

ASME B31Q-2016
(Revision of ASME B31Q-2014)

Pipeline Personnel Qualification

ASME Code for Pressure Piping, B31

AN AMERICAN NATIONAL STANDARD



**The American Society of
Mechanical Engineers**

ASME B31Q-2016
(Revision of ASME B31Q-2014)

Pipeline Personnel Qualification

ASME Code for Pressure Piping, B31

ASMENORMDOC.COM : Click to view the full PDF of ASME B31Q 2016

AN AMERICAN NATIONAL STANDARD



**The American Society of
Mechanical Engineers**

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: August 30, 2016

The next edition of this Standard is scheduled for publication in 2018. This Standard will become effective 6 months after the Date of Issuance.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published under <http://go.asme.org/Interpretations>. Periodically certain actions of the ASME B31 Committees may be published as Cases. Cases are published on the ASME Web site under the Committee Pages at <http://go.asme.org/B31committee> as they are issued.

Errata to codes and standards may be posted on the ASME Web site under the Committee Pages to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in codes and standards. Such errata shall be used on the date posted.

The B31 Committee Pages can be found at <http://go.asme.org/B31committee>. The associated B31 Committee Pages for each code and standard can be accessed from this main page. There is an option available to automatically receive an e-mail notification when errata are posted to a particular code or standard. This option can be found on the appropriate Committee Page after selecting "Errata" in the "Publication Information" section.

ASME is the registered trademark of The American Society of Mechanical Engineers.

This code or standard was developed under procedures accredited as meeting the criteria for American National Standards. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not "approve," "rate," or "endorse" any item, construction, proprietary device, or activity.

ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor assumes any such liability. Users of a code or standard are expressly advised that determination of the validity of such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representatives(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

No part of this document may be reproduced in any form,
in an electronic retrieval system or otherwise,
without the prior written permission of the publisher.

The American Society of Mechanical Engineers
Two Park Avenue, New York, NY 10016-5990

Copyright © 2016 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All rights reserved
Printed in U.S.A.

CONTENTS

Foreword	iv
Committee Roster	vi
1 Introduction	1
2 Definitions.....	1
3 References	2
4 Qualification Program.....	2
5 Determining Covered Tasks	4
6 Abnormal Operating Conditions (AOCs)	8
7 Training.....	8
8 Evaluation	9
9 Qualifications.....	11
10 Portability	14
11 Program Effectiveness	15
12 Communicating the Qualification Program and Managing Program Changes	16
13 Documentation Requirements	17
14 Bibliography	19
 Figure	
5.4-1 Fault Tree Example	6
 Nonmandatory Appendices	
A Integrated Task List	21
B Summary of Integrated Task List	88
C Task List Development Process	101
D Example of Evaluation Criteria	102
E Abnormal Operating Conditions (AOCs).....	103
F Evaluation Method Selection	104
G DIF Analysis for Subsequent Qualification Intervals.....	107
H Implementation of ASME B31Q	113
I Program Implementation and Effectiveness Appraisals	132

FOREWORD

Using pipelines for the transmission and distribution of gas and hazardous liquids is one of the safest forms of transportation. However, investigations of pipeline accidents from 1975 through 1986 revealed that human error was a contributing factor to some failures. The failures prompted the United States National Transportation Safety Board (NTSB) to make explicit recommendations for the training, testing, and qualification of pipeline employees in 1987. The qualification of pipeline personnel is an important measure against failures caused by human error.

The development of this Standard originated from the need for the pipeline industry to take a rational and technical approach to operator qualification (OQ) and from regulatory actions in the United States from 1987 through 2003. In 1987, the United States Department of Transportation (DOT) issued a notice inviting public comment on the need for additional regulations or a certification program for the qualification of personnel who design, construct, operate, and maintain gas or hazardous liquid pipelines. Shortly thereafter, work began in the United States Congress to amend the Pipeline Safety Laws to include OQ requirements. The Pipeline Safety Act of 1992 included language requiring that personnel responsible for the operation and maintenance of pipelines be tested for qualifications and certified to operate and maintain those pipelines.

In response to this congressional action, DOT published a Notice of Proposed Rulemaking (NPRM) in 1994 to establish specific training requirements for the qualification of pipeline workers. This training rule met with varying responses, including a petition for withdrawal of the NPRM from pipeline industry representatives. In the meantime, Congress amended the 1992 law with the Pipeline Safety Improvement Act of 1996 requiring simply that individuals who operate or maintain pipelines be qualified. In addition, this Act required that the qualifications address the ability to recognize and react appropriately to abnormal operating conditions (AOCs) that may indicate a potentially dangerous situation or a condition exceeding design limits. In 1996, DOT withdrew the 1994 proposed rulemaking and simultaneously issued a notice to form a negotiated rulemaking committee (RegNeg Committee) to develop a final rule on the qualification of pipeline personnel.

The negotiated rulemaking process was intended to provide an opportunity for affected parties to present their views and reach a consensus on a proposed qualification rule. The RegNeg Committee members came from various organizations representing broad interests, including industry, government, labor, and the public. The committee met several times from 1997 through 1999, when consensus on the final rule was reached.

The Final Rule on the Qualification of Pipeline Personnel was issued by DOT on August 27, 1999. This final rule delineated the essential elements of a qualification program and limited the scope of the rule with a four-part test for covered tasks. It also set time frames for the development of the operators' qualification programs and the completion of initial qualification of pipeline personnel in 2002.

The Final Rule was not prescriptive, and the resulting flexibility built into the performance-based rule made it difficult to measure operators' compliance with the rule. This led to the development of "protocols" to assist regulators in the evaluation of qualification programs. Protocols were finalized after a series of public meetings in 2003; however, differences still existed between the pipeline industry and DOT regarding the implementation, inspection, and subsequent enforcement of the OQ rule. Both groups committed to the development of a national consensus code on personnel qualification, where the outstanding issues could be resolved.

The pipeline industry approached ASME to sponsor the development of a consensus code on pipeline personnel qualification. The ASME Standard for Pressure Piping, B31 Committee formed the B31Q Project Team on Qualification of Pipeline Operators. This project team met for the first time in August 2003 and began the task of crafting a consensus code for the qualification of pipeline personnel to resolve the outstanding issues and maintain as much of the current regulatory requirements as possible.

The B31Q Project Team included representatives from federal and state regulatory agencies, contractors, industry associations, labor, and three industry sectors: hazardous liquid, gas transmission, and local distribution companies. The project team met regularly over a period of 20 months to reach consensus on the content of the code. Additional resources, including Subject Matter Experts (SMEs), industry associations, and service providers were utilized regularly. In all, over 100 people worked diligently within the ASME process, utilizing technically based data where possible, in an attempt to meet the diverse needs of the industry and regulators. Unlike most ASME standards, however, this Standard is focused on the human aspects of operating and maintaining pipeline equipment instead of on the instructions for designing or operating this equipment. Therefore, technical-based data were not always available. For those areas where technically based data did not exist, the project team utilized accepted industry practices or reached consensus within the Project Team. Nonmandatory Appendices, which include a covered task list, were added to provide additional guidance to assist pipeline operators in developing or modifying their personnel qualification programs.

This Standard provides general and specific requirements for the qualification of pipeline personnel. The implementation of this Standard is intended to minimize the impact on safety and integrity of the pipeline due to human error that may result from an individual's lack of knowledge, skills, or abilities during the performance of certain activities. This Standard does not impose a requirement to perform specific tasks that affect the safety or integrity of the pipeline. It does, however, set the requirements for qualification of individuals in the event these types of tasks are performed.

This Standard establishes the requirements for identifying covered tasks that impact the safety or integrity of pipelines performed during operation, maintenance, or construction, properly qualifying individuals to perform those tasks, and for managing the qualifications of pipeline personnel. Design and engineering tasks are excluded because assurance of their quality is provided by the fact that appropriately educated or experienced individuals perform these tasks using guidelines and procedures for the conduct of their work. In addition, the quality of the work product is generally confirmed procedurally through review and ultimately by field inspection and testing of the design that are required by the applicable ASME Standard (B31.4 and B31.8 for hazardous liquid pipelines and gas pipelines, respectively) and jurisdictional authority. Design and engineering tasks involving analysis and integration of data associated with integrity management are excluded from this Standard.

It is recognized that this Standard is being issued at a time when numerous entities have previously developed and implemented qualification programs. Therefore, as part of implementation of this Standard, the implementer should determine what changes to provisions of its existing program (e.g., span of control, subsequent qualification intervals, evaluation methods) are required to meet this Standard. An individual qualified to perform a covered task under the existing program could be considered to be qualified under the program described by this Standard. Individuals currently qualified under an existing program can maintain their qualifications by meeting the subsequent qualification requirements established in this Standard. A documented performance evaluation, if not previously performed for a task that requires performance evaluation for initial qualification under this Standard, should be performed either during the implementation period or at the time of subsequent qualification.

The 2010 Edition of the Standard was a compilation of the 2006 Edition, addition of four new tasks in the task list, editorial refinement, and clarification on handling the following issues: new technology, long-term degradation of physical abilities, qualification exemptions, and new construction.

The 2014 Edition of the Standard was a compilation of the 2010 Edition and enhancement of the qualification standards to provide more in-depth evaluation criteria for 145 of 165 tasks in the task list.

The 2016 Edition of the Standard is a compilation of the 2014 Edition and enhancement of the qualification standards to provide more in-depth evaluation criteria for the balance of the task list; addition of seven new tasks to the task list; removal of nine tasks specific to diving that are covered sufficiently by NDT, welding, and other land-based tasks; removal of one task that is being combined with a similar task; addition of a Nonmandatory Appendix that provides guidance for implementing ASME B31Q and the nonmandatory task list; and clarification on the following issues: construction documentation clarified in the definition of *documentation* in the nonmandatory task list, and redesignating section and appendices to follow ASME guidelines.

