: real
Domain: free real
- 5.1.2.9.2 Attribute Value Accuracy Explanation -- the definition of th Value Accuracy measure and units, and a description of how t estimate was derived.
Type: text
Domain: free text
- 5.1.2.10 Attribute Measurement Frequency -- the frequency with which att values are added.
Type: real
Domain: "Unknown" "As needed" "Irregular" "None planned"
text

- 5.2 Overview Description -- summary of, and citation to detailed descriptive information content of the data set.
Type: compound
- 5.2.1 Entity and Attribute Overview -- detailed summary of the information in a data set.
Type: text
Domain: free text
- 5.2.2 Entity and Attribute Detail Citation -- reference to the complete entity types, attributes, and attribute values for the data set.
Type: text
Domain: free text
- Distribution Information
- 6 Distribution Information -- information about the distributor of and options for the data set.
Type: compound

```
Distribution Information =
  1{Distributor t
    0{Resource Description}1 t
    Distribution_Liability +
    0{Standard_Order_Process}n t
    0{Custom_Order_Process}1 +
    (Technical_Prerequisites) t
    (Available_Time_Period) }n
```

```
Distributor =
  Contact Information (see section 10 for production rules)
```

```
Standard Order Process =
-[Non-digital-Form |
  1{Digital_Form}n ] +
  Fees t
  (Ordering_Instructions) +
  (Turnaround)
```

```
Digital_Form =
  Digital Transfer Information t
  Digital-Transfer-Option
```

```
Digital_Transfer_Information =
  Format Name t
  ([Format Version Number |
    Format_Version_Date] +
    (Format_Specification) ) +
  (Format_Information_Content) t
  0{File-Decompression_Technique}1 t
  (Transfer-Size)
```

```
Digital Transfer-Option =
  1{ [Online-Option |
    Offline_Option] }n
```

```
Online_Option =
  1{Computer_Contact_Information}n t
  (Access_Instructions) t
  (Online_Computer_and_Operating_System)
```

```
Computer_Contact_Information =
  [Network-Address |
  Dialup_Instructions]
```

Network Address =
 1{Network Resource Name}n

Dialup Instructions =
 Lowest_BPS +
 0{Highest_BPS}1 +
 Number_DataBits +
 Number_StopBits +
 Parity +
 0{Compression_Support}1 +
 1{Dialup_Telephone}n +
 1{Dialup_File_Name}n

Offline Option =
 -Offline Media +
 0{Recording_Capacity}1
 1{Recording_Format}n +
 0{Compatibility_Information}1

Recording-Capacity =
 1{Recording Density}n t
 Recording Density_Units

Available Time Period =
 -Time Period Information (see section 9 for production rules)

- 6.1 Distributor -- the party from whom the data set may be obtained.
 Type: compound
- 6.2 Resource Description -- the identifier by which the distributor knows
 Type: text
 Domain: free text
- 6.3 Distribution Liability -- statement of the liability assumed by the di
 Type: text
 Domain: free text
- 6.4 Standard Order Process -- the common ways in which the data set may be
 received, and related instructions and fee information.
 Type: compound
- 6.4.1 Non-digital Form -- the description of options for obtaining the c
 computer-compatible media.
 Type: text
 Domain: free text
- 6.4.2 Digital Form -- the description of options for obtaining the data
 compatible media.
 Type: compound
- 6.4.2.1 Digital Transfer Information - description of the form of the c
 distributed.
 Type: compound
- 6.4.2.1.1 Format Name -- the name of the data transfer format.
 Type: text
 Domain: domain values from the table below; free text

Domain Value	Definition
"ARCE"	ARC/INFO Export format
"ARCG"	ARC/INFO Generate format
"ASCII"	ASCII file, formatted for text attribute

declared format

"BIL" Imagery, band interleaved by line

"BIP" Imagery, band interleaved by pixel

"BSQ" Imagery, band interleaved sequential

"CDF" Common Data Format

"CFF" Cartographic Feature File (U.S. Forest Service)

