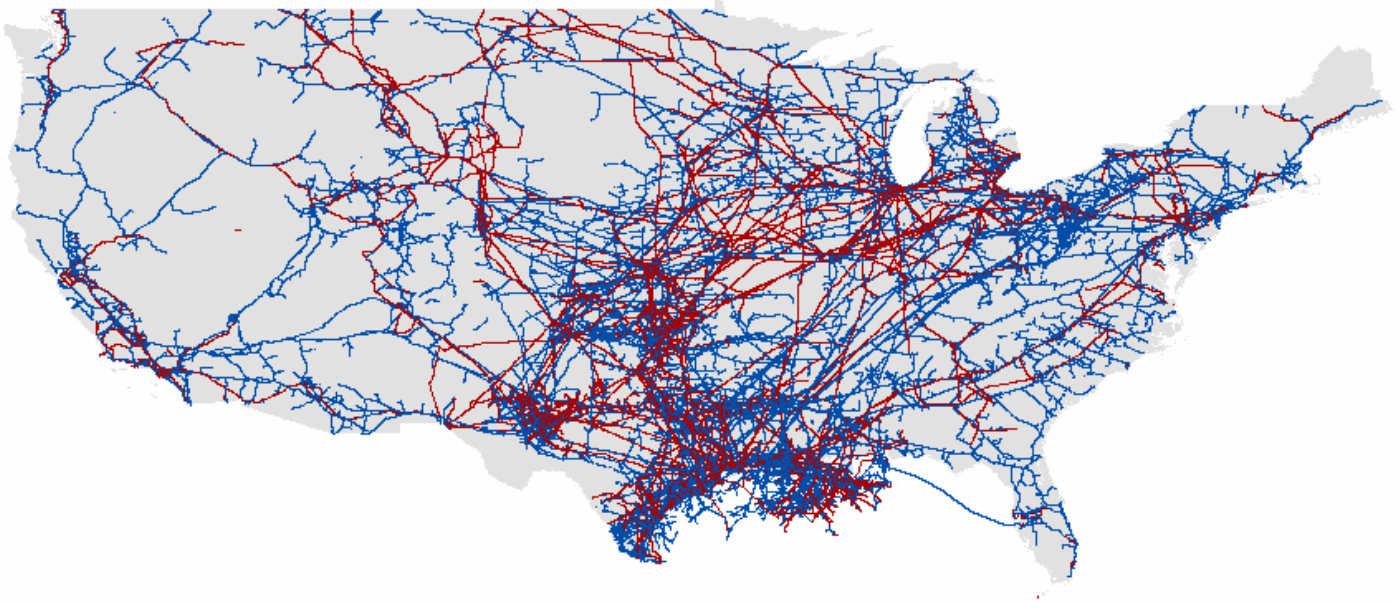# National Pipeline Mapping System

Standards for
Pipeline, Liquefied Natural Gas and
Breakout Tank Farm Operator Submissions
February 2009

www.npms.phmsa.dot.gov

Pipeline and Hazardous
Materials Safety Administration

Revisions to the Standards in February 2009

1. The definition for a low stress pipeline was added to the Pipeline Attribute Table and Glossary.
2. Annual Submission/Notifications of No Change requirements were clarified and additional requirements added in section 1.4.2.
3. Cover/Transmittal Letter requirement updated in section 2.3.
4. The list of acceptable commodities for the COMMODITY, CMDTY_DTL1, CMDTY_DTL2 and CMDTY_DTL3 fields in the Pipeline Attribute Table were updated (section 3).
5. The field name for the operator number for LNG Plants (Figure 3-2) changed from OPS_ID to OPID.

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List of Acronyms

AA ....Anhydrous Ammonia

AGA ....American Gas Association

API.....................American Petroleum Institute

ASCII.................American Standard Code for Information Interchange

BTS....................Bureau of Transportation Statistics, U.S. Department of Transportation

CAD....................Computer-Aided Drafting

CADD.................Computer-Aided Drafting and Design

CO_2 ....Carbon Dioxide

CRD....................Crude Oil

CRW ....Sweet Crude Oil

CRR ....Sour Crude Oil

DLG....................Digital Line Graph

DOE...................Department of Energy

DOS ....Disk Operating System

DRG....................Digital Raster Graphic

DXF....................Drawing Exchange Format

EMT....................Empty

EPG ....Empty Gas

EPL.....................Empty Liquid

ETH ....Pure Ethanol

FERC ....Federal Energy Regulatory Commission

FGDC ....Federal Geographic Data Committee

FTP site...............File Transfer Protocol site

GIS.....................Geographic Information System

GPS....................Global Positioning System

HG ....Hydrogen Gas

HPC ....HVL Petrochemical

HVL....................Highly Volatile Liquid

INGAA ....Interstate Natural Gas Association of America

LNG....................Liquefied Natural Gas

LPG ....Liquefied Petroleum Gas

LUT ....Look-Up Table

MIF.....................MapInfo Interchange File

MQAT ....Joint Government-Industry Pipeline Mapping Quality Action Team

NAD 27, 83 ....North American Datum (of 1927 or 1983)

NG ....Natural Gas

NG1 ....Dry, Sweet Natural Gas

NG2 ....Wet, Sweet Natural Gas

NG3 ....Dry, Sour Natural Gas

NG4 ....Wet, Sour Natural Gas

NGL....................Natural Gas Liquids

NPC ....Non-HVL Petrochemical

NPMS ....National Pipeline Mapping System

OBI ....Other Pure Biofuels
OHV ....Other HVL
OMB ....Office of Management and Budget
OPS.....................Office of Pipeline Safety
OTG....................Other Gas
OTL ....Other Hazardous Liquid
OTR ....Other Refined and/or Non-HVL Petroleum Products
PG.......................Propane Gas
PHMSA ....Pipeline and Hazardous Materials Safety Administration
PRD ....Product
RFD ....Refined Fuel Oil, Diesel
RGS ....Refined Gasoline
RKJ.....................Refined Kerosene, Jet Fuel
ROW..................Right-Of-Way
SEF ....Standard Exchange Format
SG.......................Synthetic Gas
SMYS ....Specified Minimum Yield Strength
USDOT..............U.S. Department of Transportation
USGS.................United States Geological Survey
UTM ....Universal Transverse Mercator

Preface

This document was prepared by the second Joint Government/Industry Pipeline Mapping Quality Action Team (MQAT II). The team was sponsored by the U.S. Department of Transportation (USDOT) Pipeline and Hazardous Materials Safety Administration (PHMSA), American Petroleum Institute (API), American Gas Association (AGA), and Interstate Natural Gas Association of America (INGAA). Representatives on the team included PHMSA, Bureau of Transportation Statistics (BTS), U.S. Department of Energy (USDOE), U.S. Geological Survey (USGS), Federal Energy Regulatory Commission (FERC), state representatives from California, Louisiana, New York, and Texas, and representatives from the pipeline industry.

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Bureau of Transportation Statistics – *http://www.bts.gov*

Federal Energy Regulatory Commission – *http://www.ferc.gov*

Federal Geographic Data Committee – *http://www.fgdc.gov*

Office of Pipeline Safety – *http://ops.dot.gov*

Pipeline and Hazardous Materials Safety Administration – *http://www.phmsa.dot.gov*

U.S. Department of Energy – *http://www.energy.gov*

U.S. Department of Transportation – *http://www.dot.gov*

U.S. Geological Survey – *http://www.usgs.gov*

1. Introduction

The National Pipeline Mapping System is a fully-functional Geographic Information System (GIS). The system contains the location and selected attributes of hazardous liquid and gas transmission pipelines, liquefied natural gas (LNG) plants, and breakout tank farms operating in the United States, including those pipelines that are offshore. The NPMS also contains pipeline operator contact information that is accessible to the public. The NPMS accepts voluntary data submissions for breakout tanks under OPS jurisdiction. Breakout tank submissions are discussed in section 7.

PHMSA works with other governmental agencies and private organizations to add other relevant data layers to the system. These include layers on natural disaster probability areas, high consequence areas, hydrography, and transportation networks. PHMSA uses the system to 1) depict pipelines in relation to populated areas and natural resources, 2) coordinate information with other governmental agencies, 3) provide regulatory oversight, 4) better prepare for a possible pipeline release, 5) work with governmental agencies and private industries in the event of a release.

The NPMS is built and maintained using information supplied by pipeline and LNG Plant operators. Operators are asked to provide geospatial data about their holdings as well as contact information, and must update their submission every twelve months.

1.1 Regulatory Requirements

The Pipeline Safety Improvement Act of 2002 requires that pipeline operators provide the following information to the Department of Transportation. The Department of Transportation is utilizing the National Pipeline Mapping System National Repository to handle all pipeline data.

- ♦ Data appropriate for use in the National Pipeline Mapping System (NPMS). A complete data submission includes the geospatial data, attribute data, and metadata for all LNG, hazardous liquid, and natural gas transmission pipeline operation systems operated by a company.
- ♦ The name and address of the person with primary operational control to be identified as its operator.
- ♦ Public contact information, which is used by members of the public to contact the operator for additional information about pipeline holdings.
- ♦ Updates of the above information to reflect changes in pipeline holdings.

Data updates and data accuracy verification are discussed further in section 1.4.

It is requested that the data have a **minimal** positional accuracy of ±500 feet of its known geographic location. Research indicates that most operators can easily achieve ±500 foot accuracy with current in-house data records.

The regulation of abandoned pipelines defined in 49 CFR 195.59 (a) Abandonment or Deactivation of Facilities states that "For each abandoned offshore pipeline facility or each abandoned onshore pipeline facility that crosses over, under or through a commercially navigable waterway, the operator of that facility must file a report upon abandonment of that facility." The preferred method to submit data on pipelines facilities abandoned after October 10, 2000 is to the NPMS in accordance with the standards defined in this document. In addition to the NPMS-required attributes, operators must submit a letter

which contains the date of abandonment, diameter, method of abandonment, and certification that, to the best of the operator's knowledge, all of the reasonably available information requested was provided and, to the best of the operator's knowledge, the abandonment was completed in accordance with applicable laws.

Note: Once a pipeline is officially abandoned in the NPMS, do not include it in future NPMS submissions. Please contact NPMS staff if you are unsure of which lines are currently abandoned in the NPMS for your company. Your company's abandoned lines will not appear in your PIMMA account or when you use the Update Your Submission Online tool.

1.2 Development of NPMS and Standards for Data Submission

A Joint Government/Industry Pipeline Mapping Quality Action Team (MQAT II) was formed to work with PHMSA on creating the digital pipeline location and attribute layer of the NPMS. The team was sponsored by PHMSA, American Petroleum Institute (API), American Gas Association (AGA), and Interstate Natural Gas Association of America (INGAA), and included representatives from multiple federal and state governmental agencies, and the natural gas and hazardous liquid pipeline industry.

MQAT II drafted standards and incorporated appropriate recommendations from outside entities, including comments from mapping vendors, pipeline operators, and state agencies outside the MQAT II. The standards underwent two pilot tests. These tests helped to determine the

- ♦ ability of pipeline operators to submit data that meet the standards,
- ♦ problems they encountered while trying to meet the standards,
- ♦ cost and effort required to meet the standards,
- ♦ usability of data formats other than those in the standards, and
- ♦ ability of the pilot repositories to process the submitted data based on the draft standards.

To the greatest extent possible, MQAT II resolved the problems encountered in both pilot tests in an effort to further minimize the time and effort required to meet the standards. The majority of the operators and repositories that participated in the pilot tests stated that the standards were clear and could be met without an undue burden on their company.

Various state agencies currently request or require that operators submit pipeline and LNG data to them. Some state agencies are using the operators' data to create a digital pipeline and LNG layer for their state. NPMS does not supersede or replace state regulations. Operators must still comply with all applicable state regulations.

1.3 NPMS Structure

The NPMS consists of a National Repository ("Repository"), which serves as the final processing and storage facility for all pipeline data. A number of State Repositories formerly existed, but were dissolved in 2002. All data passes through a final series of quality control checks before the data is made available to users. The Repository temporarily posts the processed data online for operator review and approval before incorporating the geospatial data and attribute data into the Repository. Operators are contacted with usernames and passwords and allowed 2 weeks to review their processed data.

1.4 Data Format, Verification, and Updates

1.4.1   Data Format

The Repository prefers to work with digital data if it is available.

1.4.2   Annual Resubmission and the Internet Submission Update Tool

Operators are required to examine their data every twelve months and determine if any part of their submission (geospatial, attribute, metadata, or public contact information) has changed. If any of these components have changed, the operator must resubmit their data to the NPMS. The NPMS prefers that operators resubmit the entire pipeline system with the exception of previously abandoned lines. Do not resubmit lines already abandoned in the NPMS. If you are unsure of which lines are already in the NPMS as abandoned for your company please contact NPMS Staff at npms-nr@mbakercorp.com. Operator ID numbers and contact information for the submission must be included.

Submissions or emails of verification are due twelve months from the date of your last submission. For example, if a submission was made June 1, 2003, the next update will be due on June 1, 2004. However, if an update is made in the interim, for example, on December 1, 2003, the update deadline is reset and the next update will be due on December 1, 2004. Contact the National Repository if you do not know the date of your last submission.

Beginning on January 1, 2009 PHMSA is requesting that operators submit their NPMS data concurrently with hazardous liquid and gas transmission annual report submissions. Annual reports are due on March 15 each year for gas transmission operators and on June 15 for hazardous liquid operators. PHMSA suggests that beginning on January 1, 2009, gas transmission NPMS submissions be submitted by March 15, 2009, and represent the pipeline operator assets as of December 31, 2008. LNG plant operators would also submit to NPMS by March 15, 2009, representing assets as of December 31, 2008. Hazardous liquid annual reports and NPMS submissions would both be submitted by June 15, 2009, representing assets as of December 31, 2008. For those operators reporting both gas and hazardous liquid transmissions under a single Operator ID number (internal DOT numbers assigned by PHMSA to the operator for specific assets), a single NPMS submission containing the changes for both the gas and hazardous liquid transmissions is preferably submitted by March 15, 2009. In 2010 and beyond, the annual report and NPMS submission due dates would remain March 15 for gas transmission and LNG plants and June 15 for hazardous liquid pipelines. NPMS submissions would represent physical assets as of December 31 of the previous year. Submitting annual reports and NPMS data at the same time will alleviate the need for pipeline operators to track their last NPMS submission and may decrease the receipt of notices from PHMSA that data has not been submitted.