This Standard was approved as an American National Standard on May 18, 2016.

Suggestions for the improvement of this Standard are welcome. They should be addressed to Secretary, B31 Standards Committee, The American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

This Foreword is provided as an aid to the user and is not part of the requirements of this Standard. This Foreword should not be interpreted as containing any requirements or limits enforceable or auditable by any entity. Where, in the judgment of the Committee, any of the topics covered by this Foreword ought to be addressed in the requirements of this Standard, appropriate requirements have been formulated and included in the body of this Standard.

ASME B31 COMMITTEE

Standard for Pressure Piping

STANDARDS COMMITTEE OFFICERS

J. E. Meyer, *Chair*
J. W. Frey, *Vice Chair*
A. Maslowski, *Secretary*

STANDARDS COMMITTEE PERSONNEL

R. J. T. Appleby, ExxonMobil Development Co.
C. Becht IV, Becht Engineering Co.
K. C. Bodenhamer, TRC Solutions
R. Bojarczuk, ExxonMobil Research & Engineering Co.
C. J. Campbell, Air Liquide
J. S. Chin, TransCanada Pipeline U.S.
D. D. Christian, Victaulic
R. P. Deubler, Fronek Power Systems, LLC
C. Eskridge, Jr., Jacobs Engineering
D. J. Fetzner, BP Exploration (Alaska), Inc.
P. D. Flenner, Flenner Engineering Services
J. W. Frey, Stress Engineering Services, Inc.
D. R. Frikken, Becht Engineering Co.
R. A. Grichuk, Fluor Corp.
R. W. Haupt, Pressure Piping Engineering Associates, Inc.
L. E. Hayden, Jr., *Ex-Officio*, Consultant
G. A. Jolly, Consultant
A. J. Livingston, *Ex-Officio*, Kinder Morgan

A. Maslowski, The American Society of Mechanical Engineers
W. J. Mauro, American Electric Power
J. E. Meyer, Louis Perry and Associates, Inc.
T. Monday, Team Industries, Inc.
M. L. Nayyar, NICE
G. R. Petru, Acapella Engineering Services, LLC
D. W. Raho, CCM 2000
R. Reamey, Turner Industries Group, LLC
E. H. Rinaca, Dominion Resources, Inc.
M. J. Rosenfeld, Kiefner and Associates, Inc.
J. T. Schmitz, Southwest Gas Corp.
S. K. Sinha, Lucius Pitkin, Inc.
W. J. Sperko, Sperko Engineering Services, Inc.
J. Swezy, Jr., Boiler Code Tech, LLC
F. W. Tatar, FM Global
K. A. Vilminot, Black and Veatch
J. Willis, Page Southerland Page, Inc.

B31 QUALIFICATION OF PIPELINE PERSONNEL TECHNICAL COMMITTEE

A. J. Livingston, *Chair*, Kinder Morgan
M. Burkhart, *Vice Chair*, Nicor Gas
P. D. Stumpf, *Secretary*, The American Society of Mechanical Engineers
L. B. Ables, Enterprise Products
A. Borgmeyer, *Contributing Member*, The Mosaic Co.
M. J. Bradley, *Contributing Member*, Pacific Gas & Electric
T. Cash, Veriforce
A. Chamblin, Kinder Morgan
J. S. Chin, TransCanada Pipeline U.S.
K. Denny, Spectra Energy
J. F. Dolniak, *Contributing Member*, NIPSCO
R. Evans, USDOT/PHMSA
E. Fonseca, *Contributing Member*, Enterprise Products
V. Frederick III, Henkels & McCoy
S. Frye, Jr., Arizona Corp. Commission
J. Garland, *Contributing Member*, Industrial Training Services, Inc.
K. Gentile, USDOT/PHMSA
T. Giles, *Contributing Member*, T. D. Williamson
S. Goodman, CenterPoint Energy
C. Grimard, TECO Peoples Gas
M. A. Gruenberg, Southwest Gas Corp.
S. C. Gupta, *Contributing Member*, Bharat Petroleum Corp. Ltd.
D. Haifleigh, Flint Hills Resources, LP

T. Hall, *Contributing Member*, Sunoco Logistics, LP
R. Hammork, *Contributing Member*, San Diego Gas and Electric
B. A. Heck, Miller Pipeline Corp.
G. W. Isbell, *Contributing Member*, ENERGY Worldnet, Inc.
J. Langwell, *Contributing Member*, OQSG, Industrial Solutions Group
W. B. McGaughey, Jr., *Contributing Member*, USDOT/PHMSA
T. Meek, Kinder Morgan
W. Miller, Veriforce, LLC
D. K. Moore, Consultant
L. P. Murray, Consultant
A. Podoreanu, *Contributing Member*, California Public Utilities Commission
K. Riddle, Magellan Midstream Partners, LP
D. Ristig, Enable Midstream Partners
J. T. Schmitz, Southwest Gas Corp.
T. A. Schumacher, *Contributing Member*, Ameren Illinois
G. Shaw, *Contributing Member*, Colonial Pipeline Co.
R. C. Smith, AGL Resources
R. L. Stump, Midwest Energy Association
J. Trevino, Valero
J. Urtz, LIUNA Training & Education Fund
T. Vaughan, *Contributing Member*, Spectra Energy
K. Wester-Hayes, *Contributing Member*, Explorer Pipeline Co.
P. Williams III, *Contributing Member*, OQSG, Industrial Solutions Group
M. Zanter, State of South Dakota Public Utilities Commission

B31 EXECUTIVE COMMITTEE

J. W. Frey, *Chair*, Stress Engineering Services, Inc.
A. Maslowski, *Secretary*, The American Society of Mechanical Engineers
G. A. Antaki, Becht Engineering Co.
R. J. T. Appleby, ExxonMobil Development Co.
D. D. Christian, Victaulic
D. R. Frikken, Becht Engineering Co.
R. A. Grichuk, Fluor Corp.
L. E. Hayden, Jr., Consultant

C. Kolovich, Kiefner and Associates
H. Kutz, Johnson Controls Corp./York Process Systems
A. J. Livingston, Kinder Morgan
W. J. Mauro, American Electric Power
J. E. Meyer, Louis Perry and Associates, Inc.
M. L. Nayyar, NICE
S. K. Sinha, Lucius Pitkin, Inc.

B31 FABRICATION AND EXAMINATION TECHNICAL COMMITTEE

J. Swezy, Jr., *Chair*, Boiler Code Tech, LLC
U. D'Urso, *Secretary*, The American Society of Mechanical Engineers
R. Campbell, Bechtel National, Inc.
D. Couch, EPRI
R. J. Ferguson, Metallurgist
P. D. Flenner, Flenner Engineering Services
S. Gingrich, AECOM

J. Hainswertz, Consultant
A. D. Nalbandian, Thielsch Engineering, Inc.
R. J. Silvia, Process Engineers and Constructors, Inc.
W. J. Sperko, Sperko Engineering Services, Inc.
P. L. Vaughan, ONEOK Partners
K. Wu, Stellar Energy Systems

B31 MATERIALS TECHNICAL COMMITTEE

R. A. Grichuk, *Chair*, Fluor Corp.
C. O'Brien, *Secretary*, The American Society of Mechanical Engineers
B. Bounds, Bechtel Corp.
W. P. Collins, WPC Sol, LLC
R. P. Deubler, Fronek Power Systems, LLC
Z. Djilali, *Contributing Member*, Sonatrach
W. H. Eskridge, Jr., Jacobs Engineering
A. A. Hassan, PGESCo

G. Jolly, Consultant
C. Melo, Technip USA, Inc.
M. L. Nayyar, NICE
M. B. Pickell, Willbros Engineer, Inc.
D. W. Rahol, CCM 2000
R. A. Schmidt, Canadoil
J. L. Smith, Jacobs Engineering Group

B31 MECHANICAL DESIGN TECHNICAL COMMITTEE

G. A. Antaki, *Chair*, Becht Engineering Co.
J. C. Minichiello, *Vice Chair*, Bechtel National, Inc.
R. Lucas, *Secretary*, The American Society of Mechanical Engineers
D. Arnett, Chevron Energy Technology Co.
C. Becht IV, Becht Engineering Co.
R. Bethea, HII-Newport News Shipbuilding
P. Cakir-Kavcar, Bechtel Corp.
N. F. Consumo, Consultant
J. P. Ellenberger, Consultant
M. Engelkemier, Stanley Consultants, Inc.
D. J. Fetzner, BP Exploration (Alaska), Inc.
D. Fraser, NASA Ames Research Center
J. A. Graziano, Consultant
J. D. Hart, SSD, Inc.

R. W. Haupt, Pressure Piping Engineering Associates, Inc.
B. P. Holbrook, Babcock Power, Inc.
H. Kosasayama, *Delegate*, JGC Corp.
W. J. Koves, Pi Engineering Software, Inc.
R. A. Leishear, Leishear Engineering, LLC
G. D. Mayers, Alion Science and Technology
J. McCabe, General Dynamics Electric Boat
T. Q. McCawley, TQM Engineering PC
A. W. Paulin, Paulin Resource Group
R. A. Robleto, KBR
E. C. Rodabaugh, *Honorary Member*, Consultant
M. J. Rosenfeld, Kiefner and Associates, Inc.
T. Sato, Japan Power Engineering & Inspection Corp.
G. Stevick, Berkeley Engineering and Research, Inc.

