National Pipeline Mapping System (NPMS)

Standards for Creating Pipeline Location Data

Standards for Electronic Data Submissions, Including Metadata Standards and Examples

Draft: July 14, 1997

This document was prepared by the second Joint Government/Industry Pipeline Mapping Quality Action Team (MQAT II). The Team is sponsored by the U.S. Department of Transportation's Office of Pipeline Safety (OPS), the American Petroleum Institute, the American Gas Association, and the Interstate Natural Gas Association of America. Representatives on the Team include OPS, the Bureau of Transportation Statistics (BTS), the Department of Energy (DOE), the U.S. Geological Survey (USGS), the Federal Energy Regulatory Commission (FERC), state representatives from California, Louisiana, New York, and Texas, and representatives from the pipeline industry.

If you have questions regarding this document, please contact one of the representatives from the Office of Pipeline Safety.

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Electronic Data Submission Standards
Draft

The data submission standards consist of four sections:
1. General Topics
2. Electronic Geographic Data
3. Attribute Data
4. Metadata (Data Transmittal Forms)

Section 1 - General Topics

These standards were created with input from the pipeline industry and government agencies. They address the submission of digital data to support the development of a reasonably accurate National Pipeline Mapping System.

It is the responsibility of the operator to provide a clean data set that complies with these standards. The operator will not be required to answer any data questions from outside parties who are contacting the repository with questions or issues regarding the data. The operator will only be required to work with the repository to ensure compliance with the standards and a smooth incorporation of the operator's data into the repository.

The repository will produce check plots after incorporating the operator's geographic electronic data and attribute data into the repository. These check plots of the operator's pipeline data will be returned to the operator for review. Only after the operator has reviewed and quality checked the check plots will the data be fully incorporated into the repository.

The repository will accept pipeline positional accuracy beyond plus or minus 500 feet. It is anticipated that there will be a greater level of accuracy of data in urban areas. Every pipeline operator that cannot currently provide the 500 foot level of accuracy should be moving towards that goal. Eventually, as the National Pipeline Mapping System evolves, the higher level of accuracy of plus or minus 500 foot may be required.

These standards represent a guideline for preparing the digital data for inclusion in the National Pipeline Mapping System Repository. The repository understands that the availability of pipeline company maps and digital data varies between operators and that there is a need for flexibility in working with the pipeline operators. On a case by case basis, the repository will review and approve variations of data submissions from this standard.

Section 2 – Electronic Geographic Data

It is preferred that all data provided by the pipeline operator be in a digital format. In that regard, these standards have been created to ensure consistency and accuracy in the compilation and incorporation of an individual operator's data into the National Pipeline Mapping System.

Data submission schedule:
After the operator has submitted data for the first time and it has been incorporated into the repository, only additions and/or revisions to the data should be reported to the repository. It is requested that the operator submit all of their data changes for the previous year on an annual basis, not to exceed 15 months. *However, changes in Pipeline Operator should be reported within 30 days.*

Data submission guidelines:
The operator should provide geographic data identifying the location and attribute information for every in-service gas transmission pipeline(as defined by the U.S. Department of Transportation), liquid trunk pipeline, or liquefied natural gas facility operated by your company(s). The operator has two options for identifying the pipelines.
- Identify individual pipeline. (Preferred method)
- Identify pipeline right-of-ways.

Individual pipelines (preferred method):
The operator should ensure that the positional accuracy of the pipeline, depicted by the electronic vector data, is plus or minus 500 feet of its' known geographic location. The operator and repository acknowledge that positional accuracy may vary based on original survey data, existing paper maps, and other variables. The operator will evaluate the positional accuracy of the data and document the value in the Metadata file (see the Metadata section of this standard).

Based on the operator's naming convention for their pipelines, each pipeline should be uniquely identified by utilizing the Facility ID and Link ID fields. The Facility ID is defined as the FACIL_ID in the attribute file. The FACIL_ID is a twenty character alpha-numeric tag that provides a unique identifier for the pipeline. This Facility ID must be unique and constant for each pipeline or pipeline segment, i.e. the same identifier "128-000" or "Amarillo 1" cannot be utilized on two different pipelines in different geographic areas.