PHMSA also suggests that Operator ID numbers in annual report submissions match the same assets described in NPMS submissions. Operators who choose to follow this guidance will use the same Operator ID number to describe a pipeline or LNG asset in both the annual report and NPMS submission beginning with their 2009 submissions. This does not apply to pipeline operators who have requested and been assigned only one Operator ID number. Synchronizing the Operator ID numbers will alleviate confusion in identifying operator assets and improve PHMSA's ability to accurately describe the pipeline operated by a specific pipeline operator. The ability to accurately identify and track operator physical

assets is beneficial to PHMSA, pipeline operators, and all stakeholders who utilize our data, and ultimately helps promote pipeline safety.

Pipeline operators whose NPMS submission due date would normally fall between October 1, 2008, and December 31, 2008, and who choose to align their submission dates with annual report due dates, may wait to submit their 2008 data capture until their new submission dates (either March 15, 2009 or June 15, 2009). As stated above, NPMS submissions will reflect the state of the assets on December 31, 2008.

The NPMS processing department encourages operators to submit data prior to the suggested deadlines. Submitting early will speed submission processing and provide time for the processing department to notify operators if a submission is incomplete. Submissions for the December 31, 2008, data capture will be accepted starting January 2, 2009.

If operators have no change since their previous NPMS submission, the operator may continue to send an email to npms-nr@mbakercorp.com or use the "Update your submission online" tool on the NPMS Web site (http://www.npms.phmsa.dot.gov) in lieu of making a submission.

To view submitted data online, go to the NPMS Web site (http://www.npms.phmsa.dot.gov). Follow the link on the home page marked "Update Your Submission Online." Using the tool, pipeline operators can inform the National Repository that their data and public contact information have not changed, or that they plan to resubmit. Operators must update their data or confirm it as accurate every 12 months in order to comply with the Pipeline Safety Improvement Act of 2002. Previously, operators could notify PHMSA that their data had not changed by sending an email to npms-nr@mbakercorp.com. Although that option is still available, PHMSA prefers that operators update their submissions through this Web tool.

The tool allows an operator to view geospatial information, attributes, and public contact information by submission or for an operator ID (OPID) as a whole. The tool does not allow an operator to view any abandoned pipelines; operators who want to verify their abandoned pipelines should contact National Repository staff at npms-nr@mbakercorp.com or 703-317-6294. The operator may also verify contact information and submission dates. The application will provide the annual due date for an operator's NPMS submission. Resubmission of data will continue to be handled through the National Repository.

To access the application, pipeline operators need a Pipeline Integrity Management Mapping Application (PIMMA) username and password. If an operator already has a PIMMA username and password, he or she may use it. If an operator has forgotten his or her username or password, he or she should contact National Repository staff at npms-nr@mbakercorp.com or 703-317-6294.

To apply for a username and password, go to
http://www.npms.phmsa.dot.gov/opersearch/access/accessform.asp.
Be sure to fill out the application marked for pipeline operators. National Repository staff take approximately 7 to 10 business days to process a username and password request.

1.4.3   Public Contact Information

All operators must now submit public contact information for their pipeline systems. This contact information is intended to be used by private citizens outside of PHMSA and the pipeline industry. It is not the same as the contact information that is provided in the metadata; that information is for PHMSA

and its contractors in case they have questions regarding your company's submission. Please see section 5 for a detailed explanation of the type of information that is required.

1.5 Distribution of NPMS Data

Federal, state, and local governmental agencies and the pipeline industry may access all or portions of the pipeline, LNG, and breakout tank farm layers of the NPMS. Other data layers on high consequence areas, transportation networks, and natural disaster probability areas are being collected from various governmental and private sources, and are available for these users to the extent possible. The data collected for the NPMS is necessary for regulatory oversight and for monitoring pipeline security. In 2007, a Public Viewer was launched. The Public Viewer allows the general public to view maps of and information about transmission pipelines, LNG plants, and breakout tank farms in a user-specified county. Map scale and attributes are limited.

One of the goals of the NPMS is to assist operators in progressing toward a digital mapping environment. Upon request, digital pipeline and LNG Plant data is provided to the contributing operator at no cost. The Repository may charge a fee for other products and services. The data contained in the NPMS are for reference purposes only and are not to be construed as actual survey-quality data or as a replacement for contacting a one-call center.

1.6 About these Standards

These standards were created with input from the pipeline industry, governmental agencies, and the public. They address the submission of digital pipeline and LNG data to support the development of a reasonably accurate NPMS. Operators are responsible for providing data that complies with these standards.

The goal of PHMSA is for the NPMS to support operators who want to develop digital geospatial data. Operators who anticipate having difficulty meeting NPMS standards are encouraged to contact the Repository. The Repository will work with the operator and PHMSA to formulate an acceptable submission.

These standards serve as a guideline for preparing and submitting pipeline and LNG plant location and attribute data for inclusion in the NPMS Repository. The Repository understands that the availability of pipeline company digital data varies among operators and that there is a need to be flexible when working with the pipeline operators. The Repository will review and approve variations of data submissions from this standard on a case-by-case basis.

The following sections discuss in detail the format, content, and quality of pipeline and LNG Plant data that are to be submitted for inclusion into the NPMS. The standards provide guidelines for the submission of digital data. If any operator is unable to meet these guidelines please contact National Repository Staff. Three types of data are required: geospatial data (location information), attribute data (descriptive information), and metadata (data about the data). Contact information for the pipeline operator is also required. See section 5 for more details about contact information.

2.   General Requirements (Key Terms and Definitions)

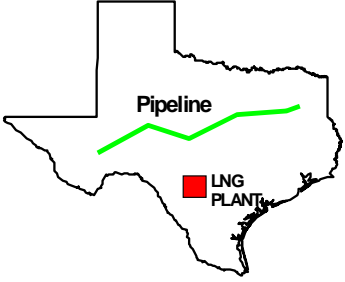This section establishes general NPMS terms and requirements.

Geospatial Data	Attribute Data	Metadata	Contact Information
Digital data with lines and/or points marking the location of pipelines, LNG Plants, and breakout tanks.	A computer database containing descriptive information about pipelines or LNG Plants. There is one record in the database for each *pipeline segment*. **Pipeline Attribute Table** Descriptive Field 1 Descriptive Field 2 Descriptive Field … **LNG Attribute Table** Descriptive Field 1 …	Descriptive information about how the geospatial and attribute data were prepared (i.e., data about data). This information includes the data projection, datum, and units,	Information about the person or entity who serves as a contact for the pipeline system. Contains **either** a person's name and title **or** the name of an entity. Also contains address, phone, and email information.

Figure 2-1. The types of NPMS data.

The NPMS includes location and selected attributes of hazardous liquid and gas transmission pipelines, liquefied natural gas (LNG) plants, and breakout tank farms. Information on other types of pipelines and facilities need not be submitted at this time.

Natural gas transmission line – A pipeline system, other than a gathering line, that

1. Transports gas from a gathering line or storage facility to a distribution center, storage facility, or large-volume customer that is not downstream from a distribution center. A large-volume customer may receive similar volumes of gas as a distribution center. Factories, power plants, and institutional users of gas are included.

2. Operates at a hoop stress of 20 percent or more of specified minimum yield strength (SMYS) *or*

3. Transports gas within a storage field.

Hazardous liquid – Petroleum, petroleum products, or anhydrous ammonia.

Hazardous liquid transmission line – A hazardous liquid transmission pipeline other than a flow line, gathering line, or in-plant pipeline.

Liquefied natural gas (LNG) – Natural or synthetic gas, having methane as its major constituent, that has been changed to a liquid or semi-solid.

LNG Plant – A component of a facility that is used for liquefying or solidifying natural gas or transferring, storing, or vaporizing liquefied natural gas.

Pipeline system – All parts of a natural gas transmission line or hazardous liquid line through which gas or hazardous liquid is transported. By definition, only one firm can operate a pipeline system. Operators should assign unique names to each of their pipeline systems. A pipeline system may have an unlimited number of branches. Each pipeline system must be represented by one or more *pipeline segments*.
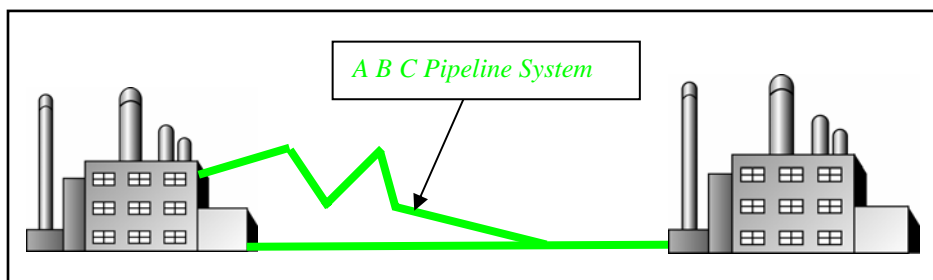

Figure 2-2. Sample of annotated pipeline system.

Pipeline segment – A linear feature representing part or all of a pipeline system. A pipeline segment must have only two ends. No branches are allowed. A pipeline segment may be a straight line or may have any number of vertices. Each pipeline segment must be uniquely identified. The number of pipeline segments should be kept to the minimum needed to represent a pipeline system and its associated attributes. A unique line segment in the computer-aided drafting (CAD) or GIS dataset should represent each pipeline segment.
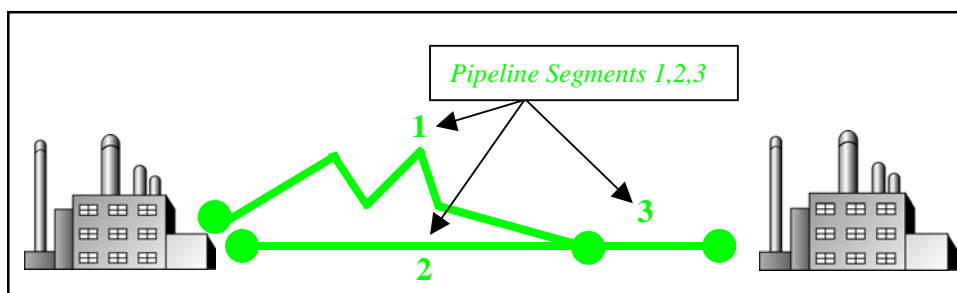
Figure 2-3. A pipeline system consisting of three pipeline segments.

A pipeline system should be broken into multiple pipeline segments for only two reasons:

1. to represent a branch or **intersection** with another pipeline segment, and/or

2. to allow for a change of associated attributes such as diameter.

Pipeline intersection – A point where a physical connection between two pipelines occurs. A commodity from one pipeline can flow into another pipeline(s), either through a branch within a pipeline system or a connection between two pipeline systems. When submitting hard-copy maps, intersections should be marked with a clear, visible dot. When submitting digital geospatial data, line segments in the CAD or GIS data set should be broken at the point of intersection. The intersection will be a common endpoint (node) representing the two pipeline segments.

Pipeline crossing – A point where two or more pipelines cross. but where there is no physical connection between the pipelines. Pipeline segments should **not** be broken at pipeline crossings.

Figure 2-4. Sample annotation of pipeline intersection and pipeline crossing.

Pipeline corridor – A pipeline corridor is a linear area where two or more pipelines (either part of the same or different pipeline systems) are closely grouped in a single right-of-way. Pipeline corridors pose a cartographic challenge. In digital files, multiple lines are required, and each separate representation must be stored in individual layers or files. Pipeline corridors should be clearly annotated, particularly where pipelines join or exit the corridor.
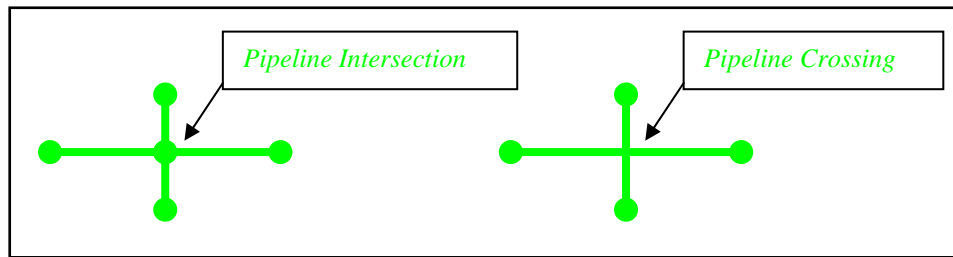
Pipeline status – The status of a pipeline or pipeline segment may be defined by one of the following options:

1. In-service – the pipeline or pipeline segments currently transports natural gas or hazardous liquid.
2. Inactive/Idle – the pipeline or pipeline segment is maintained to a degree that it may, in the future, be potentially brought back into service.
3. Retired – the pipeline or pipeline segment has been taken out of service and is no longer being maintained, but it has not yet been permanently abandoned.
4. Abandoned – the pipeline or pipeline segment has been permanently removed from service.

Breakout tank – A tank used to a) relieve surges in a hazardous liquid pipeline system or b) receive and store hazardous liquid transported by a pipeline for re-injection and continued transportation.

2.1 NPMS File Naming Conventions

Operators are requested to use the following formula when assigning file names:

Type of File Code **+** OPID **+** hyphen **+** 4-Digit Sequential Number **+** 3-Digit Alphanumeric Extension

Sample file name: G12345-0001.DWG

Type of File Code (one-character, alpha):

G = Geospatial Data Only

A = Attribute Data Only

B = Both Geospatial and Attribute Data

(Also use "B" when different geospatial and attribute files should have the same name. For example, an export from ESRI's ArcView software might have the following names: B12345-0001.SHP, B12345-0001.SHX, B12345-0001.DBF.)