B31 CONFERENCE COMMITTEE

A. Bell, Bonneville Power Administration
R. A. Coomes, Commonwealth of Kentucky
D. H. Hanrath, Consultant
C. J. Harvey, Alabama Public Service Commission
D. T. Jagger, Ohio Department of Commerce
K. T. Lau, Alberta Boilers Safety Association
R. G. Marini, New Hampshire Public Utilities Commission
I. W. Mault, Manitoba Department of Labour
A. W. Meiring, Fire and Building B & PV Division/Indiana

R. F. Mullaney, B & PV Safety Branch/Vancouver
P. Sher, State of Connecticut
D. A. Starr, Nebraska Department of Labor
D. J. Stursma, Iowa Utilities Board
R. P. Sullivan, NBBJ
J. E. Troppman, Division of Labor/State of Colorado Boiler Inspections
W. A. M. West, Lighthouse Assistance, Inc.
T. F. Wickham, Rhode Island Department of Labor

INTENTIONALLY LEFT BLANK

ASMENORMDOC.COM : Click to view the full PDF of ASME B31Q 2016

PIPELINE PERSONNEL QUALIFICATION

1 INTRODUCTION

1.1 Scope

This Standard establishes the requirements for developing and implementing an effective Pipeline Personnel Qualification Program (qualification program) utilizing a combination of technically based data, accepted industry practices, and consensus-based decisions. The Standard also offers guidance and examples of a variety of methods that may be used to meet selected requirements. The Standard specifies the requirements for identifying covered tasks that impact the safety or integrity of pipelines, for qualifying individuals to perform those tasks, and for managing the qualifications of pipeline personnel.

With the following exceptions, this Standard applies to tasks that impact the safety or integrity of pipelines:

- (a) design or engineering tasks
- (b) tasks that are primarily intended to ensure personnel safety

1.2 Purpose and Objectives

The purpose of this Standard is to establish requirements for the qualification and management of qualifications for pipeline personnel. The objective of this Standard is to minimize the impact on safety and integrity of the pipeline due to human error that may result from an individual's lack of knowledge, skills, or abilities during the performance of certain activities.

Individuals who perform covered tasks and those individuals responsible for ensuring a qualified workforce shall meet the applicable requirements of this Standard.

2 DEFINITIONS

ability: the mental and physical capacity to perform a task.

abnormal operating condition (AOC): a condition that may indicate a malfunction of a component or deviation from normal operations that may

- (a) indicate a condition exceeding design limits or
- (b) result in a hazard(s) to persons, property, or the environment

affected individual: an individual who performs a covered task(s) or who has qualification program implementation responsibility.

covered task: a task that can affect the safety or integrity of the pipeline.

DI analysis: an analysis that explores the difficulty (D) and importance (I) of each task.

DIF analysis: an analysis that explores the difficulty (D), importance (I), and frequency of performance (F) of each task.

direct and observe: the process by which a qualified individual oversees the work activities of a nonqualified individual(s) and is able to take immediate corrective action when necessary.

distinctive physical ability: clearly defined perceptual or physical functioning required to perform a task (e.g., color vision, visual acuity, hearing, smell).

entity: any individual or organization utilizing any portion of this Standard to develop or implement a qualification program or portion thereof, including pipeline operators, contractors, subcontractors, service providers, etc.

evaluation: a process established to determine an individual's ability to perform a covered task. The term can be used to refer to the process, instrument(s), or both. The process may entail one or more evaluation methods or one or more distinct evaluation instruments.

evaluation criteria: the specific knowledge and skill an individual must possess and demonstrate to be qualified to perform a covered task.

evaluation instrument: the materials that are used to conduct an evaluation, including but not limited to written, oral interview, and performance evaluation materials.

evaluator: an individual selected or credentialed to conduct performance or oral interview evaluations to determine if the individual is qualified.

knowledge: a body of information applied directly to the performance of a task.

mutual aid: pipeline operator personnel assistance (aid) provided to another pipeline operator in the performance of covered tasks.

on-the-job training: instruction at or near the work setting.

performance: demonstration of the knowledge, skills, and abilities (KSAs) required to complete a task.

performance monitoring: a means of confirming that an individual performs covered tasks in accordance with applicable standards or procedures.

personnel: individuals who perform covered tasks.

personnel qualification: the results of the process under which individuals become qualified in accordance with this Standard.

pipeline: all parts of physical facilities through which gas, hazardous liquids, or carbon dioxide moves in transportation, including pipe, valves, fittings, flanges (including bolts and gaskets), regulators, pressure vessels, pulsation dampeners, relief valves, and other appurtenances attached to pipe, compressor units, metering stations, regulator stations, pumping units, breakout tanks, and fabricated assemblies.

proctor: one selected to administer a written examination.

qualified: an individual that has been evaluated and can

- (a) perform assigned covered tasks
- (b) recognize and react to abnormal operating conditions

revocation: cancellation of an individual's qualification to perform an identified covered task(s).

safety or integrity: the state of a pipeline being operationally sound (as affected by maintenance, construction, and operation activities) or having the ability to withstand the stresses imposed during operations.

skill: the ability to perform mental and physical activities acquired or developed through training or experience.

span of control: the maximum number of nonqualified individuals that a qualified individual can direct and observe performing a covered task listed in the task list as a ratio of qualified to nonqualified individuals.

subject matter expert (SME): an individual who possesses knowledge and experience in the process/discipline they represent.

subsequent qualification: a process to evaluate, for continued qualification, an individual who is currently qualified to perform a covered task.

suspension: temporary prevention of a qualified individual from performing identified covered task(s).

task: a defined unit of work having an identifiable beginning and end and specific actions that are observable and measurable.

training: instructing individuals using materials designed to convey the skills and knowledge necessary to perform a particular task.

training program: the written description, processes, procedures, training materials, and training tests that establish and document training.

2.1 Frequently Used Abbreviations

AOCs = abnormal operating conditions

KSA = knowledge, skill, and ability

SME = subject matter expert

3 REFERENCES

The following is a list of publications referenced in this Standard.

API Std 653-2001, Tank Inspection, Repair, Alteration, and Reconstruction

API Std 1104-1999, Welding of Pipelines and Related Facilities

Publisher: American Petroleum Institute (API), 1220 L Street, NW, Washington, DC 20005 (www.api.org)

ASME B31.8S-2012, Managing System Integrity of Gas Pipelines (Supplement to ASME B31.8)

ASME BPVC, 2013 Edition, Section IX, Welding, Brazing, and Fusing Qualifications

Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (www.asme.org)

ASNT CP-189-2001, Standard for Qualification of Nondestructive Testing Personnel

ASNT Recommended Practice No. SNT-TC-1A-2001, Personnel Qualification and Certification in Nondestructive Testing

Publisher: American Society for Nondestructive Testing (ASNT), 1711 Arlingate Lane, P.O. Box 28518, Columbus, OH 43228 (www.asnt.org)

Fault Tree Development for the Nine Threats to Pipelines, Chen, Q. C-FER Technologies, Report Number L114, Edmonton, Alberta, 2006

Natural Gas Transmission Pipeline, Pipeline Integrity — Prevention, Detection, and Mitigation Practices — GRI 00/0193, December 2000, Hartford Steam Boiler Inspection and Insurance Co.

4 QUALIFICATION PROGRAM

4.1 Development

An operator shall develop a qualification program that describes, in detail, how the requirements set forth in this Standard are being addressed. This section identifies specific elements that shall be included in the program and references the section(s) in the Standard where additional

requirements and/or further details and guidance can be found. If alternative solutions that meet the intent of this Standard are utilized, they must be properly justified and documented in the qualification program.

4.2 Processes and Procedures

A qualification program developed, documented, and implemented in accordance with this Standard shall describe or reference the processes and procedures to be followed to qualify and manage the qualifications of pipeline personnel.

The qualification program shall incorporate each of the following.

4.2.1 Introduction. The introduction to the qualification program shall

- (a) identify the operating or business unit(s) of the entity to which the qualification program applies
- (b) describe the purpose and scope for the program
- (c) contain other information required within this Standard or that is necessary to clarify the purpose and scope of the program

4.2.2 Definitions (See Section 2). Key terms and phrases included within the qualification program shall be defined. Terms and phrases do not need to be defined if their use or meaning is consistent with the definitions found in section 2. Definitions shall be included for any terms or phrases that are

- (a) unique to the qualification program or
- (b) defined differently from what is found in section 2 of this Standard

4.2.3 Determining Covered Tasks (See Section 5). The qualification program shall describe the process used to identify covered tasks, which shall include one of the following methods:

- (a) SME Covered Task Identification Process
- (b) Fault Tree Covered Task Identification Process
- (c) alternate process for determining covered tasks
- (d) adoption of covered task list included as Nonmandatory Appendix A

Include or reference the list of the identified covered tasks that are being utilized in the program.

4.2.4 Abnormal Operating Conditions (AOCs) (See Section 6). The qualification program shall

- (a) describe the process used to identify AOCs, which shall include one of the following:
 - (1) adoption of AOCs identified in Nonmandatory Appendix E
 - (2) alternate process of determining AOCs
- (b) describe the process used to ensure that individuals who perform covered tasks are able to recognize and react to the identified AOCs

4.2.5 Training (See Section 7). The qualification program shall describe processes for determining when it is appropriate to provide for personnel training and how it is to be provided, when required.

4.2.6 Evaluations (See Section 8). The qualification program shall include

- (a) a description of the evaluation process (including how evaluators and/or proctors are selected)
- (b) evaluation criteria
- (c) identification of evaluation methods to be used for each covered task

4.2.7 Qualifications (See Section 9). The qualification program shall

- (a) identify parties or organizations responsible for
 - (1) determining the qualifications an individual requires
 - (2) verifying the qualifications of individuals performing covered tasks
 - (3) suspending and reinstating or revoking qualifications
 - (4) establishing and maintaining span-of-control ratios
 - (5) ensuring a qualified individual is assigned to direct and observe nonqualified individuals within span-of-control ratios
 - (6) establishing and maintaining subsequent qualification intervals
- (b) describe how other applicable codes or standards will be integrated into the qualification process
- (c) describe the process of managing initial and subsequent qualifications
- (d) describe the process for assigning qualified individuals to perform covered tasks and how covered tasks performed during emergency response are handled
- (e) describe the process for allowing performance of covered tasks by nonqualified individuals working under the direction and observation of a qualified person

4.2.8 Portability of Evaluations (See Section 10). If portable evaluations will be accepted, the operator shall describe how this is managed, monitored, and documented.