The Link ID is the link between the individual pipeline line element and its' attribute record. Most of the major mapping packages have an internal field that is used to attach a unique value to the line element, ie. COVER-ID in ARC/INFO or MSLINK_ID in MicroStation. This field could be used to populate the Link ID field. When transferring data to the National Pipeline Mapping System, this integral relationship must be maintained in order for the repository to relate a line to its' attribute record. This is

crucial when an operator is providing geographic line data in a separate file from the attribute data. The Link ID is defined in the attribute table as the LINK_ID and is an eight integer value with no leading zeros. The number of Link ID's should correspond with the number of Facility ID's in a file. There is a one to one relationship. For example, if an operator submits an electronic file in which a pipeline has been split into eight (8) line segments, there should also be an attribute file with eight (8) records, each with a unique LINK_ID corresponding to a specific segment of the pipeline.

Pipeline right-of-ways:
The operator is allowed the option of submitting one graphic line representing the location of multiple pipelines in a right-of-way. An attribute record should be submitted for each pipeline within the pipeline right-of-way. The operator should ensure that the positional accuracy of the right-of-way center is plus or minus 500 feet of its' known geographic location. The operator and repository acknowledge that the positional accuracy may vary based on original survey data, existing paper maps, and other variables. The operator should evaluate the positional accuracy of the data and document the value in the Metadata file (see the Metadata section of this standard).

Based on the operator's naming convention for their pipelines, each pipeline represented in a right-of-way should be uniquely identified by utilizing the Facility ID and Link ID fields. By creating a pipeline right-of-way, the operator is setting up a one to many relationship between the single line element and the multiple attribute records that describe the individual pipelines within the right-of-way. This relationship is handled differently among the mapping software packages. The Facility ID is defined as the FACIL_ID in the attribute file. The FACIL_ID is a twenty character alpha-numeric tag that provides a unique identifier for the pipelines within the right of way. This Facility ID must be unique and constant for each pipeline or pipeline segment, i.e. the same identifier "128-000" or "Amarillo 1" cannot be utilized on two different pipelines in different geographic areas.

The Link ID is the link between the individual pipeline right-of-way line element and its' attribute records. Therefore, there will be one Link ID for the right-of-way line element; however, an attribute file will have to be created that will allow the one Link ID to relate with many Facility ID's, each being the same Link ID value. Most of the major mapping packages have an internal field that is used to attach a unique value to the line element, ie. COVER-ID in ARC/INFO or MSLINK_ID in MicroStation. This field could be used to populate the Link ID field. When transferring data to the National Pipeline Mapping System, this integral relationship must be maintained in order for the repository to attach a line to its' attribute records. This is crucial when an operator is providing geographic line data in a separate file from the attribute data. The Link ID is defined in the attribute table as the LINK_ID and is an eight integer value with no leading zeros. There will only be one Link ID for a single right-of-way. However, that Link ID value will be repeated for each Facility ID attribute record of each pipeline within the right-of-way. For example, if an operator submits an electronic file in which a pipeline right-of-way contains three (3) pipelines, there will be one Link ID relating the

one line element to three (3) Facility ID's for the pipeline right-of-way.

LNG facilities:
The location of every active LNG facility operated by your company(s) must be reported. The operator should provide digital point data designating the approximate geographic center of the LNG facility. The LNG facility's positional accuracy should be plus or minus 500 feet of its' known geographic location. The operator and repository acknowledge that the positional accuracy may vary based on original survey data, existing paper maps, and other variables. The operator should evaluate the positional accuracy of each LNG facility and document the value in the Metadata file (see the Metadata section of this standard).

Based on the operator's naming convention for their LNG facilities, each facility should be uniquely identified by utilizing the Facility ID and Link ID fields. The Facility ID is defined as the FACIL_ID in the attribute file. The FACIL_ID is a twenty character alpha-numeric tag that provides a unique identifier for the LNG facility. This Facility ID must be unique and constant for each LNG facility i.e. the same identifier "128-000" or "Amarillo 1" cannot be utilized on two different LNG facilities in different geographic areas.

The Link ID is the link between the individual point element and its' attribute record. Most of the major mapping packages have an internal field that is used to attach a unique value to the point element, ie. COVER-ID in ARC/INFO or MSLINK_ID in MicroStation. This field could be used to populate the Link ID field. When transferring data to the National Pipeline Mapping System, this integral relationship must be maintained in order for the repository to attach a point to its' attribute record. This is crucial when an operator is providing geographic point data in a separate file from the attribute data. The Link ID is defined in the attribute table as the LINK_ID and is an eight integer value with no leading zeros. The number of Link ID's should correspond with the number of Facility ID's in a file. There is a one to one relationship. For example, if an operator submits an electronic file which contains five (5) LNG facilities and therefore five (5) FACIL_ID's, there should also be an attribute file with five (5) records, each with a unique LINK_ID corresponding to a specific LNG facility.