"COORD" User-created coordinate file, declared format

"DEM" Digital Elevation Model format (U.S. Geological Survey)

"DFAD" Digital Feature Analysis Data (Defense Mapping Agency)

"DGN" Microstation format (Intergraph Corporation)

"DIGEST" Digital Geographic Information Exchange Standard

"DLG" Digital Line Graph (U.S. Geological Survey)

"DTED" Digital Terrain Elevation Data (MIL-D-89020)

"DWG" AutoCAD Drawing format

"DX 9 0 " Data Exchange '90

"DXF" AutoCAD Drawing Exchange Format

"ERDAS" ERDAS image files (ERDAS Corporation)

"GRASS" Geographic Resources Analysis Support System

"HDF" Hierarchical Data Format

"IGDS" Interactive Graphic Design System format (Intergraph Corporation)

"IGES" Initial Graphics Exchange Standard

"MOSS" Multiple Overlay Statistical System expc file

"netCDF" network Common Data Format

"NITF" National Imagery Transfer Format

"RPF" Raster Product Format (Defense Mapping Agency)

"RVC " Raster Vector Converted format (MicroImages)

"RVF" Raster Vector Format (MicroImages)

"SDTS" Spatial Data Transfer Standard (Federal Information Processing Standard 173)

"SIF" Standard Interchange Format (DOD Project 2851)

"SLF" Standard Linear Format (Defense Mapping Agency)

"TIFF" Tagged Image File Format

"TGRLN" Topologically Integrated Geographic Encodir and Referencing (TIGER) Line format (Bureau of the Census)

"VPF" Vector Product Format (Defense Mapping Agency)

- 6.4.2.1.2 Format Version Number -- version number of the format.
Type: text
Domain: free text
- 6.4.2.1.3 Format Version Date -- date of the version of the format.
Type: date
Domain: free date
- 6.4.2.1.4 Format Specification -- name of a subset, profile, or produc specification of the format.
Type: text

- Domain: free text
- 6.4.2.1.5 Format Information Content -- description of the content of encoded in a format.
Type: text
Domain: free text
- 6.4.2.1.6 File Decompression Technique -- recommendations of algorithm processes (including means of obtaining these algorithms or that can be applied to read or expand data sets to which data compression techniques have been applied.
Type: text
Domain: "No compression applied" free text
- 6.4.2.1.7 Transfer Size -- the size, or estimated size, of the transfer in megabytes.
Type: real
Domain: Transfer Size > 0.0
- 6.4.2.2 Digital Transfer Option -- the means and media by which a data set is obtained from the distributor.
Type: compound
- 6.4.2.2.1 Online Option -- information required to directly obtain the data electronically.
Type: compound
- 6.4.2.2.1.1 Computer Contact Information -- instructions for establishing communications with the distribution computer.
Type: compound
- 6.4.2.2.1.1.1 Network Address -- the electronic address from which the data set can be obtained from the distribution computer.
Type: compound
- 6.4.2.2.1.1.1.1 Network Resource Name -- the name of the file service from which the data set can be obtained.
Type: text
Domain: free text
- 6.4.2.2.1.1.1.2 Dialup Instructions -- information required to connect to the distribution computer remotely through telephony.
Type: compound
- 6.4.2.2.1.1.1.2.1 Lowest BPS -- lowest or only speed for the connection's communication, expressed in bits per second.
Type: integer
Domain: Lowest BPS >= 110
- 6.4.2.2.1.1.1.2.2 Highest BPS -- highest speed for the connection's communication, expressed in bits per second in cases when a range of rates are provided.
Type: integer
Domain: Highest BPS > Lowest BPS
- 6.4.2.2.1.1.1.2.3 Number DataBits -- number of data bits in each character exchanged in the communication.
Type: integer
Domain: 7 <= Number DataBits <= 8
- 6.4.2.2.1.1.1.2.4 Number StopBits -- number of stop bits in each character exchanged in the communication.
Type: integer