T = Metadata and Attribute Data created with the *NPMS Metadata/Attribute Builder* software

(Since the operator must submit metadata created with the *NPMS Metadata/Attribute Builder* software, the file type will always be .MDB, for instance T12345-0001.MDB. Please note that the operator is not required to create attribute data via this software. See section 3 of this document for additional details about the software.)

OPID (five digits [maximum], numeric) – This is the identification number assigned by the Pipeline and Hazardous Materials Safety Administration to pipeline and LNG Plant operators, for user-fee purposes. The OPID has five digits or fewer. If you don't know your OPID, go to the "Operator ID search" link on the NPMS Web site.

4-Digit Sequential Number (four-digit, numeric, starting with 0001) – This is used to avoid assigning several files with the same file name.

Extension (three-character default from software package) – Use the default extension for export from the software package (e.g., **.**DWG, **.**SHP, **.**DBF, etc.).

2.2 Types of NPMS Submissions

Operators must classify submissions according to one of the following types. The various types of submissions are intended to facilitate maintenance of the NPMS and minimize the effort required by pipeline operators. The type of submission must be identified in the cover/transmittal letter accompanying the submission.

INT – Initial Submissions to the NPMS contain data for a first time submittal for a given OPID. If data has ever been submitted under your OPID in the past then you cannot make an Initial Submission under that OPID again. The revision codes (REVIS_CD) of all pipeline segments should be set to **"A"** for addition.

ADD – Additions contain **only** data that is new to the NPMS. National Repository staff will add this data to the data currently in the NPMS for your OPID. The revision codes (REVIS_CD) of all pipeline segments should be set to **"A"** for addition.

FRP – Full Replacement Submissions should be made whenever it is necessary to apply changes to your data. A full replacement must include all data for your OPID as you want it to appear online after processing because it will replace all previously submitted data. *Abandoned lines should not be included in this resubmission if they were already included in a previous submission. Contact NPMS Staff at npms-nr@mbakercorp.com if you are unsure of what abandoned lines your company has previously submitted.* The revision codes (REVIS_CD) for pipeline segments may be "**A**" for addition, "**S**" for spatial modification, "**T**" for attribute modification, "B" for both spatial and attribute modification, or "**N**" for no change.

PRP – Partial Replacement Submissions can be made when minimal changes are necessary and a full replacement would require too many additional resources. To change a segment, resubmit only the new replacement segment, use the same pipeline id (PLINE_ID) for identification purposes and set the revision code (REVIS_CD) to "**S**" for spatial modification, "**T**" for attribute modification, or "B" for both spatial and attribute modification. The new segment must also have the same starting and ending points as the old segment it replaces so the end result is still seamless. If the previous statements do not hold true your partial replacement submission may not be acceptable and a full replacement submission will be requested. When you have pipeline segments to add or delete from the NPMS in addition to your modification segments include them using the appropriate revision code of "**A**" for addition or "**D**" for deletion.

DEL – **Deletions** only contain data that needs to be removed from your OPID in the NPMS. If deletions are necessary in addition to any modifications or additions, please make a full replacement submission. Explain the reason for any deletions in your cover/transmittal letter (see section 2.3). If you sell lines include the new operator name in the cover/transmittal letter. Do not delete segments that are abandoned, unless they are physically removed from the ground. The revision codes (REVIS_CD) of all pipeline segments should be set to **"D"** for deletion.

Change of Operator Report – The operators of any given pipeline system may change frequently. When this occurs, both old and new operators should contact the National Repository. The Repository will confirm any changes.

Change Pipeline System Status – If any entire pipeline system operates sporadically or the transported commodities change, contact the National Repository.

2.3   Cover/Transmittal Letter Requirement

All submissions must be accompanied by a cover/transmittal letter. This letter is meant to provide National Repository Staff with key information for processing your submission, and allows you to communicate any additional information that does not fit into the NPMS Attribute/Metadata Builder tool. Follow the Making a Submission link at www.npms.phmsa.dot.gov to download the Cover/Transmittal Letter template, or compile a letter including the following items:

1.   Contact information for the person National Repository Staff should contact with any questions.

2.   A brief description of the system changes reflected in the submission (e.g., sold, acquired, re-routed, abandoned lines, etc. since the previous submission).

3.   Use one of the codes below to indicate how this submission as a whole should affect the previously submitted data for this OPID. You can read more about these submission types in section 2.2:

  ♦ INI: This is the initial submission to the NPMS for this OPID

  ♦ ADD: This submission should be added to the data currently in the NPMS for this OPID (Addition)

  ♦ FRP: This submission should replace all data currently in the NPMS for this OPID (Full Replacement)

  ♦ PRP: This submission should replace specific segments currently in the NPMS for this OPID as indicated by the assigned Pipeline IDs (Partial Replacement)

♦ DEL: This submission only indicates which segments should be removed from the data currently in the NPMS for this OPID (Deletion)

4. Include the answers the following 4 questions:

♦ Does this specific Operator ID operate only gas, only liquid, or both gas and liquid lines?

♦ Does this specific submission contain only gas, only liquid, or both gas and liquid lines?

(NOTE: It is preferable that operators with both gas and liquid lines make a single NPMS submission with both types included.)

♦ Does this specific submission contain any abandoned lines (STATUS_CODE value equals "B")?

♦ If the submission does contain abandoned lines, have you confirmed that the abandoned lines in this submission have not been previously submitted to NPMS?

(NOTE: <u>Never resubmit abandoned lines to the NPMS</u>; even Full Replacement submissions should only include new abandoned lines. Your previously submitted abandoned lines do not show up on Check Plots, when you sign into PIMMA or when you use the Update Your Submission Online tool. Please contact NPMS staff at <u>npms-nr@mbakercorp.com</u> with any questions regarding previously submitted abandoned pipelines.)

3. Attribute Data

When submitting data to the Repository, the operator is required to provide descriptive information about the pipelines and LNG plants. The attribute data is essential information about the pipeline or LNG plant such as its name and commodity transported. To simplify the submission, the required attribute data has been kept to a minimum.

3.1 Required and Optional Attributes

Each pipeline segment or LNG plant submitted must be accompanied by a corresponding record and attribute database table. For information about required and optional attributes, refer to the following figures:

♦ For pipeline submissions, see Figure 3-1 for the attribute field definitions.

♦ For LNG submissions, see Figure 3-2 for the attribute field definitions.

3.2 Rules for Attribute Data Input

When submitting digital attribute information, adhere to the following rules:

1. Use only UPPERCASE when defining field names.

2. Use only UPPERCASE when inputting data into the attribute tables.

3. Omit all punctuation except for periods (.), spaces ( ), backslashes (\), colons (:), commas (,), hyphens (-), and underscores (_). Semicolons (;) should be used only as a delimiter when submitting attribute data in ASCII-delimited text files.

4. Use only NPMS-specified abbreviations.

5. Be consistent. Names and terms should be exactly replicated throughout a submission. For example, if a pipeline system is named Pennsylvania Line (SYS_NM = "PENNSYLVANIA LINE"), the operator should consistently use the full and exact name. The operator should not use alternative names like "Penn Line" or "PA Line" or "Pennsylvania."

6. Use the correct OPID. OPID is an accounting number assigned by the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration to firms that operate pipelines and LNG plants. If you do not know your firm's OPID number, check with your firm's accounting department. An Operator ID search tool can be found on the home page of the NPMS Web site.

Pipeline Attribute Table

Field Name	Field Type[1]	Field Length	Short Description	Full Description	Acceptable Values (UPPERCASE)	Required Field[2]
OPER_LINK	I	8	Unique Link ID	Link between the geospatial elements (pipeline segments) and their respective attribute records. Assigned by the operator or the operator's software package (i.e., COVER-ID, MSLINK_ID, etc.). Note the OPER_LINK and the PLINE_ID may be identical.	Positive integer	Y
OPID	I	5	Operator Number	Unique tracking number assigned by PHMSA to the company that physically operates the pipeline system. If you do not know your firm's OPID, check with your DOT/Regulatory Compliance department or the NPMS Web site.	Positive integer	Y
OPER_NM	C	40	Operator Name	The company name that physically operates the pipeline system.	Character	Y
SYS_NM	C	40	System Name	Assigned by the operator. The operator's name for a functional grouping of pipelines.	Character	Y
SUBSYS_NM	C	40	Sub System Name	Assigned by the operator. A unique name for a smaller sub-section of a pipeline system. A subset of SYS_NM.	Character	N
PLINE_ID	C	20	Pipeline ID	Assigned by the operator. This is an identifier for a specific section of pipeline within a pipeline system.	Character	Y
DIAMETER	D	5	Diameter	Nominal diameter of the pipeline segment, in inches (two decimal places, ##.##).	Real Number	N
COMMODITY	C	3	Commodity Category	Abbreviation for the primary commodity carried by the pipeline system. CRD=crude oil, PRD=product, AA=anhydrous ammonia, LPG=liquefied petroleum gas, NGL=natural gas liquids, HPC=HVL petrochemical, OHV=other HVL, OBI=other pure biofuels, CO2=carbon dioxide, ETH=pure ethanol, OTL=other hazardous liquid, EPL=empty liquid, NG=natural gas, PG=propane gas, SG=synthetic gas, HG=hydrogen gas, OTG=other gas, EPG=empty gas.	CRD, PRD, AA, LPG, NGL, HPC, OHV, OBI, CO2, ETH, ONN, EPL, NG, PG, SG, HG, OTG, EPG	Y
CMDTY_DTL1	C	3	Commodity Detail 1	Abbreviation for the primary commodity's first subcategory detail. If the primary commodity defined in the COMMODITY field is not CRD, PRD, or NG, this field should be left blank. If the primary commodity in the COMMODITY field is CRD, PRD, or NG and the subcategory is not known or stated, this field should be left blank. The primary commodity CRD has the following subcategories: CRW=sweet crude, CRR=sour crude. The primary commodity PRD has the following subcategories: RGS=refined gasoline, RFD=refined fuel oil, diesel, RKJ=refined kerosene, jet fuel, NPC=non-HVL petrochemical, OTR=other refined and/or non-HVL petrochemicals. The primary commodity NG has the following subcategories: NG1=dry, sweet natural gas,	CRW, CRR, RGS, RFD, RKJ, NPC, OTR, NG1, NG2, NG3, NG4, <Null>	N

				NG2=wet, sweet natural gas, NG3=dry, sour natural gas, NG4=wet, sour natural gas.		

Pipeline Attribute Table continued

Field Name	Field Type[1]	Field Length	Short Description	Full Description	Acceptable Values (UPPERCASE)	Required Field[2]
CMDTY_DTL2	C	3	Commodity Detail 2	Abbreviation for the primary commodity's second subcategory detail. Refer to the CMDTY_DTL1 field for additional information and valid values.	CRW, CRR, RGS, RFD, RKJ, NPC, OTR, NG1, NG2, NG3, NG4, <Null>	N
CMDTY_DTL3	C	3	Commodity Detail 3	Abbreviation for the primary commodity's third subcategory detail. Refer to the CMDTY_DTL1 field for additional information and valid values.	CRW, CRR, RGS, RFD, RKJ, NPC, OTR, NG1, NG2, NG3, NG4, <Null>	N
CMDTY_DESC	C	40	Commodity Description	Descriptive information of the commodities carried by the pipeline system. For example, "NATURAL GAS" or "PROPANE."	Character	N
INTERSTATE	C	1	Interstate Designation	(Y)es / (N)o designator to identify if the pipeline system is an interstate pipeline. Y=Interstate, N=Intrastate. (Use PHMSA definition; see glossary).	Y, N	Y
LOW_STRESS	C	1	Low Stress	(Y)es / (N)o designator to identify if the pipeline segment is a low stress pipeline. If the pipeline operates at 20% or less of SYMS, the segment is a low stress pipeline.	Y, N	Y
STATUS_CD	C	1	Pipeline Status Code	Identifies the current status of the pipeline segment. I=in service, D=idle, B=abandoned, R=retired.	I, D, B, R	Y
QUALITY_CD	C	1	Data Quality Code	Operator's estimate of the positional accuracy of the submitted pipeline segment. E=excellent: within 50 feet, V=very good: 50–300 feet, G=good: 301–500 feet, P=poor: 501–1000 feet, U=Unknown.	E, V, G, P, U	Y
REVIS_CD	C	1	Revision Code	Identifies this pipeline segment as an A=addition to the NPMS, S=spatial modification of the existing NPMS feature, T=attribute modification of the existing NPMS feature, B=both a spatial and attribute modification of the existing NPMS feature, N=no change to the existing NPMS feature, or D=deletion of the existing NPMS feature.	A, S, T, B, N, D	Y
NOTES: 1 I – Integer; C – Character; D – Double. 2 Y – Yes; N – No.						

Figure 3-1. Attribute field definitions for pipelines.

LNG Plant Attribute Table

Field Name	Field Type[1]	Field Length	Short Description	Full Description	Acceptable Values (UPPERCASE)	Required Field[2]
OPER_LINK	I	8	Unique Link ID	Link between the geospatial elements (points) and their respective attribute records. Assigned by the operator or the operator's software package (i.e., COVER-ID, MSLINK_ID, etc.). Note the OPER_LINK and the LNG_ID can be identical.	Positive integer	Y
OPID	I	5	Operator Number	Unique tracking number assigned by PHMSA to the company that physically operates the LNG Plant. If you do not know your firm's OPID, check with your DOT/Regulatory Compliance department.	Positive integer	Y
OPER_NM	C	40	Operator Name	The name of the company that physically operates the facility.	Character	Y
LNG_NM	C	40	LNG Plant Name	Assigned by the operator. The operator's name for the LNG Plant.	Character	Y
LNG_ID	C	20	LNG Plant ID	Assigned by the operator. This is a unique identifier for a specific facility.	Character	Y
STATUS_CD	C	1	LNG Status Code	Identifies the current status of the facility. I=in service, B=abandoned, R=retired.	I, B, R	Y
QUALITY_CD	C	1	Data Quality Code	Operator's estimate of the positional accuracy of the submitted facility data. E=excellent: within 50 feet, V=very good: 50–300 feet, G=good: 301–500 feet, P=poor: 501–1000 feet, U=Unknown.	E, V, G, P, U	Y
REVIS_CD	C	1	Revision Code	Identifies the facility as an A=addition to the NPMS, S=spatial modification of the existing NPMS feature, T=attribute modification of the existing NPMS feature, B=both a spatial and attribute modification of the existing NPMS feature, N=no change to the existing NPMS feature, or D=deletion of the existing NPMS feature.	A, M, D	Y

NOTES: 1 I – Integer; C – Character.
2 Y – Yes.