Key Submission Points:
Pipeline and/or LNG facility location data will only be accepted in Latitude / Longitude format. (Decimal degrees with a minimum of four decimal places). West longitude is a negative value.

All data must be submitted in ASCII fixed length format or in one of the pre-approved standard GIS or CADD export format. Examples of approved formats might include Integraph (IGDS, ISFF, MGE, FRAMME), AutoCAD (DWG, DXF), MapInfo (MIF), and ESRI (E00, SDE, SHP). The specific formats will be determined at a later date. Data may be submitted via CD-ROM, 1.44meg diskette, or modem.

North American Datum (NAD) 27 or 83 is acceptable, 83 is preferred. The standard at the repository will be NAD 83. The repository is utilizing the conversion program **NADCON** to convert between 27 and 83, and requests that you use this software when converting your data. This software is available free of charge from "ftp://ftp.ngs.noaa.gov/pub/pcsoft/nadcon". The executable file name is "ndcon210.exe". The technical document is "tech.doc" and the help file is "readme.210".

Section 2 - Attribute Data:

The operator is required to provide descriptive data about the pipelines and/or LNG facilities when submitting electronic data to the repository. Data can be provided by entering the data into either the repository provided spreadsheet template, the preferred option, or in ASCII fixed length format. The submitted data must meet the defined format. Submitted data items that exceed the data length limits will be truncated. For example, the operator can submit a FACIL_ID that is up to, but not more than, twenty characters in length and an OPER_NAME that is up to, but not more than, forty characters in length.

The "Required for" columns identify whether the field is either mandatory or optional for pipeline and LNG records.

Data Submission "Physical Model"

Attribute Table

Field Name	Field Type	Field Length	Domain	Required Field
OPS_CODE	C	5	Alpha/ Numeric	Y
OPER_CO_ID	C	12	Alpha/ Numeric	Y
OPER_NAME	C	40	Alpha/ Numeric	Y
FACIL_ID	C	20	Alpha/ Numeric	Y
FACIL_NAME	C	40	Alpha/ Numeric	N
FACIL_SUB_NM	C	40	Alpha/ Numeric	N
LINK_ID**	I	8	Positive integer	Y
COMMODITY1	C	3	NG, CRD, HVL, LNG, LPG, PRD, AA, CO2, HG, NGL	Y
COMMODITY2	C	3	NG, CRD, HVL, LNG, LPG, PRD, AA, CO2, HG, NGL	N
COMMODITY3	C	3	NG, CRD, HVL, LNG, LPG, PRD, AA, CO2, HG, NGL	N
CMDTY_DESC	C	40	Alpha/ Numeric	N
INTERSTATE	C	1	Upper case Y or N	Y
STATUS_CD	C	1	A, I, B, R, S	Y
QUALITY_CD	C	1	4, 3, 2, 1 ,0	N
REVISION_CD	C	1	A, M, D	Y
DATE	C	8	YYYYMMDD	Y
META_NAME	C	12	File name	Y

**

Field Name	Field Type	Field Length	Domain	Required Field
LINK_ID **	I	8	Positive integer	Y
LONGITUDE	R	12	range: -180 -> +180	Y
LATITUDE	R	12	range: -90 -> +90	Y

** LINK_ID is the unique identifier for the spatial object, either linear or point.
NOTE: "C" is for character data, "I" is for integer data, and "R" is for real data 0.