4.2.9 Program Effectiveness (See Section 11). The qualification program shall describe processes implemented to evaluate the effectiveness of the qualification program.

4.2.10 Communication of Program Requirements and Change (See Section 12). The qualification program shall describe how program requirements are communicated to affected individuals and how changes to program requirements are managed and communicated.

4.2.11 Documentation (See Section 13). The qualification program shall describe how documentation requirements will be met and how program documentation will be maintained.

5 DETERMINING COVERED TASKS

5.1 Introduction

Personnel who perform tasks that affect the safety or integrity of the pipeline shall be qualified. The tasks that affect the safety or integrity of the pipeline shall be identified and are defined as covered tasks.

5.2 Processes for Determining Covered Tasks

The qualification program shall use one of the methods described below to determine covered tasks. They are the SME Covered Task Identification Process described in para. 5.3 and the Fault Tree Covered Task Identification Process described in para. 5.4 or an alternate process. Nonmandatory Appendix A lists covered tasks that were obtained through the utilization of a combination of the Fault Tree Covered Task Identification Process and the SME Covered Task Identification Process. This list, which is summarized in Nonmandatory Appendix B, may be utilized in lieu of an alternate process or one of the processes described in either para. 5.3 or 5.4.

If the covered task list in Nonmandatory Appendix A is used, the contents of Nonmandatory Appendix A shall be reviewed in accordance with para. 5.5.

An alternate process may be used for determining covered tasks. The alternate process shall be a technically based process that considers safety or integrity-related activities. The process shall be documented in the qualification program.

5.3 SME Covered Task Identification Process

The SME Covered Task Identification Process shall use SMEs who are knowledgeable about tasks performed during the operation, maintenance, or construction of new pipelines or the rebuilding of existing pipelines that can impact the safety or integrity of the pipeline. The individual SMEs may be employees, contractors, or an industry group such as those that participate in a consortium. The SME's purpose is to review the tasks performed during the construction, operation, and maintenance of a pipeline to determine which tasks are to be considered covered tasks.

5.3.1 Selecting SMEs. The responsibility for selection of SMEs for participation in the SME Covered Task Identification Process shall be described in the qualification program. The objective in selecting the SMEs is to have a knowledge and experience base to provide a comprehensive review of the tasks.

(a) Selection of SMEs shall be based on the following criteria:

(1) knowledge — possesses knowledge in the process/discipline

(2) experience — has worked in the process/discipline

(b) Factors that may be useful in selecting the SMEs are as follows:

(1) training — has documentation proving their successful completion of training programs in the process/discipline they represent

(2) credentials/certifications — possesses applicable and appropriate credentials and/or certifications expected of an expert in the process/discipline they represent or

(3) years of practical experience

5.3.2 Identifying Covered Tasks

(a) The SME individual or group shall identify a list of tasks that can be screened for covered tasks. Any of the following methods can be used as a starting point:

(1) Identify tasks that affect the safety or integrity of the pipeline through SME interviews.

(2) Through document reviews, identify tasks performed as a requirement of applicable codes, standards, policies, or procedures.

(3) Any other process that can identify possible or likely tasks within the scope of this Standard.

(b) After the list of tasks has been drafted, the SME individual or group shall use the following screening questions to determine tasks to be included in the covered task list:

(1) Does performance of the task affect the safety or integrity of a pipeline?

(2) Is the task performed for the construction, operation, or maintenance of the pipeline?

(c) If both of these questions are answered in the affirmative, then the task shall be identified as a covered task. If a task passes the screening test, i.e., the answer to both questions is "Yes," but the SMEs do not believe it should become a covered task, the task and the rationale for not including it in the covered task list shall be documented.

5.4 Fault Tree Task Identification Process

The fault tree task identification process is an analysis tool or technique by which the relationship of many events that interact to produce a final result can be identified. These events are linked to the final result, or in some cases to another event, to depict the manner in which that contribution is made. For some complex events, multiple layers of events may be necessary to fully describe the interaction between these events. This layering of events forms the branches of the fault tree.

This process allows the structure or form of that interaction to be defined by using two simple logic relationships. These logic relationships are called the “and” and “or” gates. The type of gate or relationship depends on the contribution of each event or series of events to the final result. Events that must all occur in order to produce the final result interact through an “and” gate. Those events that may individually produce the final result interact through an “or” gate. Related events are grouped using this process and the type of relationship shown by the gate that is used (see Fig. 5.4-1 and reference C-FER Technologies, Report Number L114, “Fault Tree Development for the Nine Threats to Pipelines”).

The fault tree task identification process is used in this Standard to identify the events or tasks that may lead to a particular threat impacting the safety or integrity of a pipeline and potentially result in a failure that could cause a hazard to persons, property, or the environment. This threat is considered the “top event” for each fault tree. The nine threat groupings in ASME B31.8S are used for the nine fault trees developed for this Standard. These threat groupings are as follows:

- (a) natural hazards
- (b) construction defects
- (c) equipment failure
- (d) internal corrosion
- (e) incorrect operation
- (f) stress corrosion cracking
- (g) external corrosion
- (h) manufacturing defects
- (i) third-party damage

Successive levels of events, such as processes that could contribute to or produce this undesired top event, are then identified in the construction of the fault tree. These processes should be identified by SMEs and ultimately related to the detection, prevention, or mitigation of the top event. These events are successively broken down by the level to which they contribute to the top event until a “primary fault” is reached. This primary fault may be a process or task that is performed on the pipeline and may contribute to the top event if not performed properly. Once the primary fault level is reached, then the SMEs identify tasks that are performed to prevent the primary fault from occurring. Not all primary fault levels are items that are controllable and therefore do not have tasks identified from that primary fault level. Others will have a task or numerous tasks identified that are conducted to prevent the occurrence of the primary fault. The SMEs perform this task identification.

The SMEs then consider any additional tasks performed for their pipelines and determine if the fault

tree analysis has identified the tasks performed for the safety or integrity of their pipelines. These potential covered tasks can also be compared with a listing of best practices tasks, such as “Natural Gas Transmission Pipelines, Pipeline Integrity — Prevention, Detection, and Mitigation Practices,” for a completeness test that can be performed by a group of SMEs. Any task to be added shall pass the screening criteria described in para. 5.3.2.

The resulting list of tasks, after thorough evaluation of the fault trees by SMEs, becomes the covered task list for the qualification program.

5.5 Using the Task List in Nonmandatory Appendix A

A combination of the Fault Tree Task Identification Process described in para. 5.4 and the SME Covered Task List Identification Process described in para. 5.3 was utilized to develop the nonmandatory covered task list in Nonmandatory Appendix A. The process is summarized in Nonmandatory Appendix C, and an example of evaluation criteria for tasks is given in Nonmandatory Appendix D.

If Nonmandatory Appendix A is used, the following steps shall be taken:

- (a) SMEs shall review Nonmandatory Appendix A and determine which tasks are applicable to their pipelines.
- (b) SMEs may remove tasks listed in Nonmandatory Appendix A applicable to their pipelines if they determined that the tasks should not become covered tasks and the rationale for not including them in the covered task list is documented.
- (c) The SMEs shall add any unique tasks or tasks that stem from the development of new technology and that affect the safety or integrity of their pipelines. For each additional task, applicable items shall be developed in accordance with this Standard (e.g., abnormal operating conditions, training requirements, subsequent qualification intervals, evaluation criteria, spans of control, and evaluation methods).

The Task List Development Process described in Nonmandatory Appendix C considered that evaluation and work assignment processes vary between entities. It is recognized that a few previously identified covered tasks are recognized as jobs. The covered tasks identified in Nonmandatory Appendix A may be combined or subdivided to fit the corresponding evaluation or work assignment process an entity uses.

Conflict in items such as span of control and evaluation methods should be resolved by adopting the more demanding requirements.