Figure 3-2. Attribute field definitions for LNG plants.

Understanding Pipeline System and Pipeline Segment Attributes
Some NPMS attributes refer to entire pipeline systems, while other attributes may refer only to a portion of a pipeline system. For example, the INTERSTATE field obviously refers to the pipeline system as a whole, not its individual pipeline segments. Therefore, the INTERSTATE field must contain the same value for every pipeline segment that is included in a pipeline system. On the other hand, a field such as DIAMETER can change during the course of a pipeline system. In such cases, a new pipeline segment with the appropriate value for DIAMETER must be created.

The following fields must contain the same value for every pipeline segment included in a pipeline system:

> OPID
> OPER_NM
> SYS_NM
> COMMODITY
> CMDTY_DTL1
> CMDTY_DTL2
> CMDTY_DTL3
> CMDTY_DESC
> INTERSTATE

Fields that **may** contain a different value for each pipeline segment include:

> OPER_LINK (must be unique for each segment)
> SUBSYS_NM
> PLINE_ID
> DIAMETER
> LOW_STRESS
> STATUS_CD
> QUALITY_CD
> REVIS_CD

3.3 Building the Attribute Data File

Attribute data may be provided in one of the following formats: common GIS export, DBASE (**.**DBF) format, Microsoft Access (**.**MDB), or American Standard Code for Information Interchange (ASCII) text file,. In all cases, operators should be careful to follow the field name, field type, and field length standards listed in Figures 3-1 and 3-2.

The Pipeline and Hazardous Materials Safety Administration has developed the *NPMS Metadata/Attribute Builder Version 4.0*. Please note that this replaces version 3.0 of the former metadata and attribute templates. You must use the latest metadata/attribute builder; the Repository is no longer accepting metadata and attribute submissions made using prior versions. The software operates on Windows personal computers and manages metadata and attribute data entry. The software produces properly formatted Microsoft Access files for NPMS submission.

♦ **Common GIS export format –** Operators using GIS systems can package attribute data with the associated geospatial data. Acceptable GIS formats are discussed in section 4.1, General Requirements for Digital Geospatial Data.

♦ **DBASE (.DBF) format –** Operators can create a **.**DBF file using one of the commercially available software packages that writes to a **.**DBF file. Options include Excel, Access, Fox Pro, Lotus 123, Dbase, and Paradox.

♦ **Microsoft Access (.MDB)** – Operators can use the *NPMS Metadata/Attribute Builder* to create a properly formatted .MDB file for submission.

♦ **ASCII format –** The file should be semicolon-delimited**.**

3.4 Using *NPMS Metadata/Attribute Builder*

The *NPMS Metadata/Attribute Builder* software is available at no cost. The software can be downloaded from the NPMS Web site and is available on CD. The software simplifies the creation of NPMS attribute data by minimizing repetition and handling all formatting issues. Additionally, the software assists the user in effortlessly creating the required metadata.

Note: Attribute data that were created with earlier versions of the NPMS Attribute Template software cannot be modified with the new NPMS Metadata/Attribute Builder software. In this scenario, the attribute data must be recreated via the NPMS Metadata/Attribute Builder software. Once the attribute data are created with the NPMS Metadata/Attribute Builder software, the data may be modified with the NPMS Metadata/Attribute Builder software.

3.4.1 System Requirements

The system requirements are a 486 processor (or higher) personal computer that uses Microsoft Windows 95, or later. The system should have at least 8 megabytes of RAM and a CD-ROM drive.

3.4.2 Installation Instructions

Before installing any version of NPMS software, close all open programs. Also, if you are running an older copy of the NPMS software and are attempting to install a new version, **uninstall the existing NPMS software** before proceeding with these steps.

From CD-ROM:

1. Insert the CD-ROM.

2. From Windows Explorer, double click on Setup.exe.

3. Follow the on-screen installation instructions.

   Note: The CD-ROM also contains these standards in Adobe Portable Document Format (.PDF) and Adobe Acrobat Reader, which is required to view or print the document.

From the Internet:

1. Create a directory anywhere on your system's hard drive called "NPMS_Software."

2. Download the file "NPMS_Builder_v4.zip" from the NPMS Web site and copy the file to the NPMS_Software folder created in step 1.

3. From Windows Explorer right click on NPMS_Builder_v4.zip and choose to unzip the file to this location (WinZip is available for free download from our website if needed). A folder and a number of files will result from the unzipping.

4. Double click on \NPMS_Software\Setup.exe.

5. Follow the on-screen installation instructions. This wizard creates an NPMS_Builder directory at C:\\Program Files (unless the user specifies elsewhere) where the program is stored, as well as a link to the program under the Start menu.

3.4.3   Step-by-Step User Instructions

NPMS Metadata /Attribute Builder simplifies the data entry process by collecting only the metadata needed for the submission and by minimizing repetition for pipeline systems and LNG plants. To use the software, follow the instructions below.

1. From the Start/Programs menu, click on NPMS Metadata/Attribute Builder to start the program. The NPMS Metadata/Attribute Builder Version 4.0 interface appears on-screen.
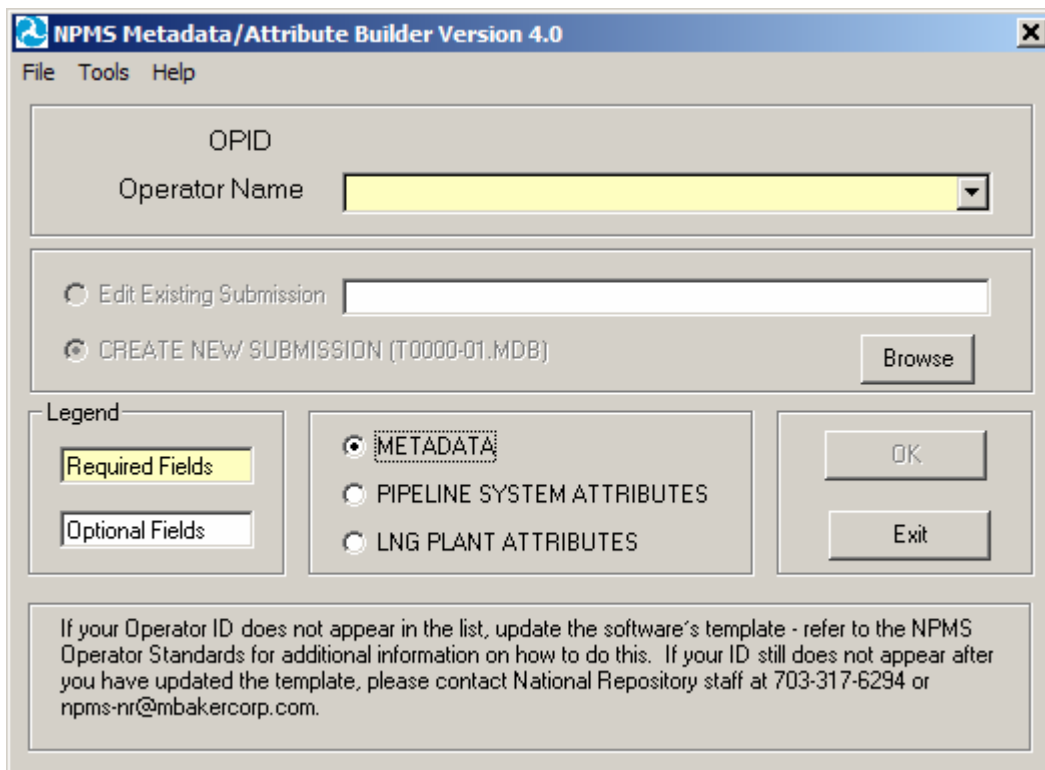

Figure 3-3. NPMS Metadata/Attribute Builder initial data entry screen.

2. The initial screen requires the user to select the correct OPID. A list of valid operator names and OPIDs is provided. If you do not know what your OPID is, you may use the Operator ID search function on the NPMS website or you may contact the designated PHMSA representative listed in the contact information section at the beginning of this manual. If your operator ID does not appear on the drop-down list of the *NPMS Metadata/Attribute Builder*, please refer to Appendix A of this manual; if you need additional assistance, please contact National Repository Staff for

instructions on adding your Operator ID and Name. The initial attribute screen also allows the user to either edit an existing file or to start a new file.

3. If there is existing data for the operator you have selected and the submission is located in the current working directory, the default table for the chosen operator will appear in the "Browse" box. "Edit Existing Submission" will be the default choice. Data fields shown with a yellow background are required; while data fields shown with a white background are optional.   Decide if you want to edit an existing file or start a new file. NPMS data is stored in the same directory where the software was installed, usually C:\Program Files\NPMS_Builder.

    Note: If there is existing data for the operator you have selected and the submission is located in the current working directory, the default table for the chosen operator will appear in the "Browse" box, and "Edit Existing Submission" will be the default choice of action. If you are creating a new submission, select that option and a new table will be created for the operator submission you have chosen.

4. This screen is the starting point in creating metadata and attributes. From this screen, depending on what data you wish to generate or update, you should select METADATA (for metadata data entry), PIPELINE SYSTEM ATTRIBUTES (for attribute data entry for pipeline systems), or LNG PLANT ATTRIBUTES (attribute entry for LNG plants) and click the OK button. Depending on the option selected, the screen will advance to the appropriate screen. When you have completed the option you selected, you will be returned to this initial screen. At that point, you may select another option and click OK to be advanced to the screens relevant to that particular option, or you may click Exit to close the software.

If "PIPELINE SYSTEM ATTRIBUTES" was selected on the initial screen,

Figure 3-4. Pipeline attributes data entry screen.

1. Complete information for the pipeline system as a whole. The upper section contains information that needs to be completed only once for each pipeline system. This includes the system name, information about the commodities transported by the system, and the system's interstate/intrastate status. The application saves data automatically as it is entered.

2. Complete information for the associated pipeline segments. When all of the required information in the upper portion has been completed, go to the lower portion of the screen to add information about the individual pipeline segments that comprise the pipeline system. Remember, each pipeline system must have at least one pipeline segment. The lower portion allows the operator to record information about items that may change during the course of the pipeline system, such as PIPELINE_ID (PLINE_ID), SUBSYSTEM NAME (SUBSYS_NM), DIAMETER, LOW STRESS, STATUS (STATUS_CD), DATA QUALITY (QUALITY_CD), and REVISION (REVISION_CD). The application saves data automatically as it is entered. It is expected that when information does not change, values will be repeated for each pipeline segment. **However, OPER_LINK cannot be duplicated. Each pipeline segment must have a unique OPER_LINK**

value. To delete a pipeline segment, highlight the row by clicking on the far left side of the grid and press the delete key.

3. The "Add" button allows you to populate attributes for another pipeline system and its related segments. When you click the button, the form will be cleared of its existing values so that you may start anew for the added pipeline system. For each added pipeline system, you should populate the upper and lower portion of the screen. For ease of use, the upper left corner of the form will indicate which system number you are on and how many systems exist.

4. If, at any time, you wish to cancel your addition, click on the "Cancel" button. You will return to the previous pipeline system, and the addition will not be saved. This button is available only when you first add the system; when you move to a previously created system, you will no longer be able to cancel the system. In this scenario you should use the "Delete" button to remove the pipeline system and its associated segment attributes.

5. The "Previous" and "Next" buttons allow forward and backward movement among previously added pipeline systems. For ease of use, the upper left corner of the form will indicate which system number you are on and how many systems exist.

6. Upon completion, click on the "Save and Exit" button. A message will indicate that the file has been saved to a **.**MDB file in the current working directory (likely C:\Program Files\NPMS_Builder). This file will be readable by the *NPMS Metadata/Attribute Builder* software. If the file is ever moved, keep track of where the file has been moved to and be sure to navigate to the **.**MDB file using the "Browse" feature on the initial NPMS attribute screen. As part of the exit process, you have the option to be routed to the NPMS FTP Upload Web site page (via your local internet browser). From this page, you can upload your .MDB to the FTP server for submission to the NPMS.

Figure 3-5. Message indicating path and filename of saved file.

Figure 3-6. Message providing the option to be routed to the FTP Web site page.

If "LNG PLANT ATTRIBUTES" was selected on the initial screen,

Figure 3-7. LNG Plant attributes data entry.

1. Enter all required data for each LNG plant.

2. Use the "Add" button to add an LNG plant.

3. The "Previous" and "Next" navigation buttons allow forward and backward movement among existing LNG plants.

4. Use the "Cancel" button to cancel an LNG plant addition.

5. Use the "Delete" button to delete an existing LNG plant.

6. Upon completion, click on the "Save and Exit" button. A message will indicate that the file has been saved in the current working directory (likely C:\\Program Files\NPMS). This file is readable by the NPMS attribute software. If the file is ever moved, keep track of where the file has been moved to and be sure to navigate to the **.**MDB file using the "Browse" feature on the initial NPMS attribute screen. As part of the exit process, you have the option to be routed to the NPMS FTP Upload Web site page (via your local internet browser). From this page, you can upload your .MDB to the FTP server for submission to the NPMS.
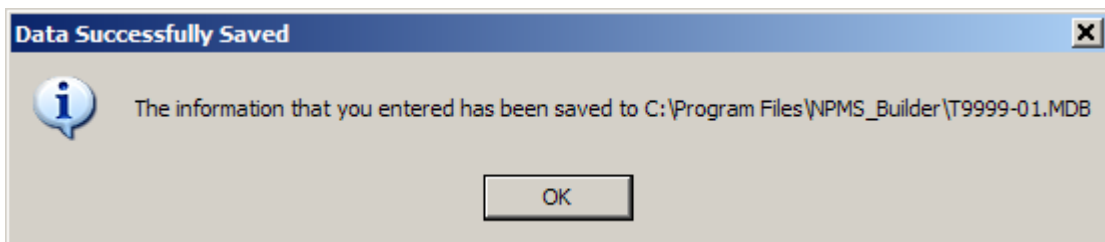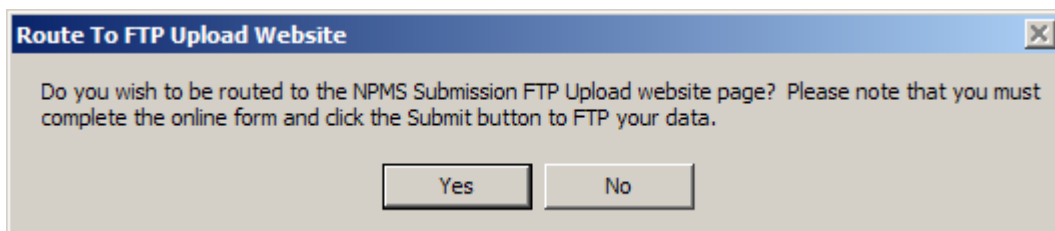
If "METADATA" was selected on the initial screen, refer to section 6 of this manual for additional information.