Data Submission - Electronic Data

Attribute Information File

Field Name	Field Type	Field Length	Short Description	Description	Domain	Required for Pipeline	Required for LNG
OPS_CODE	C	5	OPS Code	Number assigned by OPS to the company that physically operates the pipeline and its' facilities.	Alpha/Numeric	Y	Y
OPER_CO_ID	C	12	Operator Code	Assigned by Operator, unique identifier for a pipeline company. May be the same as the OPS code. Used if operator requires additional company identification beyond the OPS code. Possibly the DUNS number for the Operator.	Alpha/Numeric	Y	Y
OPER_NAME	C	40	Operator Name	The company that physically operates the pipeline and its' facilities.	Alpha/Numeric	Y	Y
FACIL_ID	C	20	Pipeline or LNG ID	Assigned by Operator, a unique identifier for each pipeline or LNG facility.	Alpha/Numeric	Y	Y
FACIL_NAME	C	40	Pipeline or LNG Name	Assigned by Operator, a unique name for each Pipeline or LNG facility. May be up to forty (40) characters.	Alpha/Numeric	Y	Y
LINK_ID	I	8	Link ID	Link between the graphic elements, points or lines, and their respective attribute records. Could be assigned by Operator or the Operator's graphic software package. (i.e. COVER-ID, MSLINK_ID, etc.)	Positive Integer	Y	Y
FACIL_SUB_NM	C	40	Pipeline or LNG Subsystem Name	Assigned by Operator, a name for a logical grouping of Facility ID's (pipelines or LNG facilities). Optional field that, when used by the operator, allows for a database query of a group of pipelines or LNG facilities.	Alpha/Numeric	N	N
COMMODITY1	C	3	Commodity Category 1	An abbreviation for the primary commodity carried in the pipeline. NG=natural gas, CRD=crude oil, HVL=highly volatile liquid, LNG=liquefied natural gas, LPG=liquefied petroleum gas, PRD=product, AA=anhydrous ammonia, CO2=carbon dioxide, HG=hydrogen gas, NGL=natural gas liquids.	NG, CRD, HVL, LNG, LPG, PRD, AA, CO2, HG, NGL	Y	Y
COMMODITY2	C	3	Commodity Category 2	An abbreviation for the secondary commodity carried in the pipeline. NG=natural gas, CRD=crude oil, HVL=highly volatile liquid, LNG=liquefied natural gas, LPG=liquefied petroleum gas, PRD=product, AA=anhydrous ammonia, CO2=carbon dioxide, HG=hydrogen gas, NGL=natural gas liquids.	NG, CRD, HVL, LNG, LPG, PRD, AA, CO2, HG, NGL	N	N
COMMODITY3	C	3	Commodity Category 3	An abbreviation for the additional commodities carried in the pipeline. NG=natural gas, CRD=crude oil, HVL=highly volatile liquid, LNG=liquefied natural gas, LPG=liquefied petroleum gas, PRD=product, AA=anhydrous ammonia, CO2=carbon dioxide, HG=hydrogen gas, NGL=natural gas liquids.	NG, CRD, HVL, LNG, LPG, PRD, AA, CO2, HG, NGL	N	N
CMDTY_DESC	C	40	Commodity Description	Assigned by the Operator, a description field for additional information on commodities carried.	Alpha/Numeric	N	N
INTERSTATE	C	1	Interstate	(Y)es/ (N)o designator to identify if pipeline is an interstate or intrastate pipeline. Y=Interstate	Upper case Y/ N	Y	N
STATUS_CD	C	1	Status Code	A designator identifying the status of the pipeline or LNG facility. (A)ctive, (I)nactive, a(B)andoned, (R)etired, and (S)old. Note: B, R, and S are for revisions, not for new submittals.	A, I, B, R, S	Y	Y
QUALITY_CD	C	1	Quality Code	Operator's estimate of the positional accuracy of the pipeline. (4): within 50 feet, (3): within 50 to 300 feet, (2): within 300 to 500 feet, (1): within 500 to 1000 feet; (0): Unknown.	4, 3, 2, 1, 0	Y	Y
REVISION_CD	C	1	Revision Code	Designates if this is a data addition, a modification, or a deletion. (A)dd, (M)odify, (D)elete	A, M, D	Y	Y
DATE	C	8	Date Stamp	Date of the change in REVISION_CD. (Year Month Day)	YYYYMMDD	Y	Y
META_NAME	C	12	Metadata Name	Link to the Metadata file (standard file name 8.3, see Metadata standards).	File name	Y	Y

Data Submission - Electronic Data

Geo-spatial Information File

Field Name	Field Type	Field Length	Short Description	Description	Domain	Required for Pipeline	Required for LNG
LINK_ID	I	8	Link ID	Link between the graphic elements, points or lines, and their respective attribute records. Could be assigned by Operator or the Operator's graphic software package. (i.e. COVER-ID, MSLINK_ID, etc.)	Positive Integer	Y	Y
LONGITUDE **	R	12	Longitude	Longitude, in decimal degrees (no projection), for the node or shape point - minimum of four decimal places required. Western hemisphere longitude should be a negative value.	Range: -180 -> 180	Y	Y
LATITUDE **	R	12	Latitude	Latitude, in decimal degrees (no projection), for the node or shape point - minimum of four decimal places required. Northern hemisphere latitude should be a positive value.	Range: -90 -> 90	Y	Y

** - Coordinate pairs should be in sequence from the beginning to the end of the pipeline segment.

** - Single coordinate pair for the location of the LNG facility.

Section 4 – Metadata (Data Transmittal Form)

Please refer to the following Metadata standards for detailed information on metadata submissions.