Fig. 5.4-1 Fault Tree Example

Fault Tree for External Corrosion

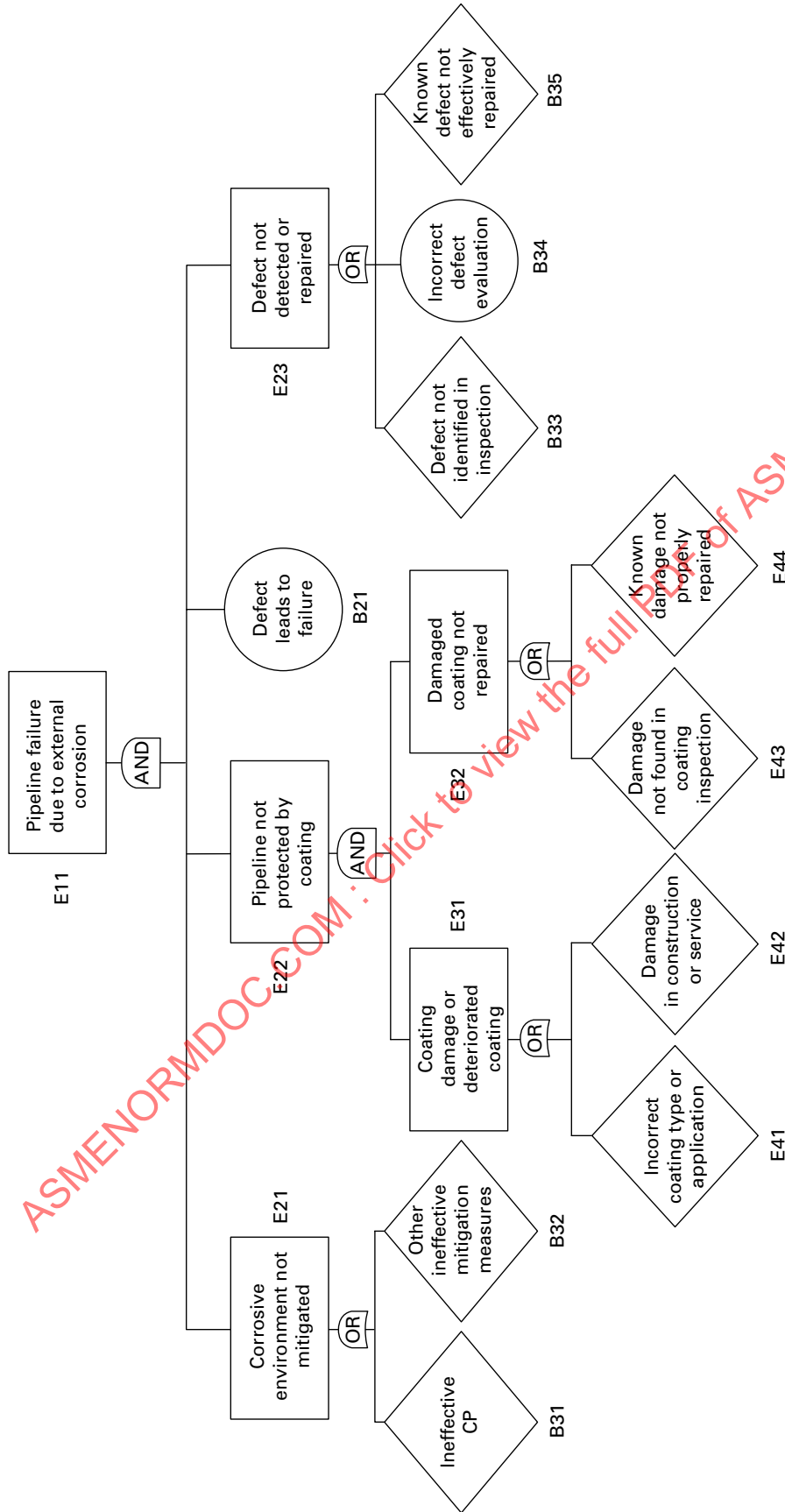


Fig. 5.4-1 Fault Tree Example (Cont'd)



6 ABNORMAL OPERATING CONDITIONS (AOCs)

Qualified individuals performing a covered task shall be able to recognize and properly react to AOCs that they might encounter during the performance of the task. For example, an individual that is performing a structure-to-electrolyte potential measurement should be able to recognize and react properly to an unplanned escape of product from the pipeline.

Nonmandatory Appendix E provides a list of AOCs that may be used in a qualification program. This list may be reviewed, and expected reactions may be communicated to those individuals performing covered tasks. Individuals who perform specific covered tasks shall be trained as appropriate or evaluated to determine if they can recognize and react to the AOCs. The evaluation may be a separate process, or it may be combined with the covered task training and evaluation.

If the list in Nonmandatory Appendix E is not utilized, a process shall be developed and implemented to identify AOCs based on the definition in this Standard. SMEs selected through the process identified in para. 5.3 shall be involved in the AOC identification process.

7 TRAINING

This section establishes minimum training requirements for the knowledge and skills required to perform covered tasks. Alternative solutions may be used as long as they meet the intent of this Standard and are properly justified and documented.

Preparing an individual to perform covered tasks requires consideration of the individual's knowledge and skills to perform the covered task. Some individuals may possess prior education, experience, and training that equips them with sufficient knowledge and skills to perform the covered tasks. For other individuals, training may be appropriate as a means to develop the knowledge and skills necessary to perform the covered tasks. Training is also an appropriate means to allow individuals to maintain the required knowledge and skills to continue performing covered tasks as they change.

7.1 Responsibility

7.1.1 Employers. Employers shall be responsible for identifying training needs and providing appropriate training for individuals requiring or maintaining qualifications.

7.1.2 Qualification Program. The qualification program shall identify the organizations or position(s) responsible for

- (a) determining the need for training an individual
- (b) identifying training materials or sources
- (c) assuring and documenting successful completion of necessary training

7.2 Identification of the Need for Training an Individual

7.2.1 Determining Training Needs. For situations such as those listed in para. 7.2.2, an individual's training needs shall be determined. An individual's current knowledge and skills resulting from prior education, experience, and training should be considered in determining if the individual requires training.

7.2.2 Situations for Considering Training. The need to train an individual should be considered for, but not limited to, situations where the individual

- (a) requires qualification for a covered task not previously performed
- (b) requires qualification for a covered task outside their knowledge and skills
- (c) has had a qualification suspended or revoked
- (d) fails an evaluation for qualification
- (e) requires new or different knowledge or skills to perform a covered task
- (f) will utilize new equipment or procedures to perform a covered task or
- (g) has completed a portable evaluation (see section 10) and requires additional knowledge or skills to implement specific requirements that are outside the scope of the portable evaluation

7.3 Training Materials and Implementation

7.3.1 Training Materials. Training implementation shall be identified consistent with the training needs determined in para. 7.2. These materials shall be acquired or maintained consistent with the knowledge and skills needed to perform the covered task(s).

7.3.2 Training Implementation. Training should be conducted in a setting conducive to learning the subject knowledge or skills. Instructor-led or on-the-job training should be conducted by individuals selected based on the following considerations:

- (a) demonstrated knowledge of the subject matter (e.g., the individual may be an SME or meet the education, experience, and training requirements to be qualified for the covered task; qualification for the covered task is not required)
- (b) possession of the knowledge, skill, and ability to provide the training using the selected training materials

7.3.3 Training Tests. If tests administered in conjunction with training are used as part of the evaluation process, they shall be developed, maintained, and implemented in accordance with section 8 of this Standard.

7.4 Training Documentation

7.4.1 Documenting Training Needs. When a need is identified for training to qualify an individual to perform a covered task, the requirement for the individual to complete training shall be documented.

7.4.2 Documenting Training. When training is required to support an individual's qualification, training information, such as an outline of the training course objectives as well as a record of the individual's successful completion of the training, shall be maintained.

8 EVALUATION

This section establishes the minimum requirements to ensure individuals are evaluated for the KSAs required to perform covered task(s). The evaluation instrument(s) and process shall be established in accordance with this Standard to maximize the validity and reliability of the evaluation. Alternative solutions may be used as long as they meet the intent of this Standard and are properly justified and documented.

The term *evaluation* can be used to refer to the process, instrument(s), or both. The process may entail one or more evaluation methods or one or more distinct evaluation instruments. For example, one evaluation instrument may contain a checklist for observing an individual perform a task and questions to answer. This one instrument is composed of both performance and oral interview evaluation methods.

8.1 Evaluation Process

8.1.1 Responsibilities. The evaluation process shall be documented in writing and as a minimum establish responsibilities for

- (a) establishing and maintaining the evaluation process and evaluations
- (b) selecting evaluators or proctors

8.1.1.1 Evaluator Selection. Evaluators shall be used when a judgment must be made about an individual's performance, such as during a performance evaluation or oral interview [see paras. 8.3.2(b) and 8.3.3(b)]. Evaluators shall be selected based on technical knowledge and capability to ascertain an individual's KSAs to perform the task and recognize and react to AOCs.

Paragraph 5.3.1 describes considerations for the selection of SMEs that may be applied to the selection of evaluators for technical knowledge. The evaluator's ability to administer the evaluation in accordance with the requirements of the evaluation should be considered. Additionally, an evaluator should be able to make it possible for the individual to accurately demonstrate his or her KSAs during the evaluation.

8.1.1.2 Proctor Selection. Selection of proctors shall be based on the individual's ability to follow the evaluation instructions. Proctors shall only be used in the evaluation process where he or she is not involved in the judgment of an individual's performance. For example, a proctor could administer a written test with an objective scoring key but not a performance evaluation or oral interview.

8.1.2 Procedures. The evaluation process shall include policies or procedures for

- (a) prohibiting an individual from self-scoring of evaluations
- (b) verifying the identity of the individual(s) being evaluated
- (c) investigating and resolving suspected cheating
- (d) concluding an evaluation early when unsafe or unsatisfactory actions are being demonstrated
- (e) resolving evaluation failure, including
 - (1) requirements for determining remedial action(s)
 - (2) minimum allowable time between evaluation attempts to ensure additional attempts are not merely measuring short-term memory

8.2 Evaluation Material(s) and Criteria

Evaluation materials shall be purchased or developed and maintained consistent with identified evaluation needs. Evaluations shall be implemented in accordance with processes that include content validity, evaluation criteria, and appropriate evaluation methods as specified in paras. 8.2.1 through 8.2.3.

8.2.1 Content Validity. Evaluations shall be developed or reviewed to establish content validity. An evaluation is content valid when an SME or group of SMEs has verified (through development or review) that the content of the evaluation covers the criteria required for performance of the task(s). A content-valid evaluation addresses conditions that may either be caused by or encountered during performance of the task that adversely impact the safety or integrity of the pipeline. The conditions should be limited to those that could be reasonably anticipated to occur.