NPMS Metadata/Attribute Builder uses a Microsoft Access database named "metadata_attribute_template.mdb" as a template for your data population. The template file is included in the software Zip file and is automatically placed in the correct location during the installation process.

This template contains all of the data tables and domain-like tables that the *NPMS Metadata/Attribute Builder* software needs to function properly. Over time, the values in the domain-like tables may be updated to better reflect valid values, such as when the operator list is changed. When this occurs, the entire metadata_attribute_template.mdb will be updated; you should replace your existing template with the updated one. Please see Appendix A of this manual for a detailed description on how to update the template.

4. Geospatial Data

Geospatial data represent pipeline systems (linear) and LNG Plant (point) elements. Pipeline and LNG plant data must be submitted in digital format; please contact National Repository staff if you are unable to meet this standard. All submissions should meet the ±500-foot accuracy standard.

4.1 General Requirements for Digital Geospatial Data

The following discusses various requirements and formats that operators should meet when submitting digital geospatial data.

1. Use a real world coordinate system based on North American Datum (NAD) 1983 or NAD 1927. The Repository accepts unprojected data in decimal degrees and data that employ a common projection scheme such as Universal Transverse Mercator (UTM) or State Plane. Projected data may employ either English (feet) or metric (meters) measurement units. In all cases, clearly state the **datum, coordinate system/ projection, and measurement units** in the accompanying metadata.

    Note: Digital data that does not employ real world coordinates, such as CAD files that employ an origin point of 0,0 in the lower left hand corner of the drawing cannot be accepted by the Repository.

2. Provide spatially accurate data. NPMS strives for minimum accuracy of ±500 feet. Base maps or other source materials used to develop digital geospatial data submissions should have a scale between 1:24,000 (1" = 2,000') and 1:1,200 (1" = 100'). The spatial accuracy of the digital submission should be clearly stated in the accompanying metadata.

3. Always submit pipeline systems (lines) and LNG plants (points) in separate files.

4. Submit only qualifying pipeline and LNG plant data. The submitted digital file should contain only pipeline segments representing natural gas transmission lines, hazardous liquid trunklines, and points representing LNG plants. Separate all other data such as gathering lines, spur lines, valves, and base map data such as buildings, roads, property lines, political boundaries, scanned images, etc.

    Note: Curves should be represented by a pipeline segment with as many vertices/shape points as is required to provide the appropriate cartographic appearance. CAD system arcs should be avoided.

    Note: Do not resubmit abandoned pipelines to the NPMS, even when completing a full submission. Please contact NPMS staff if you are unsure of which lines are currently abandoned in the NPMS for your company. Your company's abandoned lines will not show up in your PIMMA account or when you use the Update Your Submission Online tool.

5. Ensure that the reproduction and submission of any map or data does not violate existing copyright laws.

6. Review data for quality. Common problems include:
    a. overshoots and undershoots at pipeline intersections,
    b. stray points and lines that do not represent a pipeline or LNG plants, often left from deleting non-NPMS data, and/or
    c. duplicate points and lines.

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7. Use commonly accepted digital media. The Repository accepts CD-ROMs and Internet transmissions. Check the NPMS Web site for details.

4.2 Digital Submission Techniques

The instructions below provide general assistance to operators using some of the more popular GIS and CAD software packages. Some currently available GIS formats are not discussed, but may be acceptable. Operators interested in submitting data in a format not provided for in these instructions should contact the Repository to determine its acceptability.

The instructions may not correspond to the exact version of the software package the operator is using, nor do they reflect any software customizations that may have been made. Operators who encounter problems are encouraged to contact their software vendor for technical support.

4.2.1   ESRI ArcInfo Format Data Submissions

Data from ESRI's ArcInfo may be submitted to the NPMS in **Export (.E00) format**. The following describes how coverages must be prepared before the data files are constructed to ensure that they are received and processed correctly.

Steps for preparing an Export (**.**E00) File follow.

1. Isolate the data to be submitted to the NPMS in a separate coverage.

2. Store the coverage as double precision. Use the Arc COPY command with the DOUBLE option to create double-precision coverages.

3. If not already done, use the PROJECTDEFINE command to define the coverage's projection information.

4. If the attribute data are stored in an external Lookup Table (LUT), the NPMS requests that the attribute data be attached to the coverage to lessen the opportunity for data corruption. To attach the LUT files, use the Arc JOINITEM command based on some common identifier.

5. If not already present, create arc topology using the BUILD command for lines.

6. Use the Arc EXPORT command to generate the **.**E00 file.

7. Submit the **.**E00 file to the NPMS.

4.2.2   ESRI ArcGIS Format Data Submissions

Operators may submit data to the NPMS using the shapefile format of ESRI's ArcGIS desktop software. The following describes how shapefiles must be prepared:

1. Isolate the data to be submitted to the NPMS into a single line (pipeline) or point (LNG Plant) layer.

2. Right-click on the layer in the Table of Contents and select the Data > Export Data command to export the data. This will create three files (**.**SHP, **.**SHX, **.**DBF). If using ESRI's ArcView 3.x desktop software, use the "Convert to Shapefile" command on the Theme menu to export the data.

3. Submit all three files, the **.**SHP (geospatial data file), the **.**SHX (index file), and the **.**DBF (attribute data file) for each layer to the NPMS. If the data is projected, include the .PRJ (projection data file) in the submission.

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4.2.3   Intergraph Corporation's FRAMME Data Submissions

Data from an Intergraph AM/FM/GIS system that uses the FRAMME database architecture can be provided to the NPMS in several different formats. However, the two that the Repository prefers are 1) **Microsoft Access** format and 2) **FRAMME Loader SEF** format (a structured ASCII file format). These two approaches are described below.

Microsoft Access Format. Intergraph offers a viewing/analysis product called GeoMedia that allows users to access and perform analysis operations on various GIS databases (including data stored in FRAMME, ArcInfo, ArcView, Oracle Spatial Data Cartridge/Spatial Data Option, MGE, and Microsoft Access). **It can also extract data from any of these databases** and store it in a local Microsoft Access database file format. The process to create this Access file follows:

1. Make a warehouse connection to the GIS database (FRAMME).

2. Create an empty Access database file warehouse using GeoMedia.

3. Define the coordinate system of the Access warehouse as Geographic (Lat/Long) and NAD 83 Datum. Many other coordinate system definitions are also supported.

4. Isolate the data to be submitted to the NPMS. A subset of the GIS data may be identified by means of attribute and/or spatial queries. This will create a named query set.

5. Import data from either the GIS database or from the named query set into the Access warehouse. On import, the data will be transformed from whatever native coordinate system it is stored in to the desired Geographic NAD83 format. The Access file will contain both feature attributes and graphic definitions.

FRAMME Loader SEF Format. FRAMME's normal method of bulk data import and export is a product module called FRAMME Loader. It supports both loading and unloading of ASCII text files. These text files must be in a structured format called Standard Exchange Format (SEF). The SEF file contains both feature attributes and graphic definitions. The basic process to create the SEF file follows.

1. From within FRAMME, isolate the data to be exported using the feature extraction process.

2. Unload the extracted data using FRAMME Loader capabilities.

4.2.4   Intergraph/Bentley Corporation's Microstation and non-FRAMME Data Submissions

Operators may submit geospatial data using Microstation/Intergraph systems. The following procedures have been developed to help operators submit this type of data.

Because it is difficult to attach attribute data to Microstation/Intergraph drawing files, the following tasks must be performed before providing data to the NPMS Repository:

1. Isolate the data to be submitted to the NPMS.

2. Annotate a unique item, OPER_LINK, for each pipeline or LNG plant as a text element in the drawing. The OPER_LINK value must be located adjacent to the pipeline or facility that it identifies.

3. Save the drawing as a **.**DGN file. Create an attribute data table using the *NPMS Attribute Data Template* software.

4. Enter the OPER_LINK identifier from the drawing and that pipeline's or facility's attribute data into the attribute table.

5. Submit both the **.**DGN and the attribute table to the NPMS. For the **.**DGN file, also submit a schema or template for the levels used.

6. Include in the associated metadata any special instructions, such as map units, scale, seed file, font types, etc. that are associated with the **.**DGN file to help the NPMS process the data.

4.2.5   MapInfo Data Submissions

Operators may submit data to the NPMS using the MapInfo Interchange File (MIF) format of MapInfo Corporation desktop software (Version 3 or higher). The **projection** must be noted: Category, Category Members, and Map Units (coordinate units, distance units, and area units).

1. Isolate the data to be submitted to the NPMS in a separate table.

2. Export the table (Table → export).

3. Submit the MIF, MID, and projection (ASCII format) files for each table to the NPMS.

4.2.6   AutoCAD Data Submissions

Operators may submit geospatial data using AutoCAD systems containing geospatial data. The following procedures have been developed to assist operators in submitting this type of data.

1. Isolate the data to be submitted to the NPMS.

2. Because it is difficult to attach attribute data to CAD drawing files, the following tasks must be performed. Annotate a unique item, OPER_LINK, for each pipeline or LNG plant using either the LAYER or MS-ID field in the AutoCAD drawing.

3. Save the drawing as a Version 12 AutoCAD **.**DWG file. Ensure that the drawings are saved in "model space" and not in "paper space." In other words, all drawings should be cross-referenced to the appropriate coordinate system before saving.

4. Create an attribute data table using the *NPMS Attribute Data Template* software. Add columns in the table for OPER_LINK and each of the attribute items required by the NPMS.

5. Enter the OPER_LINK identifier from the drawing and that pipeline's or facility's attribute data into the attribute table.

6. Submit both the **.**DWG and the attribute table to the NPMS. For the **.**DWG file, also submit a schema or template for the levels used.

7. Include in the associated metadata any special instructions, such as map units, scale, projection information, font types, etc. that are associated with the **.**DWG file to help the NPMS process the data.

By providing the AutoCAD and attribute data in these formats, the Repository will be able to use the OPER_LINK values to associate the pipeline and LNG plant features with their appropriate attributes.

4.2.7   Smallworld Data Submissions

Operators may submit geospatial data using Smallworld. The following procedures have been developed to assist operators in submitting this type of data. It is important to note that the data must conform to the datum, projection, scale, and control requirements outlined in these standards.

1. Isolate the data (real world objects) to be submitted to the NPMS.

2. Use the FME (Feature Manipulation Engine), an add-on package available from Smallworld or Safe Software Inc., to create an ArcInfo exchange (**.**E00) file.

3. Submit the **.**E00 file to the NPMS.

4.2.8 Generic (ASCII) Digital Data Submissions

This type of submission will include a geospatial file containing coordinate data, an attribute file containing information associated with the pipeline(s) or LNG plant(s), and a metadata file describing the data.

The file formats for pipelines and LNG plants are different. Both file formats are described below, including record layouts.

Geospatial File for Pipeline Digital Data Submissions. To submit digital data for pipelines, the operator will create files matching the following format. The file format will include the unique identifier (OPER_LINK) on one line, followed by a coordinate pair (longitude and latitude). Additional coordinate pairs will be listed in order of appearance along the line segment until all coordinate pairs are displayed. The final coordinate pair for the line segment is to be followed by the word "END." "END" designates the end of the coordinate information that comprises a line segment. Each line segment submitted must contain a minimum of two coordinate pairs to represent the beginning and end of a straight line. An additional "END" is required to designate the end of the file.

The unique identifier (OPER_LINK) will link the geospatial location to the attribute information for each pipeline submitted. Header information, as shown in Figure 4-1, should not be included in the submitted file.

DESCRIPTION	ASCII FILE FORMAT
(Do not include this section in your file)	
OPER_LINK	1 5 1
LONGITUDE, LATITUDE PAIR	- 9 4 . 5 7 6 4 1 5 , 3 2 . 9 1 1 6 5 8
LONGITUDE, LATITUDE PAIR	- 9 4 . 5 7 6 4 5 6 , 3 2 . 9 1 2 6 3 9
END OF LINE	END
OPER_LINK	1 5 2
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 6 4 1 5 , 3 3 . 0 0 1 6 5 8
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 6 7 9 7 , 3 3 . 0 0 0 6 8 1
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 7 1 0 8 , 3 3 . 0 0 0 2 8 4
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 7 8 0 1 , 3 2 . 9 9 9 9 1 6
END OF LINE	END
OPER_LINK	1 5 3
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 7 8 0 1 , 3 2 . 9 9 9 9 1 6
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 7 1 5 3 , 3 3 . 0 0 1 4 7 9
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 6 8 8 3 , 3 3 . 0 0 2 6 3 9
END OF LINE	END
	.
	.
	.
OPER_LINK	1 5 1 9
LONGITUDE, LATITUDE PAIR	- 9 3 . 5 4 1 2 1 3 , 3 3 . 6 7 4 0 6 8
LONGITUDE, LATITUDE PAIR	- 9 3 . 5 4 1 4 1 6 , 3 3 . 6 7 4 5 9 7
LONGITUDE, LATITUDE PAIR	- 9 3 . 5 4 2 3 8 6 , 3 3 . 6 7 5 4 1 9
LONGITUDE, LATITUDE PAIR	- 9 3 . 5 4 5 6 0 4 , 3 3 . 6 7 7 4 3 7
LONGITUDE, LATITUDE PAIR	- 9 3 . 5 4 6 6 0 9 , 3 3 . 6 7 7 7 8 2
END OF LINE	END
END OF FILE	END

Figure 4-1. Geospatial file containing pipeline information.