- Domain: 1<= Number StopBits <= 2
- 6.4.2.2.1.1.2.5 Parity -- parity error checking used in each exchanged in the communication.
Type: text
Domain: "None" "Odd" "Even" "Mark" "Space"
- 6.4.2.2.1.1.2.6 Compression Support -- data compression available through the modem service to speed data transfer.
Type: text
Domain: "V. 32" "V.32bis" "V.42" "V.42bis" free text
- 6.4.2.2.1.1.2.7 Dialup Telephone -- the telephone number of the distribution computer.
Type: text
Domain: free text
- 6.4.2.2.1.1.2.8 Dialup File Name -- the name of a file contained in the data set on the distribution computer.
Type: text
Domain: free text
- 6.4.2.2.1.2 Access Instructions -- instructions on the steps required to receive the data set.
Type: text
Domain: free text
- 6.4.2.2.1.3 Online Computer and Operating System -- the brand of the distribution computer and its operating system.
Type: text
Domain: free text
- 6.4.2.2.2 Offline Option -- information about media-specific options for receiving the data set.
Type: compound
- 6.4.2.2.2.1 Offline Media -- name of the media on which the data was received.
Type: text
Domain: "CD-ROM" "3-1/2 inch floppy disk" "5-1/4 inch floppy disk" "9-track tape" "4 mm cartridge tape" "8 mm cartridge tape" "1/\$-inch cartridge tape" free text
- 6.4.2.2.2.2 Recording Capacity -- the density of information that can be written. Used in cases where different recording methods are possible.
Type: compound
- 6.4.2.2.2.2.1 Recording Density -- the density in which the data can be recorded.
Type: real
Domain: Recording Density > 0.0
- 6.4.2.2.2.2.2 Recording Density Units -- the units of measurement for recording density.
Type: text
Domain: free text
- 6.4.2.2.2.3 Recording Format -- the options available or method used to transfer the data set to the medium.
Type: text

- Domain: "cpio" "tar" "High Sierra" "ISO 9660"
"ISO 9660 with Rock Ridge extensions" "ISO
9660 with Apple HFS extensions" free text
- 6.4.2.2.2.4 Compatibility Information --- description of other li
requirements for using the medium.
Type: text
Domain: free text
- 6.4.3 Fees -- the fees and terms for retrieving the data set.
Type: text
Domain: free text
- 6.4.4 Ordering Instructions -- general instructions and advice about, an
services provided for, the data set by the distributor.
Type: text
Domain: free text
- 6.4.5 Turnaround -- typical turnaround time for the filling of an order.
Type: text
Domain: free text
- 6.5 Custom Order Process -- description of custom distribution services av
terms and conditions for obtaining these services.
Type: text
Domain: free text
- 6.6 Technical Prerequisites -- description of any technical capabilities t
have to use the data set in the form(s) provided by the distributor.
Type: text
Domain: free text
- 6.7 Available Time Period -- the time period when the data set will be ava
distributor.
Type: compound
- Metadata Reference Information
- 7 Metadata Reference Information -- information on the currentness of the m
and the responsible party.
Type: compound
- Metadata Reference Information =
Metadata Date t
(Metadata Review Date t
(Metadata Future_Review-Date)) +
Metadata Contact +
Metadata_Standard_Name t
Metadata_Standard_Version t
0{Metadata_Time_Convention}1 t
(Metadata_Access_Constraints) t
(Metadata_Use_Constraints) t
(Metadata_Security_Information)
- Metadata Contact =
Contact_Information (see section 10 for production rules)
- Metadata Security_Information =
Metadata_Security_Classification_System t
Metadata_Security_Classification t
Metadata_Security_Handling_Description
- 7.1 Metadata Date -- the date that the metadata were created or last updat
Type: date
Domain: free date