8.2.2 Evaluation Criteria. For each task, evaluation criteria shall be documented. Evaluation criteria represent the knowledge, skills, and distinctive physical abilities an individual must possess and demonstrate to be considered qualified to perform a covered task. Evaluation criteria for each covered task may be developed by SMEs or obtained from vendors, manufacturers, or applicable references and standards. For some evaluations, evaluation criteria and the evaluation instrument may be one and the same (e.g., performance

checklist, list of oral interview questions). An example of evaluation criteria is in Nonmandatory Appendix D. Factors that may be considered when developing evaluation criteria include

- (a) pipeline and personnel safety considerations
- (b) AOCs and other conditions adversely affecting the safety or integrity of the pipeline that may be either caused by or encountered during task performance
- (c) technical knowledge required to perform the task, for example
 - (1) applicable policies or procedures
 - (2) necessary sequence of performance
 - (3) base technical knowledge to perform the task (e.g., corrosion characteristics, electrical laws, federal and state regulatory requirements, equipment selection, equipment maintenance, equipment calibration, equipment operation)
 - (4) knowledge to account for variance required in task performance due to equipment differences
 - (5) knowledge to account for variance required in task performance due to conditions or context differences (e.g., cold weather, dry climate, performed for a different purpose)
- (d) technical skills required to perform the task (e.g., welding, hot tapping, operating heavy equipment, crane operation), for example
 - (1) demonstration of basic skills
 - (2) demonstration to account for substantial variance required in task performance due to equipment differences (e.g., different principles of equipment operation)
 - (3) demonstration to account for variance required in task performance due to conditions or context differences (e.g., hot work versus work on evacuated pipeline)
- (e) distinctive physical abilities required to perform the task (e.g., color vision or hearing for Control Center Operator tasks)

8.2.3 Evaluation Method Selection. Evaluation method(s) shall be selected for each task to reflect the purpose of the evaluation. For example, evaluation for knowledge is commonly done using a written evaluation or oral interview, and skill is commonly measured through performance evaluation. Physical ability is best verified while the individual's skills are being evaluated through a performance evaluation.

8.3 Method-Specific Evaluation Requirements

8.3.1 Written Evaluations. When written evaluations are used, they shall be developed and maintained using a process that

- (a) prevents the disclosure of written evaluations and scoring keys (evaluation security).
- (b) includes administration instructions.

(c) includes questions to probe an individual's knowledge and comprehension of all task criteria, unless the criteria are covered in another part of the evaluation process.

(d) limits the use of true/false items to those situations that present two likely but only one correct choice. When deciding which format to use for a written test, considerations include how well the format matches the requirements of the job and the odds of individuals getting the item(s) right by guessing. The True/False format provides a 50/50 chance of the individual getting the answer right by guessing. Further, there are very few things that are absolutes (always, never), which increases the chances of getting T/F items right whether the person really knows the information or not. For these reasons, True/False items are only suggested for limited use.

(e) establishes which, if any, items may be completed with access to reference materials.

(f) minimizes the use of individual items that must be answered correctly in order to pass the evaluation. Written evaluations should contain a sufficient number of items to verify specific knowledge by more than one written item in order to compensate for the fact that the evaluation is imperfect and some items will be misinterpreted.

(g) sets a pass/fail score for written evaluations. Due to the fact that individuals miss items for reasons other than a lack of knowledge, such as misinterpretation of the question, misreading the question, poorly worded questions, differences in terminology, etc., the pass/fail score is normally set at less than 100%.

(h) ensures that when an individual is accommodated by having a written evaluation read to them, this reading is performed by a proctor in accordance with administration directions and without coaching the individual. Note that even though the evaluation is being read for the individual, it is still considered a written evaluation.

8.3.2 Oral Interview Evaluations. When oral interview evaluations are used, they shall be developed and maintained utilizing a process that

- (a) includes administration instructions.
- (b) assures administration that oral interview evaluations are performed by an evaluator selected in accordance with para. 8.1.1(b).

(c) includes questions to probe an individual's knowledge and comprehension of all task criteria, unless the criteria are covered in another part of the evaluation process.

(d) establishes which, if any, questions may be answered with access to reference materials.

(e) requires evaluator judgment that the individual performed satisfactorily on each question. Given the subjective judgment of an evaluator, "satisfactory" does not necessarily mean perfect. For example, an evaluator may determine that an individual's answer to a question is "satisfactory" because all of the critical ideas were

included, even though the answer may not have been as complete as the evaluator could answer it.

8.3.3 Performance Evaluations. When performance evaluations are used, to include observation during performance on the job, on-the-job training, or simulation (e.g., use of simulators, equipment mock-ups, interactive scenarios), they shall be developed and maintained utilizing a process that

- (a) includes administration instructions.
- (b) assures administration that performance evaluations are performed by an evaluator selected in accordance with para. 8.1.1(b).
- (c) specifies observable behavior or performance components to be checked by the evaluator.
- (d) establishes which behavior or performance components may be performed with access to reference materials.
- (e) specifies questions that should be asked to probe an individual's knowledge and comprehension, unless covered in another part of the evaluation process.
- (f) assures the performance evaluation occurs within an appropriate setting such as on-the-job, field simulation, or laboratory simulation. An appropriate setting is one that replicates the work setting to a sufficient degree to reflect performance on the job.
- (g) requires evaluator judgment that the individual performed satisfactorily on each item.

9 QUALIFICATIONS

(a) This section (section 9) establishes the minimum requirements for

- (1) initial and subsequent qualification
 - (2) suspension and reinstatement or revocation of qualifications
 - (3) assigning qualified and nonqualified individuals to perform covered tasks
 - (4) establishing and maintaining span-of-control ratios and subsequent qualification intervals
- (b) This Standard applies to individuals performing any covered task.

(c) This Standard does allow a qualification alternative for manufacturer or service provider personnel who are performing covered tasks. Manufacturer personnel or service provider personnel performing covered tasks at that organization's facility would be considered qualified if provisions exist for validating the correct performance of the task. Such provisions may include, but are not limited to, the following:

- (1) performance of tasks in conformance with standards developed through the ANSI process
- (2) certification of the organization's quality management program to ISO quality management system standards
- (3) certification by the organization of the individual performing the task that the work product is

in conformance with the standards or specifications established for the job, given that this certification is supported by the performing organization's quality assurance or inspection program

Manufacturer personnel or service provider personnel who are performing covered tasks on the pipeline would be considered qualified and may perform the task on the pipeline if they meet the alternative provisions above and are able to recognize and react to any AOCs that could reasonably be encountered while performing the task.

(d) Other alternative solutions may be used as long as they meet the intent of this Standard and are properly justified and documented.

9.1 Qualification Requirements

9.1.1 Responsibilities. The qualification program shall establish responsibility for

- (a) determining the qualifications individuals require
- (b) verifying the qualifications of individuals performing covered tasks
- (c) ensuring a qualified individual is assigned to direct and observe nonqualified individuals within the established span-of-control ratios
- (d) suspending and reinstating or revoking qualifications
- (e) establishing and maintaining span-of-control ratios
- (f) establishing and maintaining subsequent qualification intervals

9.1.2 Other Codes or Standards. Qualification requirements for selected covered tasks may be specified in an American National Standard (ANSI Standard), e.g., API 653, API 1104. If an entity chooses to qualify individuals under an American National Standard

- (a) the initial and subsequent qualification (certification) requirements of that standard shall govern.
- (b) requirements, other than initial and subsequent qualification (certification) requirements, of this Standard that are not included in that code or standard, such as recognition of and reaction to AOCs, shall also be met.

9.1.3 Qualification Process. Each individual who performs covered tasks on the pipeline shall be qualified through evaluation. The qualification process shall include an initial evaluation for qualification and a subsequent evaluation for qualification. Subsequent qualifications shall be completed within the specified subsequent qualification intervals established in accordance with para. 9.5 for each covered task.

9.1.3.1 Initial Qualification. Individuals shall be qualified initially for covered tasks they perform through either of the following options:

- (a) evaluation in accordance with section 8, Evaluation or

(b) completion of training, if appropriate, in accordance with section 7, Training, followed by evaluation in accordance with section 8, Evaluation.

Evaluations for initial qualification shall include a performance evaluation, unless the covered task has been determined to require only an individual's knowledge to correctly perform the task. Individuals qualified under a program prior to the issuance of this Standard can maintain their qualifications by meeting the subsequent qualification requirements established in this Standard. A documented performance evaluation, if not previously performed for a task that requires a performance evaluation for initial qualification under this Standard, should be performed either during the implementation period or at the time of subsequent qualification.

9.1.3.2 Subsequent Qualification. Subsequent qualifications by evaluation may utilize the same evaluation methods as those utilized for initial qualification or may utilize other methods that verify the required KSAs needed to perform each covered task.

When subsequent qualifications for covered tasks require performance evaluations, the verification of retention of required knowledge, skills, or distinctive physical abilities may be completed through a performance evaluation in accordance with section 8 or through documented performance monitoring or other means that confirm and document the individual is capable of performing covered tasks associated with the qualification in accordance with applicable standards or procedures.

If subsequent qualification of a covered task requires evaluation of only the required knowledge, a written or oral interview evaluation in accordance with section 8 may be used.

The subsequent qualification process for covered tasks should verify that any suspension related to the qualification has been satisfactorily resolved.

9.2 Suspension and Revocation of Qualification

The qualification program shall include processes or procedures to suspend and reinstate or revoke a qualification(s).

9.2.1 Suspension. The suspension and reinstatement process or procedures shall include, when necessary, notifying the individual and those who are responsible to assign the performance of covered tasks to the individual of the suspension or reinstatement. Suspension of qualification should be considered for, but not limited to, such items as

- (a) failure to complete requirements (such as training or subsequent qualification) that have become necessary due to a task change
- (b) failure to complete or expiration of continuing education or training required for qualification in a task

(c) if there is reason to believe an individual's performance of a covered task may have affected pipeline safety or integrity adversely or cannot be ruled out as a contributing factor

(d) subsequent qualification is not completed by the due date

(e) discovery that an individual might have been improperly evaluated

(f) if there is reason to believe a change in an individual's distinctive physical abilities has resulted in failure to complete a covered task or

(g) whenever there is reasonable belief that an individual is no longer qualified to perform a covered task(s)

9.2.2 Reinstatement. The suspended qualification(s) may be reinstated when one of the following has been completed:

(a) It has been determined and documented that the individual was and still is qualified.