Longitude should be stated in decimal degrees (no projection), for every stored pipeline start, shape, and end point. A minimum of five decimal places is required. Western Hemisphere longitude should be a negative value. Acceptable values are -180.00000 to 0.00000. Northern Hemisphere latitude should be a positive value. Acceptable values are 0.00000 to 90.00000.

Geospatial File for LNG Plant Digital Data Submissions. To submit digital data for LNG Plants, the operator will create files matching the following format. The geospatial file for LNG Plants will contain the unique identifier (OPER_LINK) plus the longitude and latitude values on a single line. The unique identifier (OPER_LINK) will link the geospatial location to the attribute information for each LNG Plant submitted. The last line in the file must contain only the word "END." Header information, as shown in Figure 4-2, should not be included in the submitted file.

The location should reflect the approximate geographic center of the LNG Plant. If the location depicts something other than the approximate center, note this in Question 3 of the Data Transmittal Form.

OPER_LINK				LONGITUDE											LATITUDE											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27

```
201,    - 94. 115997,  33. 250000
202,    - 94. 383003,  33. 200001
203,    - 93. 865997,  32. 865999
204,    - 94. 050003,  32. 785937
205,    - 94. 599998,  33. 536294
END       *** Marks the end of the file.
```

Figure 4-2. Geospatial file containing LNG point information.

5.   Contact Information

Contact information is now required for all pipeline submittals. Each pipeline operator has the choice of picking either an individual (example: "Joe Smith") or an entity (example: "Public Relations Department") to be responsible for handling public questions about their pipelines. **Pick one or the other of these options; do not pick both.**

The pipeline operator also has the choice of specifying multiple contacts based on geography or operating units within the company. **Note: if an operator chooses to have more than one contact, he or she must contact the National Repository before submitting this information.**

Contact information is submitted through the NPMS Web site at <u>www.npms.phmsa.dot.gov</u>. When entering contact information, you will see the following screen.

Figure 5-1. Operator Contact Information Form.

Most of the information is self-explanatory. You will need to decide whether you are designating an individual or an entity. If you choose an individual, fill in the individual's first name, last name, and title. If you choose an entity, fill in the "Entity Name" field. When finished, click on the Submit button. If you do not fill in the appropriate fields for your choice, you will receive an error message telling you which field or fields you still need to complete. You will receive a copy of your response at the e-mail address you provided. If your Operator ID is not contained in the list of operators, contact the National Repository at npms-nr@mbakercorp.com.

If you need to edit your contact information in the future, contact the National Repository at npms-nr@mbakercorp.com.

Figure 5-2 shows attribute information for the Operator Contact Information Form.

Operator Contact Information

Field Name	Field Type[1]	Field Length	Short Description	Full Description	Acceptable Values (UPPERCASE)	Required Field[2]
OPID	I	5	Operator ID	PHMSA Operator ID.	Positive Integer	Y
FNAME	C	50	First Name	First name of designated contact person, if applicable.	Character	N*
LNAME	C	50	Last Name	Last name of designated contact person, if applicable.	Character	N*
TITLE	I	50	Title	Title of designated contact person, if applicable.	Character	N*
ENTITY	I	50	Position	Entity name, if applicable.	Character	N*
ADDRESS1	C	50	Address 1	Address, first line.	Character	Y
ADDRESS2	C	50	Address 2	Address, second line.	Character	N
CITY	C	50	City	City.	Character	Y
STATE	C	2	State	Two-letter abbreviation for state.	Character	Y
ZIP	I	5	ZIP Code	Five-digit ZIP code.	Integer	Y
PHONE	C	10	Telephone Number	Daytime telephone number of designated contact.	Character	Y
EXT	C	5	Telephone Extension	Telephone extension of designated contact.	Character	N
FAX	C	10	Fax Number	Fax number of designated contact.	Character	N
EMAIL	C	50	Email Address	Email address of designated contact.	Character	Y

NOTES: 1 I – Integer; C – Character.
 2 Y – Yes; N – No.
 * You must choose either A or B from the following: A) FNAME, LNAME, TITLE or B) ENTITY.

Figure 5-2. Attribute field definitions for the Operator Contact Information form.

6. Metadata

Submission of metadata created with the *NPMS Metadata/Attribute Builder* is an NPMS requirement. Metadata is textual information that describes geospatial data. It describes the content, quality, condition, and other characteristics of data. It provides additional background information such as descriptions and points of contact. Similar pieces of information must also be included in a cover/transmittal letter with your submission (See section 3.2 for cover/transmittal letter requirements).

Metadata must accompany all geospatial data submissions sent to the NPMS. The operator will include information regarding the source and the quality of the data submission. The metadata will assist the Repository and the end user of pipeline and LNG plant data. As a general rule, there should be one metadata file created for each pipeline system.

6.1 Background

Metadata was developed to help "insure an organization's investment in data. As personnel change or time passes, information may be lost and the data may lose their value."[1] Where metadata is not collected, future staff may not trust the data due to its unknown quality. Metadata also provides information necessary for data transfer. It allows the receiver to process, interpret, and incorporate the data properly with another data set.

Executive Order 12906 requires that each federal agency use the Federal Geographic Data Committee (FGDC) Metadata Standard, "Content Standards for Digital Geospatial Metadata," to document digital geospatial data that they produce. The FGDC is an interagency committee that promotes the coordinated use, sharing, and dissemination of geospatial data on a national basis. PHMSA must produce metadata compliant with the FGDC Metadata Standard**.**

The *FGDC Metadata Standard for Digital Geospatial Metadata* provides a standard format, specifies the requirements for data collection, and establishes a common set of terminology and definitions. The standard is somewhat complex and is composed of mandatory, mandatory if applicable, and optional sections. PHMSA is collecting only mandatory information or information that is critical to clear understanding of the operator submittal.

6.2 Using *NPMS Metadata/Attribute Builder*

To simplify the operator's metadata submission, PHMSA has developed *NPMS Metadata/Attribute Builder* software. The software is available at no cost and can be downloaded from the NPMS Web site. The *NPMS Metadata/Attribute Builder* has been customized for NPMS submissions. Do not use other metadata software. Use of the *NPMS Metadata/Attribute Builder* software to generate the metadata information is required.

Note: Metadata that was created with earlier versions of the NPMS Metadata Template software cannot be modified with the new NPMS Metadata/Attribute Builder software. In this scenario, the metadata must be recreated via the NPMS Metadata/Attribute Builder software. Once the metadata is created with the NPMS Metadata/Attribute Builder software, it may be modified with the NPMS Metadata/Attribute Builder software.

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[1] Content Standards for *Digital Geospatial Metadata Workbook*, Version 1.0, March 24, 1995.

6.3.1   System Requirements

The system requirements are a 486 processor (or higher) personal computer that uses Microsoft Windows 95, 98, 2000, or Windows NT. The system should have at least 8 megabytes of RAM and a CD-ROM drive.

6.3.2   Installation Instructions

From CD-ROM:

1.   Insert CD-ROM.

2.   From Windows Explorer, double click on Setup.exe.

3.   Follow the on-screen installation instructions.

From the Internet:

1.   Create a directory anywhere on your system's hard drive called "NPMS_Software."

2.   Download the file "NPMS_Builder_v4.zip" from the NPMS Web site and copy the file to the NPMS_Software folder created in step 1.

3.   From Windows Explorer right click on NPMS_Builder_v4.zip and choose to unzip the file to this location (WinZip is available for free download from our website if needed). A folder and a number of files will result from the unzipping.

4.   Double click on \NPMS_Software\Setup.exe.

5.   Follow the on-screen installation instructions. This wizard creates an NPMS_Builder directory at C:\\Program Files, as well as a link to the program under the Start menu.

6.3.3   Step-by-Step User Instructions

Use of *NPMS Metadata/Attribute Builder* is mandatory. To use the software, perform the following steps:

1.   From the Start/Programs menu, click on NPMS Metadata/Attribute Builder to start the program.
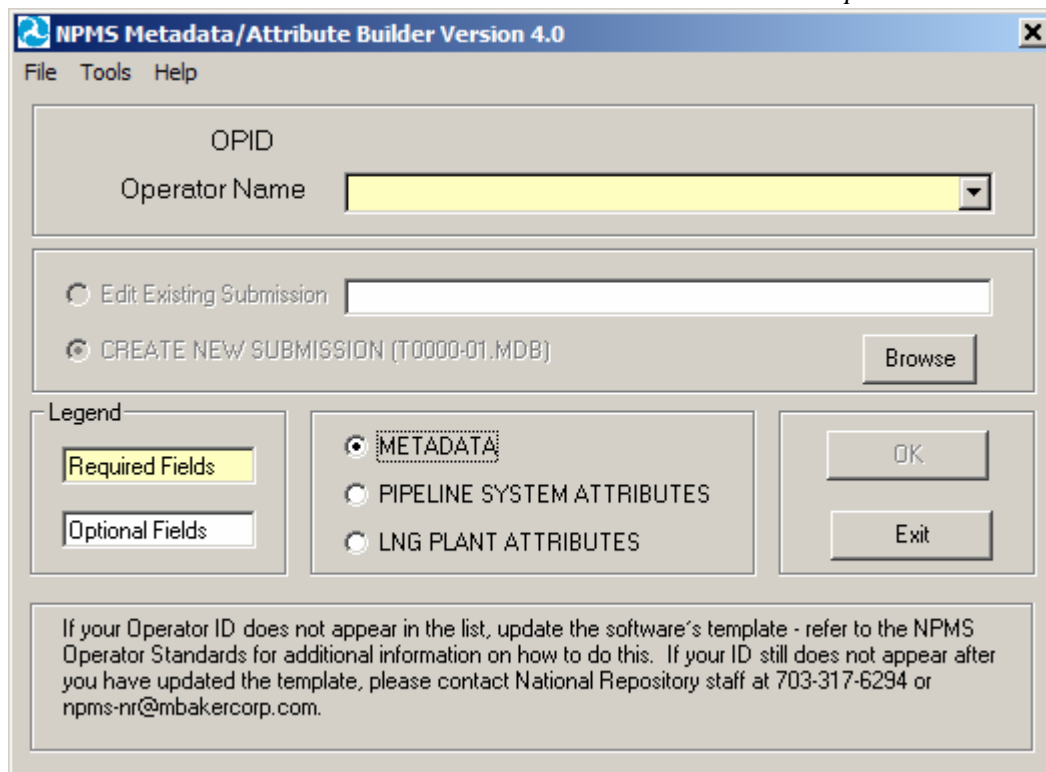
Figure 6-1. NPMS Metadata/Attribute Builder initial data entry screen.

2. The initial screen requires the user to select the correct OPID. A list of valid operator names and OPIDs is provided. If you do not know what your OPID is, see page 5 of this manual. If your operator ID does not appear on the drop-down list, please refer to Appendix A of this manual; if you need additional assistance, please contact National Repository Staff for instructions on adding your Operator ID and Name. The initial attribute screen also allows the user to either edit an existing file or to start a new file.

3. If there is existing data for the operator you have selected and the submission is located in the current working directory, the default table for the chosen operator will appear in the "Browse" box. "Edit Existing Submission" will be the default choice. Data fields shown with a yellow background are required; while data fields shown with a white background are optional. Decide if you want to edit an existing file or start a new file. NPMS data is stored in the same directory where the software was installed, usually C:\Program Files\NPMS_Builder.

Note: If there is existing data for the operator you have selected and the submission is located in the current working directory, the default table for the chosen operator will appear in the "Browse" box, and "Edit Existing Submission" will be the default choice of action. If you are creating a new submission, select that option and a new table will be created for the operator submission you have chosen.

4. This screen is the starting point in creating metadata and attributes. From this screen, depending on what data you wish to generate or update, you should select METADATA (for metadata data entry), PIPELINE SYSTEM ATTRIBUTES (for attribute data entry for pipeline systems), or LNG PLANT ATTRIBUTES (attribute entry for LNG plants) and click the OK button. Depending on the option selected, the screen will advance to the appropriate screen. When you have completed the option you selected, you will be returned to this initial screen. At that point, you may select

another option and click OK to be advanced to the screens relevant to that particular option, or you may click Exit to close the software.

If "METADATA" was selected on the initial screen,

1. In Step 1, complete the submission contact information. Submitting operators must provide name, mailing address, phone number, and, if available, e-mail address of the primary contact. The operator my also provide information for the technical contact. The primary contact must be an employee of the operating company. The technical contact may be a technical employee or an outside contractor. If repository technicians have questions about a submission, they will contact the technical representative first, then the primary representative. This information is not for the public; only Repository staff will use these contacts when questions arise during the processing phase. As you click in each cell to enter data, the cell's descriptive text will change from black to red to indicate that it is the active cell. The application saves data automatically as it is entered. Click the "Next" button to advance to the next step in the metadata entry process.

Figure 6-2. Metadata Entry Step 1 of 2 data entry screen.

2. In Step 2, complete the information for the submission's spatial extent and projection/reference system. All submittals must be in real world coordinates. Several lists are provided to assist operators in providing complete and accurate coordinate information. If you cannot find an exact match for your coordinate system, use the space provided by question 5 to include details. If the drop-down lists do not provide a suitable response, you can key in an alternate entry. Note that questions 4b and 4c may be required, depending on the projection you chose for your data. The application saves data automatically as it is entered.

Figure 6-3. Metadata Entry Step 2 of 2 data entry screen.