The operator must link every attribute data record to a metadata file. The operator will provide in the metadata file:
- Descriptive information that will be used to answer questions about the submitted data.
- An estimate of the pipeline positional accuracy.
- Identification of source documents utilized.
- Contact information to be used only by the repositories.

An operator may have one or more metadata files, depending on how much the above items vary in relation to the attribute data. The repository will add to the operator's submitted metadata file, any applicable metadata information that results from the processing of the submitted electronic data.

Metadata Standards for Electronic Data Submissions
Draft

Overview

The definition of metadata is simply "data about data." Metadata describes the content, quality, condition, and other characteristics of the data. Metadata helps a person to locate and understand the data. Think of it as a candy wrapper around electronic data. If you take the time to read the wrapper, you will learn a great deal about the electronic data underneath. In the process of building a National Pipeline Mapping System, metadata plays an important role:

1.   Metadata allows operators and the repository(s) to organize and maintain the major investment in this data, made by both pipeline companies and government agencies. As personnel change or time passes, information about pipeline data could be lost. Later, individual pipeline companies and repository users may not understand the content and uses of the original data set and find they can't trust results generated from the data. Complete metadata descriptions of the content and accuracy of the data set will encourage appropriate use of the data.

2.   Metadata provides a means for researching the data. Few operators and government agencies can afford to create all of the data they need. By making the metadata available through the repository(s) and other clearinghouses, pipeline operators and others can review metadata information to find appropriate data.

3.   Metadata provides information to aid in the transfer of data. Metadata should always accompany the transfer of a data set. The metadata will aid the entity receiving the data to process, interpret, and correctly incorporate the data into their existing system.

The following "Data Transmittal Form", when completed, will provide all of the metadata that will be needed from the operator. Example A is a completed Data Transmittal Form created for clarification.

Data Transmittal Form for Electronic Submittal

Operator and Data Description

1. Pipeline operator name:

2. Name of file(s) submitted:

3. Briefly describe the contents of these file(s):

4. Briefly describe why the data was created:

5. When was the data first digitized or scanned?

6. When was the data last modified?

7. How up-to-date is this data compared to the actual field conditions?

8. What are the lower left and upper right coordinates (minimum and maximum) of this data?
    Please provide in decimal latitude /longitude degrees:
    Lower Left Longitude:
    Lower Left Latitude:
    Upper Right Longitude:
    Upper Right Latitude:

9. List places covered by this data (keywords-states, cities, basin(s)):

10. What kind of quality checks did you perform on the attribute data?

11. What kind of quality checks did you perform on the line/point data?

12. Are there any parts of the data that were omitted, required significant editing, rubbersheeting, etc? If so, explain briefly:

13. Is the pipeline or LNG facility positional accuracy within (mark only one)?
    ___ Less than 50 feet (4)
    ___ 50 to 300 feet (3)
    ___ 300 to 500 feet (2)
    ___ 500 to 1000 feet (1)
    ___ Unknown (0)

14. Briefly explain how you determined the positional accuracy value:

15. What is the computer hardware/software (including versions) and operating system used in creating this data set? What is the size of this data set?

Source Material Description

Note: For the following section, if you have more than one source material, please duplicate this page and complete for each source.

16. What is the name of the organization or individual that created the source material for your data set?

17. What is the date(s) of the source material?

18. What is the source material (e.g. a map, GPS data, survey, etc.)?

19. What is the source material on (e.g. paper, mylar, diskette, cartridge tape, CD-ROM, etc.)?

20. How up-to-date is this source material compared to actual field conditions?

21. Briefly describe how you processed the source material and incorporated it into creating or modifying this data set :

22. Have you completed the process of incorporating the source with the data set? If so, when did you complete this process?

23. Is the data set in NAD27 (North American Datum) or NAD83?

Contact Information

Technical Information Contact

Name:

Company:

Mailing Address:

Phone Number:

Fax Number:

E-mail Address:

Transmittal Form Contact (if different from technical contact)

Name:

Company:

Mailing Address:

Phone Number:

Fax Number:

E-mail Address:

Example A

Data Transmittal Form for Electronic Submittal

Operator and Data Description

1. Pipeline operator name: `ABC Pipeline Company`

2. Name of file(s) submitted: `pipeline.e00 (ARC/INFO export format file)`

3. Briefly describe the contents of these file(s): `The file contains the entire portion of the OK-TEX pipeline and its' attributes. The vector data has been split into twenty-five (25) different Facility ID's.`

4. Briefly describe why the data was created: `The digital data was created to better manage the maintenance of the pipeline, provide more accurate data to employees in the field, and reduce the time required for maintaining and producing maps.`