- 7.2 Metadata Review Date -- the date of the latest review of the metadata
 Type: date
 Domain: free date; Metadata Review Date later than Metadata Date
- 7.3 Metadata Future Review Date -- the date by which the metadata entry sh
 Type: date
 Domain: free date; Metadata Future Review Date later than Metada
 Date
- 7.4 Metadata Contact -- the party responsible for the metadata informatior
 Type: compound
- 7.5 Metadata Standard Name -- the name of the metadata standard used to dc
 set.
 Type: text
 Domain: "FGDC Content Standards for Digital Geospatial Metadata"
- 7.6 Metadata Standard Version -- identification of the version of the meta
 to document the data set.
 Type: text
 Domain: free text
- 7.7 Metadata Time Convention -- form used to convey time of day informati
 metadata entry. Used if time of day information is included in the me
 Type: text
 Domain: "local time" "local time with time differential factor"
- 7.8 Metadata Access Constraints -- restrictions and legal prerequisites fc
 metadata. These include any access constraints applied to assure the
 or intellectual property, and any special restrictions or limitations
 metadata.
 Type: text
 Domain: free text
- 7.9 Metadata Use Constraints -- restrictions and legal prerequisites for u
 after access is granted. These include any access constraints applied
 protection of privacy or intellectual property, and any special restri
 obtaining the metadata.
 Type: text
 Domain: free text
- 7.10 Metadata Security Information -- handling restrictions imposed on the
 of national security, privacy, or other concerns.
 Type: compound
- 7.10.1 Metadata Security Classification System -- name of the classificat
 metadata.
 Type: text
 Domain: free text
- 7.10.2 Metadata Security Classification -- name of the handling restricti
 metadata.
 Type: text
 Domain: "Top secret" "Secret" "Confidential" "Restricted" "Ur
 "Sensitive" free text
- 7.10.3 Metadata Security Handling Description -- additional information a
 restrictions on handling the metadata.
 Type: text
 Domain: free text
- Citation Information
- a Citation Information -- the recommended reference to be used for the data

section provides a means of stating the citation of a data set, and is us metadata standard. This section is never used alone.)
 Type: compound

```
Citation Information =
  1{Originator}n +
  Publication Date +
  (Publication Time) +
  Title +
  O{Edition}1 +
  O{Geospatial_Data_Presentation_Form}1 +
  O{Series_Information}1 +
  O{Publication_Information}1 t
  O{Other_Citation_Details}1 t
  (1{Online_Linkage}n) t
  O{Larger_Work_Citation}1
```

```
Series_Information =
  Series Name t
  Issue_Identification
```

```
Publication Information =
  Publication_Place t
  Publisher
```

```
Larger Work Citation =
  Citation Information
```

- 8.1 Originator -- the name of an organization or individual that developed name of editors or compilers are provided, the name must be followed by "(comp.)" respectively.
 Type: text
 Domain: "Unknown" free text
- 8.2 Publication Date -- the date when the data set is published or otherwise release.
 Type: date
 Domain: "Unknown" "Unpublished material" free date
- 8.3 Publication Time -- the time of day when the data set is published or available for release.
 Type: time
 Domain: "Unknown" free time
- a.4 Title -- the name by which the data set is known.
 Type: text
 Domain: free text
- 8.5 Edition -- the version of the title.
 Type: text
 Domain: free text
- 8.6 Geospatial Data Presentation Form -- the mode in which the geospatial
 Type: text
 Domain: (the domain is from pp. 88-91 in Anglo-American Committee Cataloguing of Cartographic Materials, 1982, Cartographic Association):
 "atlas" "diagram" "globe" "map" "model" "profile"
 "remote-sensing image" "section" "view"
- a.7 Series Information -- the identification of the series publication of part.
 Type: compound