3. The "Previous" navigation button allows backward movement to Step 1.

4. Upon completion, click on the "Save and Exit" button on either the Step 1 screen or Step 2 screen. A message will indicate that the file has been saved in the current working directory (likely C:\Program Files\NPMS_Builder). This file will be readable by the *NPMS Metadata/Attribute Builder* software. If the file is ever moved, keep track of where the file has been moved to and be sure to navigate to the **.**MDB file using the "Browse" feature on the initial NPMS attribute screen. As part of the exit process, you have the option to be routed to the NPMS FTP Upload Web site page (via your local internet browser). From this page, you can upload your .MDB to the FTP server for submission to the NPMS.
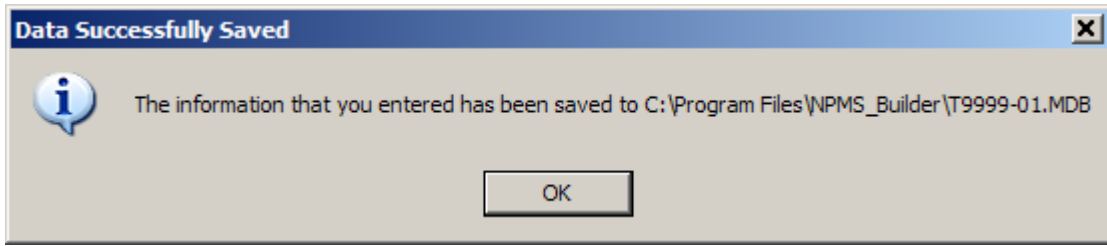
Figure 6-4. Message indicating path and filename of saved file.
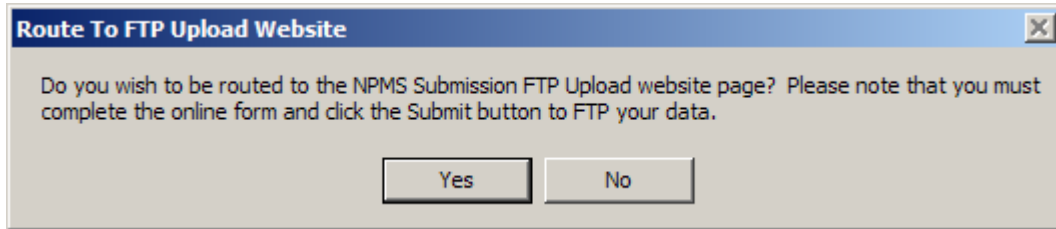
Figure 6-5. Message providing the option to be routed to the FTP Web site page.

If "PIPELINE SYSTEM ATTRIBUTES" or "LNG PLANT ATTRIBUTES" was selected on the initial screen, refer to section 3 of this manual for additional information.

NPMS Metadata/Attribute Builder uses a Microsoft Access database named "metadata_attribute_template.mdb" as a template for your data population. The template file is included in the software Zip file and is automatically placed in the correct location during the installation process. This template contains all of the data tables and domain-like tables that the *NPMS Metadata/Attribute Builder* software needs to function properly. Over time, the values in the domain-like tables may be updated to better reflect valid values, such as when the operator list is changed. When this occurs, the entire metadata_attribute_template.mdb will be updated; you should replace your existing template with the updated one. Please see Appendix A of this manual for a detailed description on how to update the template.

7. Voluntary Breakout Tank Submissions

PHMSA accepts **voluntary** data submissions to the NPMS for breakout tanks under PHMSA jurisdiction. PHMSA accepts breakout tank data in the following formats:

- ESRI shapefile (see section 7.2 for standards)
- Microsoft Excel spreadsheet (see section 7.3 for standards)
- Via online form
- Via downloadable executable file

Operators who maintain one breakout tank will submit the geographical location and attributes for the single tank. If an operator maintains multiple tanks at a given location (a tank farm), the submission will include a geographical location representing the approximate center of the tank farm and attributes for each breakout tank operated at the facility. Operators will be required to provide answers to all questions in order to complete their submission. Figure 7-1 shows the attribute table for breakout tank data.

7.1 Submitting via the NPMS website

Both the online form and the downloadable executable file are available on the NPMS Web site (www.npms.phmsa.dot.gov). If the operator chooses the executable file option, the completed file should be emailed to the National Repository at npms-nr@mbakercorp.com.

To submit online, you will need the following information:

- PHMSA Response Plan Number (FRP number)
- Tank location information, including
  - Projection (UTM, State Plane, or Geographic)
  - Latitude and Longitude
- Tank ID number
- Year of Original Construction
- Nominal Size (in bbls*1,000)
- Liquid Stored (e.g. crude, product)

You may use the online application or the NPMS Tank Data Creation Software to make additions to the database or delete previous submissions.

The Tank Attribute Table is shown in Figure 7-1. It is similar to the NPMS tables used in the collection of pipeline and LNG data.

All questions should be directed to the National Repository contacts.

7.2 Submitting via ESRI shapefile

In 2008, the National Repository began accepting breakout tank data in ESRI shapefile format. Operators wishing to submit data via shapefile should follow the procedure below.

- Create a shapefile named "BOT_OPSUB_<YYYYMMDD>", where <YYYYMMDD> is the date of the data submission (e.g., BOT_OPSUB_20080924.shp, BOT_OPSUB_20081130.shp).

♦ Add the attribute fields identified in the table in Figure 7-1.

♦ Ensure that the values you enter conform to the "Acceptable Values" column in Figure 7-1.

♦ Create one record (row) in the attribute table for each tank.

♦ Create one point per breakout tank and ensure that the FACILNAME field contains *exactly* the same name for each tank in a given tank farm.

♦ Ensure that the mandatory fields identified in the "Required Field" column in Figure 7-1 are populated with data.

♦ Longitude should be in the following format: decimal degrees with five decimal places, and a negative sign (for example, -77.04327).

♦ Latitude should be in the following format: decimal degrees with five decimal places (for example, 38.89664).

Zip up the shapefile and email it to npms-nr@mbakercorp.com. The shapefile submission should include the following files: .shp, .shx, .dbf, and .prj (if the spatial data is projected).

7.3 Submitting via Microsoft Excel

To make a submission using Microsoft Excel, follow the steps below.

♦ Create an .xls file named "BOT_OPSUB_<YYYYMMDD>", where <YYYYMMDD> is the date of the data submission (e.g., BOT_OPSUB_20080924.xls, BOT_OPSUB_20081130.xls).

♦ In the spreadsheet each row represents one tank. Each column should contain one of the Field Names from Figure 7-1.

♦ Ensure that the values you enter conform to the "Acceptable Values" column in Figure 7-1.

♦ Ensure that the mandatory fields identified in the "Required Field" column in Figure 7-1 are populated with data.

♦ Ensure that the FACILNAME column contains exactly the same name for each tank in a given tank farm.

♦ Longitude should be in the following format: decimal degrees with five decimal places, and a negative sign (for example, -77.04327).

♦ Latitude should be in the following format: decimal degrees with five decimal places (for example, 38.89664).

♦ Email the complete .xls file to npms-nr@mbakercorp.com.

Breakout Tank Attribute Table

Field Name	Field Type[1]	Field Length	Short Description	Full Description	Acceptable Values (UPPERCASE)	Required Field[2]
COMPANY	C	60	Company Name	Name of the company that physically operates the tank or tank farm.	Character	Y
FIRSTNAME	C	50	Contact First Name	First name of the person to contact for information regarding the tank or tank farm.	Character	Y
MIDDLENAME	C	50	Contact Middle Name	Middle name or initial of the person to contact for information regarding the tank or tank farm, if applicable.	Character	N
LASTNAME	C	50	Contact Last Name	Last name of the person to contact for information regarding the tank or tank farm.	Character	Y
TITLE	C	30	Contact Title	Contact person's title.	Character	Y
PHONE	C	10	Phone Number	Primary telephone number for the contact person including area code. Please do not include dashes or parentheses.	Character	Y
FAX	C	10	Facsimile Number	Primary fax number for the contact person including area code. Please do not include dashes or parentheses.	Character	Y
EMAIL	C	100	Email Address	Contact person's email address.	Character	Y
STREET	C	100	Street Address	Street address of the contact person.	Character	Y
CITY	C	20	City Name	Name of the city or town.	Character	Y
STATE	C	25	State Name	Standard two-letter postal abbreviation for the state.	Character	Y
ZIP	C	10	ZIP Code	Postal ZIP code (+4 if available).	Character	Y
FRP	I	4	PHMSA Facility Response Plan Number	Tracking number assigned by PHMSA corresponding to the facility response plan (FRP) for the tank/tank farm. The FRP number is usually maintained by the operator's Environmental Health and Safety contact or an operations manager.	Positive Integer	Y
SUBMITDATE	DT	8	Date of Data Submission	Four-number year, two-number month, and two-number day of data submission (i.e. YYYYMMDD).	8-Digit Date	Y
FACILNAME	C	50	Facility Name	Assigned by the operator. The operator's name for a functional grouping of tanks (e.g. tank farm, tank hotel, etc.).	Character	Y
FCITY	C	30	Facility City Name	Name of the city in which the tank/tank farm resides.	Character	Y
FSTATE	C	25	Facility State Name	Standard two-letter postal abbreviation for the name of the state in which the tank/tank farm resides.	Character	Y
OWNER	C	60	Facility Owner	Name of the owner of the tank/tank farm.	Character	Y
TANKIDNO	C	15	Tank ID	Assigned by the operator. This is an identifier for a specific tank within a functional grouping of tanks.	Character	Y

Field Name	Field Type[1]	Field Length	Short Description	Full Description	Acceptable Values (UPPERCASE)	Required Field[2]
CNSTRYR	I	4	Construction Year	Four-digit year of facility construction (e.g. "1990").	Positive Integer	Y
TANKSIZE	I	3	Size of Tank	Nominal size of the tank (bbls x 1000).	Positive Integer	Y
STOREDLIQ	C	50	Primary Commodity Code	Abbreviation for the primary commodity stored in the tank. LNG= liquefied natural gas, CRD= crude oil, G= gasoline, K= kerosene, JF= jet fuel, DF= diesel fuel, HO= heating oil, AA= anhydrous ammonia, CO2= carbon dioxide, HVL= highly volatile liquid, OTH= other.	LNG, CRD, G, K, JF, DF, HO, AA, CO2, HVL, OTH	Y
COMMODITY2	C	50	Secondary Commodity Code	Abbreviation for the secondary commodity stored in the tank. LNG= liquefied natural gas, CRD= crude oil, G= gasoline, K= kerosene, JF= jet fuel, DF= diesel fuel, HO= heating oil, AA= anhydrous ammonia, CO2= carbon dioxide, HVL= highly volatile liquid, OTH= other. If the tank does not store a secondary commodity, enter NONE.	LNG, CRD, G, K, JF, DF, HO, AA, CO2, HVL, OTH, NONE	Y
COMMODITY3	C	50	Tertiary Commodity Code	Abbreviation for the tertiary commodity stored in the tank. LNG= liquefied natural gas, CRD= crude oil, G= gasoline, K= kerosene, JF= jet fuel, DF= diesel fuel, HO= heating oil, AA= anhydrous ammonia, CO2= carbon dioxide, HVL= highly volatile liquid, OTH= other. If the tank does not store a tertiary commodity, enter NONE.	LNG, CRD, G, K, JF, DF, HO, AA, CO2, HVL, OTH, NONE	Y
LONGITUDE	D	19, 5	Longitudinal Coordinate	The longitudinal coordinate in decimal degree format; include the "-" (e.g. -###.#####).	Negative Number with 5 Decimal Places	Y
LATITUDE	D	19, 5	Latitudinal Coordinate	The latitudinal coordinate in decimal degree format (e.g. ###.#####).	Positive Number with 5 Decimal Places	Y
DATUM	C	50	Datum	The datum of the data.	Most popular values include NAD27, NAD83, WGS84	Y
PROJECTION	C	60	Projection	The projection of the data.	GEOGRAPHIC, STATE PLANE, UTM	Y
UTMZONE	C	10	UTM Zone	If the data is UTM projection, the UTM zone of the data. If the data is not in UTM, this field is left blank.	2 - 20	A
STPLNCAT	C	50	State Plane Category	If the data is State Plane projection, the State Plane zone of the data. If the data is not in State Plane, this field is left blank	Refer to Figure 7-2 for valid values.	A
MAPUNIT	C	20	Map Unit	Map unit of the data.	METERS, FEET, DECIMAL DEGREES	Y

Field Name	Field Type[1]	Field Length	Short Description	Full Description	Acceptable Values (UPPERCASE)	Required Field[2]
SUB_TYPE	C	1	Submission Type	Identifies this tank/tank farm as an A= addition to the NPMS, M= modification to the existing NPMS, or D= deletion of a previous submission.	A, M, D	Y
NOTES: 1 I – Integer; C – Character; DT – Date; D – Double. 2 Y – Yes; N – No; A – If Applicable.						

Figure 7-1. Attribute field definitions for breakout tank features.