5. When was the data first digitized or scanned? `The digitizing for the OK-TEX Pipeline began in June of 1992.`

6. When was the data last modified? `February of 1997`

7. How up-to-date is this data compared to the actual field conditions? `The digital data accurately represents the actual field conditions.`

8. What are the lower left and upper right coordinates (minimum and maximum) of this data? Please provide in decimal latitude/longitude degrees:

Lower Left Longitude: `-89.875`

Lower Left Latitude: `30.375`

Upper Right Longitude: `-89.742`

Upper Right Latitude `30.506`

9. List places covered by this data (keywords-states, cities, basin(s)): `Texas, Oklahoma, Houston, Dallas, Oklahoma City`

10. What kind of quality checks did you perform on the attribute data? `Attribute accuracy was tested by manual comparison of the source with hard copy printouts and routines developed in the mapping system compare attribute values with a list of acceptable values.`

11. What kind of quality checks did you perform on the line/point data? `The digital file has line topology. Duplicate line elements were deleted. Check plots were created and compared against the source documents for accuracy. GPS was utilized to verify several points along the pipeline.`

12. Are there any parts of the data that were omitted, required significant editing, rubbersheeting, etc? If so, explain briefly: `This data set does not contain abandoned or retired pipelines.`

13. Is the pipeline or LNG facility positional accuracy within (mark only one)?

___ Less than 50 feet (4)

_X_ 50 to 300 feet (3)

___ 300 to 500 feet (2)

___ 500 to 1000 feet (1)

___ Unknown (0)

14. Briefly explain how you determined the positional accuracy value: `Horizontal positional accuracy for the digital data was tested by visual comparison and measurement of the   source with hard copy plots.  Additionally, a limited number of known points were located with GPS and a comparison was made between the GPS survey and the digital data.`

15. What is the computer hardware/software (including versions) and operating system used in creating this data set? What is the size of this data set? `The latest modifications to the data were made using ARC/INFO software version 7.0.3 on a Sun Ultra2 SparcStation.  The operating system is UNIX.  The file size is 500kb.`

Source Material Description

Note: For the following section, if you have more than one source material, please photocopy this page and complete for each source.

16. What is the name of the organization or individual that created the source material for your data set? `ABC Pipeline Surveying Division`

17. What is the date(s) of the source material? `1950 to 1992`

18. What is the source material (e.g. a map, GPS data, survey, etc.)? `Map from rechain survey books`

19. What is the source material on (e.g. paper, mylar, diskette, cartridge tape, CD-ROM, etc.)? `Mylar`

20. How up-to-date is this source material compared to actual field conditions? `The source was accurate as of 1992. Afterwards, all updates were made directly into the mapping system.`

21. Briefly describe how you processed the source material and incorporated it into creating or modifying this data set : `The survey books have four (4) geo-referenced control points on each sheet. These sheets provided the source for the digitizing. The data was digitized using a map registration of +/- .003". Duplicate vectors were deleted. The only dangle vectors are the ends of the pipeline. Topology was created. Check plots were created and overlaid with the hard copy aerial photographs. Edits were made directly on the check plots and any modifications were corrected in`

the digital file. The sheets were edgematched and rubbersheeted. Finally, all of the individual map sheets were joined together to create one digital file for the entire length of the pipeline.

22. Have you completed the process of incorporating the source with the data set? If so, when did you complete this process? `Yes, July 1993`

23. Is the data set in NAD27 (North American Datum) or NAD83? `NAD83`

Source Material Description

Note: For the following section, if you have more than one source material, please photocopy this page and complete for each source.

16. What is the name of the organization or individual that created the source material for your data set? `Al's Air Photo, Inc.`

17. What is the date(s) of the source material? `Spring 1996`

18. What is the source material (e.g. a map, GPS data, survey, etc.)? `Aerial photography`

19. What is the source material on (e.g. paper, mylar, diskette, cartridge tape, CD-ROM, etc.)? `Aerial photo mylar sheets`

20. How up-to-date is this source material compared to actual field conditions? `The aerials represented the actual field conditions as of the photo date.`

21. Briefly describe how you processed the source material and incorporated it into creating or modifying this data set : `The aerials were used to improve the accuracy of the digital pipeline data upon completion of the digitizing. Check plots of the pipelines, at the same scale as the photos, were created and overlaid. Pipeline scars were often visible on the photos. The pipelines on the check plots were edited and the corrections were made on the digital file.`