- 8.7.1 Series Name -- the name of the series publication of which the data set is a part.
Type: text
Domain: free text
- 8.7.2 Issue Identification -- information identifying the issue of the series publication of which the data set is a part.
Type: text
Domain: free text
- 8.8 Publication Information -- publication details for published data sets
Type: compound
- 8.8.1 Publication Place -- the name of the city (and state or province, needed to identify the city) where the data set was published or reprinted.
Type: text
Domain: free text
- 8.8.2 Publisher -- the name of the individual or organization that published the data set.
Type: text
Domain: free text
- 8.9 Other Citation Details -- other information required to complete the citation.
Type: text
Domain: free text
- 8.10 Online Linkage -- the name of an online computer resource that contains the data set. Entries should follow the Uniform Resource Locator convention of the Internet.
Type: text
Domain: free text
- 8.11 Larger Work Citation -- the information identifying a larger work in which the data set is included.
Type: compound
- Time Period Information
- 9 Time Period Information -- information about the date and time of an event. This section provides a means of stating temporal information, and is used by other sections of the standard. This section is never used alone.)
Type: compound

Time Period Information =
[Single-Date/Time |
Multiple-Dates/Times |
Range_of_Dates/Times]

Single-Date/Time =
Calendar_Date +
(Time_of_Day)

Multiple Dates/Times =
2{Calendar Date +
(Time_of_Day) }n

Range_of_Dates/Times =
Beginning Date +
(Beginning-Time) +
Ending-Date t
(Ending-Time)

- 9.1 Single Date/Time -- means of encoding a single date and time.
Type: compound
- 9.1.1 Calendar Date -- the year (and optionally month, or month and day)

- Type: date
Domain: "Unknown" free date
- 9.1.2 Time of Day -- the hour (and optionally minute, or minute and second)
Type: time
Domain: "Unknown" free time
- 9.2 Multiple Dates/Times -- means of encoding multiple individual dates and times.
Type: compound
- 9.3 Range of Dates/Times -- means of encoding a range of dates and times.
Type: compound
- 9.3.1 Beginning Date -- the first year (and optionally month, or month and day) for the event.
Type: date
Domain: "Unknown" free date
- 9.3.2 Beginning Time -- the first hour (and optionally minute, or minute and second) for the event.
Type: time
Domain: "Unknown" free time
- 9.3.3 Ending Date -- the last year (and optionally month, or month and day) for the event.
Type: date
Domain: "Unknown" "Present" free date
- 9.3.4 Ending Time -- the last hour (and optionally minute, or minute and second) for the event.
Type: time
Domain: "Unknown" free time
- Contact Information
- 10 Contact Information -- Identity of, and means to communicate with, person or organization(s) associated with the data set. (Note: this section provides information on individuals and organizations, and is used by other sections of the metadata section is never used alone.)
Type: compound

```
Contact Information =
    [Contact_Person Primary |
     Contact_Organization_Primary] +
    (Contact_Position) +
    1{Contact_Address}n +
    1{Contact_Voice_Telephone}n +
    (1{Contact_TDD_TTY_Telephone}n) +
    (1{Contact_Facsimile_Telephone}n) +
    (1{Contact_Electronic_Mail_Address}n) +
    (Hours_of_Service) +
    (Contact_Instructions)
```

```
Contact Person Primary =
    -Contact_Person t
    (Contact_Organization)
```

```
Contact_Organization_Primary =
    Contact_Organization t
    (Contact_Person)
```

```
Contact Address =
    Address_Type +
    0{Address}n +
    City t
    State or Province t
```