(b) The individual has completed action that resolves the concern that caused the suspension (e.g., training, coaching, evaluation, completion of change communication).

(c) The qualification has been reestablished in accordance with the requirements for initial qualification (para. 9.1.3.1).

If para. 9.2.2(a), (b), or (c) is not completed, the suspended qualification shall be revoked.

9.2.3 Revocation. The revocation process or procedures shall include, when necessary, notifying the individual and those who are responsible to assign the performance of covered tasks to the individual of the revocation. Revocation of qualification should be considered for, but not limited to, such items as

- (a) a suspended qualification is not resolved in accordance with para. 9.2.2, or
- (b) when it is determined that an individual is no longer qualified

9.2.4 Additional Qualification. If it is determined that an individual is to be qualified for a revoked qualification, they shall be qualified in accordance with the applicable requirements of para. 9.1.3.1.

9.3 Qualification Requirements for Emergency Response

The first priority is to dispatch qualified individuals to respond to the emergency condition. However, nonqualified individuals that are close to the scene may be called upon to respond to an emergency condition in order to immediately protect life, property, and the environment. When practical, reasonable guidance and direction should be provided to nonqualified individuals on the appropriate actions for stabilizing the emergency condition.

Individuals whose normal job responsibilities include emergency response shall be qualified for the covered tasks they perform in responding to, stabilizing, or terminating an emergency condition.

Tasks that are performed after the emergency condition has been stabilized or terminated shall be performed by qualified individuals or nonqualified individuals under the direction and observation of qualified persons consistent with the span-of-control requirements identified in this Standard.

Professional emergency responders, such as firefighters, do not need to be qualified to perform covered tasks. Professional emergency responders who perform covered tasks under contract on behalf of the operator shall be qualified.

Individuals that perform covered tasks through a mutual aid arrangement shall perform emergency response tasks consistent with the qualification requirements for emergency responders as described above.

9.4 Performance of Covered Tasks by Nonqualified Individuals

A nonqualified individual performing a covered task shall be directed and observed by an individual who is qualified. The qualified individual is accountable for the work and shall be physically present during task performance and able to take immediate action to prevent or mitigate an AOC.

9.4.1 Direct and Observe. A span-of-control ratio that indicates the number of nonqualified individuals who can perform a task under the direction and observation of a qualified individual shall be set for each task (development of the span of control is described in para. 9.4.2). Factors that the qualified individual should consider that may require the reduction of a span of control include noise, visual obstructions, weather, or job-site conditions that make it more difficult for an individual to observe others. A span of control of 1:0 indicates that the task may not be performed by any nonqualified individual, even under the direction and observation of a qualified individual.

This Standard recognizes that a single qualified individual may, on occasion, direct and observe more than one nonqualified individual performing different covered tasks. These tasks may have different span-of-control ratios. If the performance of these multiple covered tasks is occurring at the same time, the qualified individual must adhere to the most restrictive span-of-control ratio for a given task.

For example, a qualified individual is directing and observing a nonqualified crew performing two covered tasks. Task 1 has a span-of-control ratio of 1:3, while Task 2 has a span-of-control ratio of 1:2. Per the requirements of the Standard, the qualified individual could only be responsible for monitoring two

unqualified individuals doing any combination of the two tasks.

9.4.2 Span-of-Control Ratio Development and Maintenance. The qualification program shall either adopt the span-of-control ratios in Nonmandatory Appendix A or include processes or procedures to establish and assess the span-of-control ratio for each covered task. The methods for establishing and assessing the span-of-control ratios are described in paras. 9.4.2.1 through 9.4.2.4.

9.4.2.1 Methods. The span-of-control ratio may be established by one of the following methods:

- (a) SME consensus in accordance with para. 9.4.2.2
- (b) difficulty and importance or difficulty, importance, and frequency analysis in accordance with para. 9.4.2.3
- (c) adoption of Nonmandatory Appendix A span-of-control ratios in accordance with para. 9.4.2.4
- (d) any other process that provides a rational and verifiable basis for the span-of-control ratio

9.4.2.2 SME Consensus. The initial span-of-control ratios may not exceed one qualified individual to five nonqualified individuals. SMEs shall set the span-of-control ratio considering the difficulty associated with directing and observing the task performance. The span-of-control ratios set by this method shall be assessed and reduced if necessary. The span-of-control ratios may be increased if analysis of data establishes a rational basis for a greater ratio.

As a minimum, SMEs will set the span-of-control ratio considering such factors as

- (a) difficulty and importance of the tasks associated with the qualification
- (b) task and job-site factors that affect the ability of the qualified individual to direct or observe

9.4.2.3 Difficulty (D) and Importance (I) or Difficulty, Importance, and Frequency (F) Analysis. The span-of-control ratio may be established by completion of a difficulty and importance or difficulty, importance, and frequency analysis as described in Nonmandatory Appendix G. The initial span-of-control ratios may not exceed one qualified individual to five nonqualified individuals. The span-of-control ratio shall be assessed and reduced if necessary. The span-of-control ratios may be increased if analysis of data establishes a rational basis for a greater ratio.

9.4.2.4 Adoption of Nonmandatory Appendix A Span-of-Control Ratios. If Nonmandatory Appendix A is utilized for the covered task list, the listed spans of control for each respective task in the appendix may be used. The span-of-control ratios in Nonmandatory Appendix A

were established through SME consensus. The Nonmandatory Appendix A span-of-control ratios do not exceed one to five. Assessment is not required if the span-of-control ratios in Nonmandatory Appendix A are adopted or more restrictive. Assessment of data is required to establish a rational basis to increase the adopted Nonmandatory Appendix A span-of-control ratios.

9.5 Subsequent Qualification Interval

9.5.1 Development and Implementation. The qualification program shall include processes or procedures to establish the subsequent qualification interval for each qualification. The processes and procedures shall include assessment to identify subsequent qualification intervals that require reduction, unless the subsequent qualification intervals in Nonmandatory Appendix A are adopted or are more frequent than those in Nonmandatory Appendix A. Subsequent qualification intervals can be lengthened when data can be provided that show a longer interval is prudent.

Subsequent qualification intervals may be established with a 3-month grace period. For example, tasks with a 1-yr subsequent qualification interval may be stated as 1 yr not to exceed 15 months, 3-yr subsequent qualification interval stated as 3 yr not to exceed 39 months, and 5-yr subsequent qualification intervals stated as 5 yr not to exceed 63 months.

9.5.2 Methods. The subsequent qualification interval may be established by one of the following methods:

- (a) SME consensus in accordance with para. 9.5.3
- (b) difficulty and importance or difficulty, importance, and frequency analysis in accordance with para. 9.5.4
- (c) adoption of Nonmandatory Appendix A subsequent qualification interval(s) in accordance with para. 9.5.5
- (d) any other process that provides a rational and verifiable basis for the interval

9.5.3 SME Consensus. The subsequent qualification intervals may be established by use of SMEs. The initial subsequent qualification intervals may not exceed 5 yr. The subsequent qualification intervals set by this method shall be assessed and reduced if necessary. The subsequent qualification intervals may be set longer than 5 yr if data establish a rational basis for a longer interval.

As a minimum, SMEs will set the subsequent qualification interval considering such factors as

- (a) difficulty and importance of the tasks associated with the qualification
- (b) potential for loss of knowledge, skill, or distinctive physical abilities over time
- (c) manufacturer or vendor recommendations

(d) other technical issues that may impact the safety or integrity of the pipeline

9.5.4 Difficulty and Importance Analysis or Difficulty, Importance, and Frequency Analysis. The subsequent qualification interval may be established by completion of a difficulty and importance analysis or a difficulty, importance, and frequency analysis as described in Nonmandatory Appendix G. The initial interval for subsequent qualification may not exceed 5 yr. The subsequent qualification intervals shall be assessed and reduced if necessary. The subsequent qualification interval may be set longer than 5 yr if data establish a rational basis for a longer interval.

9.5.5 Adoption of Nonmandatory Appendix A Subsequent Qualification Intervals. The subsequent qualification intervals in Nonmandatory Appendix A were established by completing a difficulty and importance analysis. The analysis was completed as described in Nonmandatory Appendix G. Frequency data were not used due to the wide variation in frequencies encountered at the industry level. The Nonmandatory Appendix A subsequent qualification intervals do not exceed 5 yr. Assessment is not required if the subsequent qualification intervals in Nonmandatory Appendix A are adopted. The subsequent qualification interval in Nonmandatory Appendix A may be increased if data establish a rational basis for a longer interval.

10 PORTABILITY

This section is nonmandatory and has been written to provide a common basis for utilizing and developing portable evaluations. A portable evaluation is an evaluation that more than one entity has mutually agreed to accept as meeting the requirements of this section (hereinafter referred to as acceptors).

Entities that choose to issue or accept portable evaluations shall describe or document how the minimum requirements of this section will be met. An entity (hereinafter referred to as a provider) may issue and manage portable evaluations. The acceptors shall describe how to determine if the portable evaluation is acceptable.

10.1 Evaluation Portability Requirements

The portable evaluation requirements of this section shall be implemented, as specified in paras. 10.1.1 through 10.1.8.

10.1.1 Section 2, Definitions. The definitions in section 2 shall apply to the processes for accepting, issuing, and managing portable evaluations.

10.1.2 Section 3, References and Standards. The references and standards in section 3 shall apply to the processes for accepting, issuing, and managing portable evaluations where applicable.