22. Have you completed the process or incorporating the source with the data set? `If so, when did you complete this process? Yes, October 1996`

23. Is the data set in NAD27 (North American Datum) or NAD83? `NAD83`

Contact Information

Technical Information Contact

Name: Billy Input

Company: ABC Pipeline Company

Mailing Address: 1234 The Boss Drive
                      Austin, TX 12345

Phone Number: 555-123-1234

Fax Number: 555-123-5678

E-mail Address: input@abcpipeline.com

Transmittal Form Contact (if different from technical contact)

Name: John Data

Company: ABC Pipeline Company

Mailing Address: 1234 The Boss Drive
                      Austin, TX 12345

Phone Number: 555-123-0123

Fax Number: 555-123-5678

E-mail Address: data@abcpipeline.com

Acronyms

AA	Anhydrous Ammonia
AGA	America Gas Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCII	American Standard Code for Information Interchange
BTS	Bureau of Transportation Statistics
CAD	Computer Aided Drafting
CADD	Computer Aided Drafting and Design
CO2	Carbon dioxide
CRD	Crude oil
DLG	Digital Line Graph
DOE	Department Of Energy
DOT	Department Of Transportation
DXF	Drawing Interchange File or Drawing Exchange File
FERC	Federal Energy Regulatory Commission
FGDC	Federal Geographic Data Committee
FIPS	Federal Information Processing Standards
GIS	Geographic Information System
GPS	Global Positioning System
HG	Hydrogen gas
HVL	Highly volatile liquid
INGAA	Interstate Natural Gas Association of America
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MQAT	Joint Government-Industry Pipeline Mapping Quality Action Team
NAD 27, 83	North American Datum (of 1927 or 1983)
NG	Natural gas
NGL	Natural gas liquids
NPMS	National Pipeline Mapping System
OMB	Office of Management and Budget
OPS	Office of Pipeline Safety
PRD	Product
ROW	Right-Of-Way
RSPA	Research and Special Programs Administration
SQL	Structured Query Language
USGS	United States Geological Survey

Glossary of Pipeline GIS-Related Terms

Accuracy	The degree of conformity with a recognized or established standard.
Accuracy (absolute)	The accuracy of a map in representing the geographic location of an object relative to its true location on the surface of the earth. Absolute accuracy is based on geographic coordinates.
Accuracy (relative)	The accuracy of a map in representing the geographic location of an object relative to the locations of other objects.
Aerial photo	Photograph of part of the earth=s surface taken by an aircraft-supported camera.
Alignment sheets	A general purpose drawing designed to be used by company personnel during the operation and maintenance of the pipeline.
Alphanumeric	Consisting of both letters and numbers, as well as some punctuation symbols.
Area	A generic term for a bounded, continuous, two-dimensional object that may or may not include its boundary.
ASCII	American Standard Code for Information Interchange. A popular standard for the exchange of alphanumeric data.
Attribute	Characteristic that help describe the data.
Base map	A map containing visible surface features and boundaries that is used for local reference.
Benchmark	A point of known location used as a reference point.
CAD or CADD	Computer Aided Drafting (CAD) and Design (CADD) - an automated system for the drafting and display of graphic oriented information.
Control point	A point of known vertical elevation and/or horizontal position.
Conversion	The process of transforming information from one form to another, i.e. analog (paper) data into digital data.
Coordinates	Pairs of numbers expressing horizontal distances along orthogonal axes.
Crude oil	Liquid petroleum as it comes out of the ground, as distinguished from refined oils manufactured out of it.
Database	Structured collection of data defined for a particular use, user, system, or program; it may be sequential, network, hierarchical, relational, or semantic.
Data capture	Process of converting hard copy maps into a digital format.
Data dictionary	A listing of each data field and a definition or description of what is contained in that field.
Data set	A collection of related data.
Datum (geodetic)	Level surface to which elevations are referenced, such as mean sea level; frame of reference for measuring a location on the surface of the earth.
Digital	The discrete numerical representation of data.
Digital centerline	Series of connected data elements representing the pipeline.
Digital orthophotos	A digital image of an aerial photograph in which the displacement caused by the camera tilt and by terrain have been corrected.
Digitize	The process of converting hard copy manual drawings into digital format.
Display	A computer monitor screen or image produced on the screen.
DLG	Digital Line Graphs - digitized data from USGS base map categories, including transportation, hydrology, elevation contours, and public land survey boundaries.
Domain	Identifies valid values for a metadata element.
DXF	Drawing eXchange Format - a graphic file and data interchange standard.
Facilities	Parts of the pipeline system, such as the pipe, valves, compressor stations, etc.
FGDC	Federal Geographic Data Committee - established though OMB and charged with coordinating the development, use, sharing, and dissemination of geographic data.
File	A collection of records (data) treated as a unit.
Format	How the information is stored - paper, electronic, or digital.
Free date	Calendar date specifying on of the following:

1. Year (formatted YYYY)

2. Year and month (formatted YYYYMM)

3. Year, month and day (formatted YYYYMMDD)

Free real	Numbers with decimal places that describe the individual data element.
Free text	Words or numbers that describe the individual data element.
Geodetic control	Surveying and monumental points on the earth's surface whose location is established in accordance with national standards.
Geographic	Referring to coordinate systems, latitude/longitude or comparable geographic grid location reference.
Geospatial data	Information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth.
GIS	Geographic Information System - computer hardware, software, geographic data used to capture, store, update, maintain, analyze, and display graphically referenced information.
GPS	Global Positioning System -survey instrument/process using satellite generated timing data to establish either ground or aerial coordinates.
Graphic element	Points, lines, arcs, symbols, etc., that are displayable.
Hardcopy	A permanent image such as a plot or printout.
Hardware	The physical components of the computer system or network such as the computer, printer, plotter, and terminal.
Hazardous liquid	Petroleum, petroleum products, or anhydrous ammonia.
Highly volatile liquid	Also referred to as HVLs. A hazardous liquid that will form a vapor cloud when released to the atmosphere and has a vapor pressure exceeding 76 kPa (40 psia) at 37.8ᴇ (100ᴇ F) Note: natural gas liquids are also HVLs .
Interstate	A pipeline or part of a pipeline that is used in the transportation of natural gas, hazardous liquid, or carbon dioxide in interstate or foreign commerce.
Latitude	Distance measured north or south of the equator.
Liquefied Natural Gas	Also referred to as LNG. Natural gas that has been cooled to about -160 degrees Centigrade for storage or shipment as a liquid.
Liquefied Petroleum Gas	Butane and propane separated from natural gasoline and sold in liquid form as fuel. Commonly referred to as bottled gas, tank gas, or simply LPG.
Longitude	Distance measured east or west from a reference meridian (usually Greenwich).
Map	A spatial representation, usually graphic on a flat surface, of spatial phenomena.
Media	The physical devices used to record, store, or transmit data.
Metadata	Documented descriptions of the information, such as the timeliness of the data, attribute sources, accuracy of the data, etc.
MQAT	Joint Government-Industry Pipeline Mapping Quality Action Team. Sponsored by OPS, API, and AGA/INGAA.
NAD 27, 83	North American Datum (of 1927 or 1983) - two mathematical representations of the surface of the earth.
Natural Gas Liquids	Also referred to as NGLs. Can be ethane, butane, propane, or a propane-butane mix.
NPMS	National Pipeline Mapping System - a pipeline database that will indicate the location, commodity, operator, and contact person for transmission pipelines and LNG facilities operating in the United States.
One-Call	Service to notify underground utilities of planned excavations.
Operator	A person who owns or operates a pipeline and engages in the transportation of gas.
Orthophoto	Photo with camera tilt and relief displacements removed, resulting in a scale-correct image.
Overlay	Simultaneously viewing two or more digital data sets of similar geographic areas.
Pipeline/pipeline system	All parts of those physical facilities through which gas or hazardous liquid moves in transportation.
Point	A zero dimensional object that specifies geometric location. One coordinate pair specifies the location.
Quadrangles (Quads)	Typically refers to the USGS map sheets in the 7.5 minute quad series or the 15 minute quad series. Also known as topographic maps.
Quality	An essential or distinguishing characteristic needed for cartographic data to be fit for use.
Repository	An entity(s) designed to maintain, store, and warehouse data.
ROW	Right-Of-Way - a section of land designated for use by a pipeline.
Scale (large)	Small map area showing greater detail (1:2400).

Scale (small)	Large map area with less detail (1:100,000).
Software	General name for computer programs and programming languages.
Spatial data	Data about the location of objects and their relationship with one another.
SQL	Structural Query language - an ANSI standard high level database language.
Thematic	Depicting particular features or concepts.
Topographic maps	Map showing horizontal and vertical (contours) indicating lines of equal surface elevation.
Topography	Shape of configuration of the land surface. Represented by contour lines in map form.
Topology	Descriptions of geographic relationships of features, especially what features are adjacent to or connected to another feature.
Vector	Data composed of individual coordinate points and lines whose endpoints are defined by coordinate pairs.