- Postal Code t
(Country)
- 10.1 Contact Person Primary -- the person, and the affiliation of the person to the data set. Used in cases where the association of the person to the data set is more significant than the association of the organization to the data set.
Type: compound
- 10.1.1 Contact Person -- the name of the individual to which the contact applies.
Type: text
Domain: free text
- 10.1.2 Contact Organization -- the name of the organization to which the contact applies.
Type: text
Domain: free text
- 10.2 Contact Organization Primary -- the organization, and the member of the organization associated with the data set. Used in cases where the association of the organization to the data set is more significant than the association of the person to the data set.
Type: compound
- 10.3 Contact Position -- the title of individual.
Type: text
Domain: free text
- 10.4 Contact Address -- the address for the organization or individual.
Type: compound
- 10.4.1 Address Type -- the information provided by the address.
Type: text
Domain: "mailing address" "physical address"
"mailing and physical address"
- 10.4.2 Address -- an address line for the address.
Type: text
Domain: free text
- 10.4.3 City -- the city of the address.
Type: text
Domain: free text
- 10.4.4 State or Province -- the state or province of the address.
Type: text
Domain: free text
- 10.4.5 Postal Code -- the ZIP or other postal code of the address.
Type: text
Domain: free text
- 10.4.6 Country -- the country of the address.
Type: text
Domain: free text
- 10.5 Contact Voice Telephone -- the telephone number by which individuals can contact the organization or individual.
Type: text
Domain: free text
- 10.6 Contact TDD/TTY Telephone -- the telephone number by which hearing-impaired individuals can contact the organization or individual.
Type: text
Domain: free text

- 10.7 Contact Facsimile Telephone -- the telephone number of a facsimile mac organization or individual.
Type: text
Domain: free text
- 10.8 Contact Electronic Mail Address -- the address of the electronic mail organization or individual.
Type: text
Domain: free text
- 10.9 Hours of Service -- time period when individuals can speak to the orga individual.
Type: text
Domain: free text
- 10.10 Contact Instructions -- supplemental instructions on how or when to cc or organization.
Type: text
Domain: free text

□

Appendix A

Glossary

[Most of the terms and definitions are from Department of Commerce, 1992, Spatial [(SDTS) (Federal Information Processing Standard 173): Washington: Department of C Institute of Standards and Technology.]

abscissa -- the coordinate of a point in a plane Cartesian coordinate system obtain axis ("the 'x' value").

accuracy -- the closeness of results of observations, computations or estimates to accepted as being true.

altitude -- elevation above or below a reference datum, as defined in Federal Infor 1. See also elevation.

area -- a generic term for a bounded, continuous, two-dimensional object that may c boundary.

area chain -- a chain that explicitly references left and right polygons and not st component of a two-dimensional manifold.

area point -- a representative point within an area usually carrying attribute info

arc -- a locus of points that forms a curve that is defined by a mathematical expre

attribute -- a defined characteristic of an entity type (e.g. composition).

attribute value -- a specific quality or quantity assigned to an attribute (e.g., s

chain -- a directed nonbranching sequence of nonintersecting line segments and (or) necessarily distinct, at each end. Area chain, complete chain, and network chain a share all characteristics of the general case as defined above.

clearinghouse -- see National Geospatial Data Clearinghouse.

complete chain -- a chain that explicitly references left and right polygons and st component of a two-dimensional manifold.

compound element -- a group of data elements and other compound elements. Compound higher-level concepts that cannot be represented by individual data elements.

coordinates -- pairs of numbers expressing horizontal distances along orthogonal ax

numbers measuring horizontal and vertical distances.

data element -- a logically primitive item of data.

data set -- a collection of related data.

depth -- perpendicular distance of an interior point from the surface of an object.

developable surface -- a surface that can be flattened to form a plane without comp it. Examples include cones and cylinders.

digital image -- a two-dimensional array of regularly spaced picture elements (pixe

digital volume -- a three-dimensional array of regularly spaced volume elements (vc

domain -- in the definition of the elements in the metadata standard, the domain id element.

Edge, Topology Level 0 -- VPF term for a string.

Edge, Topology Level 1 -- VPF term for a network chain in a network (in SDTS, a "Ne graph").

Edge, Topology Level 2 -- VPF term for a network chain in a planar graph (in SDTS, graph").