Acceptable Values for State Plane Category (STPLNCAT)			
ALABAMA,EAST	GUAM_ISLAND	MINNESOTA,SOUTH	PENNSYLVANIA,NORTH
ALABAMA,WEST	HAWAIIAN_ISLANDS,ZONE_1	MISSISSIPPI,EAST	PENNSYLVANIA,SOUTH
ALASKA,ZONE_1	HAWAIIAN_ISLANDS,ZONE_2	MISSISSIPPI,WEST	PUERTO_RICO_&_ST._CROIX
ALASKA,ZONE_2	HAWAIIAN_ISLANDS,ZONE_3	MISSOURI,CENTRAL	PUERTO_RICO_ZONE
ALASKA,ZONE_3	HAWAIIAN_ISLANDS,ZONE_4	MISSOURI,EAST	RHODE_ISLAND
ALASKA,ZONE_4	HAWAIIAN_ISLANDS,ZONE_5	MISSOURI,WEST	SOUTH_CAROLINA
ALASKA,ZONE_5	IDAHO,CENTRAL	MONTANA	SOUTH_CAROLINA,NORTH
ALASKA,ZONE_6	IDAHO,EAST	MONTANA,CENTRAL	SOUTH_CAROLINA,SOUTH
ALASKA,ZONE_7	IDADO,WEST	MONTANA,NORTH	SOUTH_DAKOTA,NORTH
ALASKA,ZONE_8	ILLINOIS,EAST	MONTANA,SOUTH	SOUTH_DAKOTA,SOUTH
ALASKA,ZONE_9	ILLINOIS,WEST	NEBRASKA	ST._CROIX_ZONE
ALASKA,ZONE_10	INDIANA,EAST	NEBRASKA,CENTRAL	TENNESSEE
AMERICAN SAMOA	INDIANA,WEST	NEBRASKA,NORTH	TEXAS,CENTRAL
ARIZONA,CENTRAL	IOWA,NORTH	NEBRASKA,SOUTH	TEXAS,NORTH
ARIZONA,EAST	IOWA,SOUTH	NEVADA,CENTRAL	TEXAS,NORTH_CENTRAL
ARIZONA,WEST	KANSAS,NORTH	NEVADA,EAST	TEXAS,SOUTH
ARKANSAS,NORTH	KANSAS,SOUTH	NEVADA,WEST	TEXAS,SOUTH_CENTRAL
ARKANSAS,SOUTH	KENTUCKY,NORTH	NEW_HAMPSHIRE	UTAH,CENTRAL
CALIFORNIA_ZONE1	KENTUCKY,SOUTH	NEW_JERSEY	UTAH,NORTH
CALIFORNIA_ZONE2	LOUISIANA,NORTH	NEW_MEXICO,CENTRAL	UTAH,SOUTH
CALIFORNIA_ZONE3	LOUISIANA,OFF_SHORE	NEW_MEXICO,EAST	VERMONT
CALIFORNIA_ZONE4	LOUISIANA,SOUTH	NEW_MEXICO,WEST	VIRGINIA,NORTH
CALIFORNIA_ZONE5	MAINE,EAST	NEW_YORK,CENTRAL	VIRGINIA,SOUTH
CALIFORNIA_ZONE6	MAINE,WEST	NEW_YORK,EAST	WASHINGTON,NORTH
CALIFORNIA_ZONE7	MARYLAND	NEW_YORK,LONG_ISLAND	WASHINGTON,SOUTH
COLORADO,CENTRAL	MASSACHUSETTS,ISLAND	NEW_YORK,WEST	WESTVIRGINIA,NORTH
COLORADO,NORTH	MASSACHUSETTS,MAINLAND	NORTH_CAROLINA	WESTVIRIGINA,SOUTH
COLORADO,SOUTH	MICHIGAN,CENTRAL_(NEW)	NORTH_DAKOTA,NORTH	WISCONSIN,CENTRAL
CONNECTICUT	MICHIGAN,CENTRAL_(OLD)	NORTH_DAKOTA,SOUTH	WISCONSIN,NORTH
DELAWARE	MICHIGAN,EAST_(OLD)	OHIO,NORTH	WINCONSIN,SOUTH
FLORIDA,EAST	MICHIGAN,NORTH_(NEW)	OHIO,SOUTH	WYOMING,ZONE_I,EAST
FLORIDA,NORTH	MICHIGAN,SOUTH_(NEW)	OKLAHOMA,NORTH	WYOMING,ZONE_II,EAST_CENTRAL
FLORIDA,WEST	MICHIGAN,WEST_(OLD)	OKLAHOMA,SOUTH	WYOMING,ZONE_III,WEST_CENTRAL
GEORGIA,EAST	MINNESOTA,CENTRAL	OREGON,NORTH	WYOMING,ZONE_IV,WEST
GEORGIA,WEST	MINNESOTA,NORTH	OREGON,SOUTH	

Figure 7-2. Acceptable values for State Plane Category attribute field.

8. Submitting the Data

Operators should use the following checklist to verify that the data being submitted to the NPMS Repository meets the standards and that all necessary information has been included.

8.1 Operator Submission Checklist

8.1.1 Attribute Data Submissions

- ✓ Have all required fields in each feature attribute record been completed?
- ✓ Does each attribute record have a unique link to its line or point element in a geospatial file?
- ✓ Has the attribute data been created and formatted according to the NPMS standard?
- ✓ Does each geospatial element have an attribute record?

8.1.2 Geospatial Data Submissions

- ✓ Are the linear features continuous without gaps or overshoots?
- ✓ Does each feature have a complete attribute record as defined in the NPMS standard?
- ✓ Has the attribute record been uniquely linked to the point or line feature?
- ✓ Has the submission file been exported and formatted according to the NPMS standard?
- ✓ If the attribute data is in a separate file, has this file been exported according to the NPMS standard?
- ✓ Have the data files being submitted on media been approved by the NPMS?
- ✓ Are the submitted data file names descriptive and unique, following NPMS guidelines?
- ✓ Are all of the geospatial files included in this submission?

8.1.3 Operator Contact Information Submissions

- ✓ Have you chosen either an individual or a general contact name as your contact, but not both?
- ✓ Have you filled in all required sections?

8.1.4 Metadata Submissions

- ✓ Use the *NPMS Metadata/Attribute Builder* software.
- ✓ Is the contact information current?
- ✓ Are the required sections of the metadata completed?

8.2 Packaging and Sending Data

To send your data to the National Repository, perform the following steps:

1. Prepare the required cover letter or transmittal form with the information requested in Section 2.3.

2. Copy all digital file (s) including geospatial data, attribute data, and metadata to an NPMS-approved medium such as diskettes, CD-ROMs, or your submission can be FTPed at the NPMS website: http://199.107.71.25/npms/index.php.

3. Mail submission to the NPMS National Repository.

Appendix A: Updating the *NPMS Metadata/Attribute Builder* Template

When the template, metadata_attribute_template.mdb for the *NPMS Metadata/Attribute Builder* software is periodically updated, operators should replace the existing file with the updated one to take advantage of the most current set of domain values, including an updated operator list. When the template is updated, the file will be posted on the NPMS Web site (in the Software section).

To install the updated template on your local computer perform the following steps:

1. From the Software section of the NPMS Web site, opt to download the template for the *NPMS Metadata/Attribute Builder* software.

2. Save the downloaded Microsoft Access .MDB file to a temporary location on your computer.

3. Verify that the *NPMS Metadata/Attribute Builder* software is not currently open on your computer. If it is, close it before continuing.

4. Locate where the *NPMS Metadata/Attribute Builder* software is installed on your computer (generally this will be C:\\Program Files\NPMS_Builder).

5. Copy and paste the downloaded .MDB into the folder where the software is installed. When prompted, select to overwrite the existing file.

6. The updated template is now installed. When you now use *NPMS Metadata/Attribute Builder* you will see the template additions/changes in the software.

If you need additional assistance with installing the updated template or are experiencing problems, contact the National Repository at 703-317-6289 or npms-nr@mbakercorp.com.

Appendix B: Glossary

A

Abandoned pipeline .... A pipeline that has been permanently removed from service. The pipeline can be abandoned in place or by removal.

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 earth's surface. 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.

Alignment sheet .... A general-purpose drawing designed to be used by company personnel during the operation and maintenance of the pipeline.

Alphanumeric .... Consists of a possible combination of letters, numbers, and 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 .... A characteristic that helps to describe the data.

B

Base map .... A map containing visible surface features and boundaries that is used for local reference.

Breakout tank…………… A tank used to a) relieve surges in a hazardous liquid pipeline system or b) receive and store hazardous liquid transported by a pipeline for reinjection and continued transportation.

C

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 horizontal position used in digitizing paper maps.

Conversion .... The process of transforming information from one form to another, e.g., analog (paper) data into digital data.

Coordinates .... Pairs of numbers expressing a known horizontal location on the earth's surface.

Crude oil .... Liquid petroleum out of the ground, as distinguished from refined oils manufactured from crude oil.

D–E

Database .... Structured collection of data defined for a particular use, user, system, or program; may be sequential, network, hierarchical, relational, or semantic.

Data capture .... The 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) .... The level surface to which elevations are referenced, such as mean sea level. A datum serves as a frame of reference for measuring a location on the surface of the earth.

Digital .... The discrete numerical representation of data.

Digital centerline .... A 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 has been corrected.

Digitize .... The process of converting hard-copy manual drawings into digital format.

DLG .... Digital Line Graphs. Digitized data from USGS base map categories, including transportation, hydrology, elevation contours, and public land survey boundaries.

DXF .... Drawing eXchange Format. A graphic file and data interchange standard.

F

Facilities .... Components of the pipeline system, such as the pipe, valves, and compressor stations.

FGDC .... Federal Geographic Data Committee. Established through OMB and charged with coordinating the development, use, sharing, and dissemination of geographic data.

G

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, and 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., which can be displayed.

H

Hardware .... The physical components of a computer system or network such as the computer, printer, plotter, and terminal.

Hazardous liquid .... Petroleum, petroleum products, or anhydrous ammonia.

Hazardous liquid
trunkline .... A hazardous liquid transmission pipeline other than a flow line, gathering line, or in-plant pipeline.

Highly volatile liquid
(HVL) .... A hazardous liquid that will form a vapor cloud when released to the atmosphere and has a vapor pressure exceeding 276 kPa (40 psia) at 37.8° C (100° F). Note: natural gas liquids are also HVLs.

I–K

In-service pipeline .... A pipeline that currently transports natural gas or hazardous liquid.

Inactive/idle pipeline .... A pipeline that is maintained to a degree that it may, in the future, be potentially brought back into service.

Interstate pipeline .... 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 across state boundaries.

L

Latitude .... Distance measured north or south of the equator.

Liquefied Natural Gas
(LNG) .... Natural gas or synthetic gas having methane as its major constituent that has been changed to a liquid or semi solid.

Liquefied Petroleum
Gas (LPG) .... Butane and propane separated from natural gasoline and sold in liquid form as fuel. Also known as bottled gas and tank gas.

LNG Plant .... A component of a facility that is used for 1) liquefying or solidifying natural gas, or 2) transferring, storing, or vaporizing liquefied natural gas.

Longitude .... Distance measured east or west from the Prime Meridian in Greenwich, England.

Low stress pipeline .... Pipelines operating at 20% or less of SMYS.

M

Media .... The physical devices used to record, store, or transmit data, i.e. CD-ROM, diskette, cartridge, tape.

Metadata .... Descriptive information about data, such as the timeliness of the data, attribute sources, and accuracy of the data.

MQAT .... Joint Government-Industry Pipeline Mapping Quality Action Team. Sponsored by PHMSA, API, and AGA/INGAA.

N

NAD 27, 83 .... North American Datum (of 1927 or 1983). Two mathematical representations of the earth's surface.

Natural gas liquid .... Also referred to as NGL. Can be ethane, butane, propane, or a propane-butane mix.

Natural gas
transmission line .... A pipeline system, other than a gathering line, that 1) Transports gas from a gathering line or storage facility to a distribution center, storage facility, or large-volume customer that is not downstream from a distribution center. A large-volume customer may receive similar volumes of gas as a distribution center, and includes factories, power plants, and institutional users of gas, 2) Operates at a hoop stress of 20 percent or more of specified minimum yield strength (SMYS), or 3) Transports gas within a storage field.

Nominal diameter .... A dimensionless designator of pipe that indicates the standard pipe size.

O

Offshore pipeline .... A major natural gas transmission line or hazardous liquid trunkline on the outer continental shelf that begins where production ends and transportation begins. For example, in state waters, a pipeline begins downstream of the outlet flange of each facility where either hydrocarbons are produced or

where produced hydrocarbons are first separated, dehydrated, or otherwise processed – whichever facility is farther downstream.

One-Call .... Service to notify underground utilities of planned excavations.

Operator .... A person or firm who operates a pipeline system and engages in the transportation of gas or hazardous liquid. The operator may or may not also be the owner of the pipeline system.

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.

P

Petroleum .... Crude oil, condensate, natural gasoline, natural gas liquids, and liquefied petroleum gas.

Petroleum product............ Flammable, toxic, or corrosive products obtained from distilling and processing crude oil, unfinished oils, natural gas liquids, blend stocks, and other miscellaneous hydrocarbon compounds.

Pipeline corridor .... A linear area where two or more pipelines (either part of the same or different pipeline systems) are closely grouped in a single right-of-way. Pipeline corridors pose a cartographic challenge. In digital files, multiple lines are required, and operators should separate them into individual layers or files.

Pipeline crossing .... A point where two or more pipelines cross, but where there is no physical connection between the pipelines. Pipeline segments should not be broken at pipeline crossings.

Pipeline intersection .... A point where a physical connection between two pipelines occurs. A commodity from one pipeline can flow into another pipeline(s), either a branch within a pipeline system or a connection between two pipeline systems.

Pipeline segment .... A linear feature representing part or all of a pipeline system on a map. A pipeline segment must have only two ends. No branches are allowed. A pipeline segment may be a straight line or may have any number of vertices. Each pipeline segment must be uniquely identified. The number of pipeline segments should be kept to the minimum needed to represent a pipeline system and its associated attributes. A unique line segment in the computer-aided drafting (CAD) or GIS data set should represent each pipeline segment.

Pipeline system .... All parts of a major natural gas transmission line or hazardous liquid trunkline though which gas or hazardous liquid is transported. By definition, only one firm can operate a pipeline system. Operators should assign unique names to each of their pipeline systems. A pipeline system may have an

unlimited number of branches. Each pipeline system must be represented by one or more pipeline segments.

Q

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.

R

Repository .... The entity designated to maintain, store, and warehouse NPMS data.

Retired pipeline .... A pipeline that is still connected to the system but has been taken out of service and is no longer maintained. The pipeline has not yet been permanently abandoned.

ROW .... Right-of-Way. A section of land designated for use by one or more pipelines. The NPMS refers to ROWs as pipeline corridors.

S

Scale (large) .... Small map area showing greater detail, e.g., 1:2,400 = 1" to 200'.

Scale (small) .... Large map area with less detail, e.g., 1:100,000 = 1" to 8333'.

Spatial data .... Data about the location of objects and their relationship with one another.

T–Z

Thematic .... The depiction of particular features or concepts.

Topographic maps .... Map showing horizontal and vertical contours, or lines of equal surface elevation.

Topography .... Shape of configuration of the land surface. Represented by contour lines in map form.

Topology .... Description of the geographic relationship of features, especially features that are adjacent to or connected to another feature.

Vector .... Data composed of individual coordinate points and lines whose endpoints are defined by coordinate pairs.