Edge, Topology Level 3 -- VPF term for a complete chain.

elevation -- conforming to Federal Information Processing Standard 70-1, the term " standard, rather than the common term elevation.

entity instance -- a spatial phenomenon of a defined type that is embedded in one c type, or that has at least one key attribute value different from the corresponding phenomena (e.g., the 10 Street Bridge).

entity point -- a point used for identifying the location of point features (or are such as towers, buoys, buildings, places, etc.

entity type -- the definition and description of a set into which similar entity ir

explicit -- method of identifying positions directly by pairs (for horizontal posit vertical positions) of numbers.

Face, Topology Level 3 -- VPF term for a GT-polygon composed of rings.

G-polygon -- an area consisting of an interior area, one outer G-ring and zero or n inner G-rings. No ring, inner or outer, shall be collinear with or intersect any c

G-ring -- a ring created from strings and (or) arcs.

geospatial data -- information that identifies the geographic location and characte features and boundaries on the earth. This information may be derived from, among mapping, and surveying technologies.

graph -- a set of topologically interrelated zero-dimensional (node), one-dimension

times two-dimensional (GT-polygon) objects that conform to a set of defined constra can be used to distinguish different types of graphs. Three such types, planar gra dimensional manifold, are used in this standard. All three share the following rul by an ordered pair of nodes, not necessarily distinct; a node may bound one or more chains may only intersect at nodes. Planar graphs and networks are two specialized dimensional manifold is an even more specific type of planar graph.

grid -- (1) a set of grid cells forming a regular, or nearly regular, tessellation

arrayed in a pattern that forms a regular, or nearly regular, tessellation of a surface formed by repeating the pattern of a regular polygon, such as a square, equilateral triangle. The tessellation is nearly regular if formed by repeating the pattern of an "almost rectangle, non-square parallelogram, or non-equilateral triangle.

grid cell -- a two-dimensional object that represents the smallest nondivisible element

GT-polygon -- an area that is an atomic two-dimensional component of one and only a manifold. The boundary of a GT-polygon may be defined by GT-rings created from its polygon may also be associated with its chains (either the bounding set, or the convex hull of these chains. The complete set of chains associated with a GT-polygon may also be referred to as polygon references on the chains.

GT-ring -- a ring created from complete and (or) area chains.

horizontal -- tangent to the geoid or parallel to a plane that is tangent to the geoid

implicit -- method of identifying positions by a place in an array of values.

interior area -- an area not including its boundary.

label point -- a reference point used for displaying map and chart text (e.g., feature identification).

latitude -- angular distance measured on a meridian north or south from the equator

layer -- an integrated, areally distributed, set of spatial data usually representing a phenomenon or having one common attribute or attribute value in an association of spatial objects. A layer is specifically a two-dimensional array of scalar values associated with all objects in the layer.

line -- a generic term for a one-dimensional object.

line segment -- a direct line between two points.

link -- a topological connection between two nodes. A link may be directed by order.

longitude -- angular distance between the plane of a meridian east or west from the Greenwich meridian.

map -- a spatial representation, usually graphic on a flat surface, of spatial phenomena.

media -- the physical devices used to record, store, and (or) transmit data.

meridian -- a great circle on the Earth that passes through the geographic poles.

metadata -- data about the content, quality, condition, and other characteristics of data.

National Geospatial Data Clearinghouse -- a distributed network of geospatial data linked electronically. Building on initiatives such as the national information infrastructure, a distributed, electronically connected network, such as the Internet. Each data provider provides data in an electronic form, and provide these descriptions (or "metadata") using metadata exchange communications network. Thus, the data for the clearinghouse are located at the sites of providers (or more efficient, at the sites of intermediaries) throughout the country. Using the metadata descriptions to locate data that are suitable for their applications.

network -- a graph without two dimensional objects. If projected onto a two-dimensional surface, nodes have either more than one node at a point and (or) intersecting links or chains with other nodes.

network chain -- a chain that explicitly references start and end nodes and not left or right component of a network.

node -- a zero-dimensional object that is a topological junction of two or more links, lines, link or chain.

Node, Topology Level 0 -- VPF term for a point (in SDTS, a "point").

Node, Topology Level 1 -- VPF term for a node on a network (in SDTS, a "node, netwc

Node, Topology Level 2 -- VPF term for a node on a planar graph (in SDTS, a "node,

Node, Topology Level 3 -- VPF term for a point used to represent isolated features. to a containing face.

object -- a digital representation of all or part of an entity instance.

ordinate -- the coordinate of a point in a plane Cartesian coordinate system obtain axis ("the 'y' value").

phenomenon -- a fact, occurrence or circumstance. Route 10, George Washington Nati Chesterfield County are all phenomena.

pixel -- two-dimensional picture element that is the smallest nondivisible element

planar graph -- the node and link or chain objects of the graph occur or can be re upon a planar surface. Not more than one node may exist at any given point on the only intersect at nodes.

point -- a zero-dimensional object that specifies geometric location. One coordina location. Area point, entity point, and label point are special implementations of

primitive -- the quality of not being subdivided; atomic.

quality -- an essential or distinguishing characteristic necessary for cartographic

raster -- one or more overlapping layers for the same grid or digital image.

raster object - one or more images and/or grids, each grid or image representing a grid cells and/or pixels between layers are congruent and registered.

resolution -- the minimum difference between two independently measured or computed distinguished by the measurement or analytical method being considered or used.

ring -- sequence of nonintersecting chains or strings and (or) arcs, with closure. boundary, but not the interior area inside the closed boundary.

SDTS -- the Spatial Data Transfer Standard defined by Department of Commerce, 1992, Standard (SDTS) (Federal Information Processing Standard 173): Washington, Departn National Institute of Standards and Technology.

spatial data -- see geospatial data.

stratum -- one of a series of layers, levels, or gradations in an ordered system. the sense of (1) a region of sea, atmosphere, or geology that is distinguished by r socioeconomic level of society comprised of persons of the same or similar status, education or culture; or (3) a layer of vegetation, usually of the same or similar

string -- a connected nonbranching sequence of line segments specified as the order those line segments. Note: A string may intersect itself or other strings.

two-dimensional manifold -- a planar graph and its associated two dimensional objec and only two, not necessarily distinct, GT-polygons. The GT-polygons are mutually exhaust the surface.

type -- in the definition of the elements in the metadata standard, a compound elem provide a unique way to identify compound elements. For a data element, the type i can be assigned to the data element. The choices are "integer" for integer numbers for ASCII characters, "date" for day of the year, and "time" for time of the day.

universe polygon -- defines the part of the universe that is outside the perimeter polygons ("covered area") and completes the two-dimensional manifold. This polygon relationships of the perimeter links. The boundary of the universe polygon is repr rings and no outer ring. Attribution of the universe polygon may not exist, or may the attribution of the covered area.

vector -- composed of directed lines.

vertical -- at right angles to the horizontal; includes altitude and depth.

VPF -- the Vector Product Format defined by Department of Defense, 1992, Vector Prc 600006): Philadelphia, Department of Defense, Defense Printing Service Detachment

void polygon -- defines a part of the two-dimensional manifold that is bounded by c otherwise has the same characteristics as the universe polygon. The geometry and t those of a GT-polygon. Attribution of a void polygon may not exist, or may be subs attribution of the covered area.

voxel -- a three-dimensional element that is the smallest nondivisible element of a
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Kgs, remote sensing, mapping, and surveying technologies.

graph -- a set of topologically interrelated zero-dimensional (node), one-dimensional times two-dimensional (GT-polygon) objects that conform to a set of defined constraints can be used to distinguish different types of graphs. Three such types, planar graph, one-dimensional manifold, and two-dimensional manifold, are used in this standard. All three share the following rule by an ongoing machine-readable data files: Chicago, American Library Association.

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