10.1.3 Section 5, Determining Covered Tasks. The provider

(a) shall identify the covered tasks in Nonmandatory Appendix A for which they will issue portable evaluations

(b) shall not change any of the steps listed in Nonmandatory Appendix A for any task, unless agreed to by the acceptors

(c) may add tasks not listed in Nonmandatory Appendix A as agreed to by the acceptors

10.1.4 Section 6, Abnormal Operating Conditions (AOCs). The provider shall incorporate AOCs identified in Nonmandatory Appendix E in their evaluation process for the portable evaluations.

10.1.5 Section 8, Evaluation

(a) The provider shall establish processes to ensure that individuals are evaluated in accordance with the requirements of section 8. The development and maintenance of portable evaluations, at a minimum, shall

(1) establish evaluation criteria for the steps for covered tasks identified in Nonmandatory Appendix A and any tasks added by SME review

(2) supplement, as necessary, the steps for covered tasks identified in Nonmandatory Appendix A to ensure the evaluations are valid and reliable

(3) incorporate the AOCs identified in Nonmandatory Appendix E that are applicable to the evaluations

(4) utilize the evaluation methods specified in Nonmandatory Appendix A that are applicable to the covered task being evaluated

(b) The acceptors shall establish the process for acceptance of portable evaluations. Portable evaluations may be accepted from a provider whose processes have been verified by the acceptors or an organization authorized by the acceptors.

10.1.6 Section 9, Qualifications. Qualification requirements for selected covered tasks may be specified in an American National Standard (ANSI standard), e.g., API 653, API 1104. If an entity chooses to qualify individuals under an American National Standard

(a) the initial and subsequent qualification (certification) requirements of that standard shall govern.

(b) requirements, other than initial and subsequent qualification (certification) requirements, of this Standard that are not included in that code or standard, such as recognition of and reaction to AOCs, shall also be met.

10.1.7 Section 12, Communicating the Qualification Program and Managing Program Changes. The provider shall develop and implement processes for communication of changes consistent with the requirements of section 12, including

(a) communicating changes in provider processes to those responsible for their implementation

(b) communicating changes affecting an individual's evaluations to the individual and others as required

(c) submitting changes to the provider's processes for review by the acceptors or an organization authorized by the acceptors

10.1.8 Section 13, Documentation Requirements. The provider shall develop and implement processes for

(a) generating and maintaining documentation as it applies to each provider's processes and the individual's evaluation records. The specific requirements are in section 13.

(b) providing a copy of an individual's evaluation records to the individual or other organization authorized by the individual within 14 calendar days of receipt of a written request from the individual.

11 PROGRAM EFFECTIVENESS

11.1 General

The qualification program shall include a process to appraise its effectiveness. An effective program minimizes human errors caused by an individual's lack of knowledge, skills, and abilities to perform tasks in a manner that maintains the safety and integrity of the pipeline. This process shall be conducted periodically at an interval of 3 yr not to exceed 39 months.

The process shall be comprised of the following three parts:

(a) determine whether the program is being implemented as documented

(b) appraise whether it is effective as implemented

(c) include provisions to update the qualification program based on the results from the implementation and effectiveness appraisals

(1) *Program Implementation.* The operator shall develop a process to evaluate if the program is being implemented and executed as documented or use Nonmandatory Appendix I, section I-1 as a guide for developing a process.

(2) *Program Measures.* The operator shall use the following measure to appraise the effectiveness of the program. This measure and any others used shall be periodically reviewed.

Number of individuals whose performance of a covered task(s) adversely affected the safety or integrity of the pipeline due to any of the following deficiencies:

- evaluation was not conducted properly
- knowledge, skill, and ability (KSA) for the specific covered task were not adequately determined
 - training was not adequate for the specific covered task
 - individual forgot needed KSA
 - change to the covered task or the KSA
 - program failed to determine the inability of the individual to perform the covered task correctly
 - individual failed to recognize an abnormal operating condition (AOC)
 - individual failed to take the appropriate action following the recognition of an AOC
 - individual was not qualified or was not being directed and observed

The initial numbers establish the baseline for the operator's program performance in the individual categories, addressing specific areas in which a program may or may not need improvement, depending on subsequent program appraisals.

The operator may select other measures specifically related to incidents or accidents caused by human error as determined by industry studies or individual operator data.

Additional examples of program effectiveness measures may be found in Nonmandatory Appendix I, section I-2.

(3) *Program Updates.* The operator shall incorporate changes into the program to address any deficiencies found as a result of the program implementation appraisals or the program measures review. This update process shall comply with the management of change process utilized for the OQ program.

12 COMMUNICATING THE QUALIFICATION PROGRAM AND MANAGING PROGRAM CHANGES

The qualification program shall incorporate processes or procedures by which its content, requirements, and implementation responsibilities are communicated in accordance with para. 12.1. Changes in the program and its implementing processes and procedures shall be communicated in accordance with the requirements of para. 12.2. Communication methods may include the following:

- (a) written notification
- (b) electronic notification (e.g., Internet, Web page, e-mail)
- (c) department meetings
- (d) training sessions
- (e) other methods as appropriate

12.1 Communicating the Qualification Program

12.1.1 Program Requirements. Communication of qualification program requirements shall include the following:

- (a) identification of the types of information that need to be communicated
- (b) determination of which affected parties should receive such communication
- (c) identification of how this information is communicated
- (d) description of how assurance is provided that needed communications have occurred

12.1.2 Qualified Individuals. Communication to qualified individuals or individuals who will be qualified shall include the following:

- (a) their responsibilities in the implementation of the qualification program
- (b) a list of covered tasks and AOCs
- (c) a method for determining their qualification status and the qualification status of individuals they may direct and observe
- (d) the requirement to perform only covered tasks for which they have been qualified, unless directed and observed by a qualified individual
- (e) procedures for directing and observing non-qualified individuals, including span-of-control requirements
- (f) action to take if an individual loses one or more qualification(s)

12.1.3 Program Responsibilities. Communication to individuals with program responsibilities shall include the following:

- (a) their role in the implementation of the qualification program
- (b) qualification program requirements
- (c) a list of covered tasks and AOCs
- (d) qualification program procedures or processes they are responsible to implement

12.2 Managing Program Changes

The qualification program shall include processes or procedures for managing and communicating changes that impact qualified individuals and individuals with program implementation responsibility. The processes and procedures should be flexible enough to accommodate changes having different levels of impact. Changes affecting the qualification program may be integrated into existing processes for managing changes to documents.

12.2.1 Management of Change Process. The management of change process is intended to ensure that qualified individuals and individuals with program implementation responsibility are provided appropriate and up-to-date information on changes affecting covered tasks and the qualification program.

The management of change process ensures that, as the qualification program or a covered task changes, qualified individuals performing covered tasks remain

qualified to perform those tasks. The management of change also ensures that individuals with program implementation responsibility have the information necessary to discharge those responsibilities.

For example, equipment changes may require a corresponding technical or procedural change. Personnel operating or maintaining such equipment need to understand and be able to follow these changed procedures.

The qualification program management of change communication processes and procedure shall include the following:

- (a) description of the change
- (b) assessment of the impact of the change on the qualification program and qualifications (see para. 12.2.3)
- (c) determination of the responsibility for communicating the change and any required actions
- (d) methods to verify communication

12.2.2 Conditions for Change. A number of conditions, whether temporary or permanent, may influence and require changes to the qualification program. The management of change process shall require identification of such changes.

The following list contains some of the changes that may affect individual qualifications or the qualification program:

- (a) modification or adoption of a new procedure or policy
- (b) changes in applicable codes, standards, and regulations
- (c) changes in equipment
- (d) changes in AOCs
- (e) implementation of new processes or technology
- (f) new information from equipment or product manufacturers
- (g) changes to evaluation criteria
- (h) modification to the covered task list
- (i) changes resulting from findings regarding investigation of events or actions that impact the safety or integrity of the pipeline
- (j) changes from program effectiveness results
- (k) changes from merger/acquisitions/divestitures
- (l) changes resulting from employee and contractor feedback

12.2.3 Rating the Impact of Changes. Managing changes affecting covered tasks shall include a process for rating the impact of each change. Depending on the impact of the change on knowledge and skills required to perform covered tasks, qualified individuals may also require training or evaluation on the change. An example of an acceptable method to accomplish this would be to rate the impact of the change as one of the following:

low impact: requires no documented change communication. Low-impact changes may include modifications that result in no material effect on the qualification program or covered tasks, such as grammatical changes to the qualification program or color deviations for paint.

medium impact: requires documented notification to affected individuals before they implement the change. Medium-impact changes may include revisions to administrative procedures, evaluation methods, company procedures, or other items that affect the implementation of the qualification program but do not require training or evaluation of qualified individuals.

high impact: requires documented communication of change to affected individuals before they implement the change. High-impact changes are those that affect the knowledge or skill required to perform a covered task or the knowledge to implement qualification program requirements. As a minimum, affected individuals shall be trained on high-impact changes.

13 DOCUMENTATION REQUIREMENTS

This section establishes the documentation requirements to create, manage, and maintain records associated with the qualification program. Existing documentation currently kept by entities may fulfill the requirements of this section. If alternative solutions have been included in the program, then the documentation shall demonstrate that these solutions meet the intent of this Standard.

13.1 Documenting the Qualification Program (Section 4)

A qualification program shall be written and maintained in accordance with section 4 of this Standard.

13.2 Documenting Communication of the Qualification Program (Section 12)

Document the initial communication of the qualification program and its requirements to the affected individuals.

13.3 Documenting Identification of Covered Tasks (Sections 5, 8, and 9)

13.3.1 Process for Identifying Covered Tasks. Describe the process used to identify covered tasks. If SMEs do not believe a task in Nonmandatory Appendix A or one where the answer is "Yes" to both questions listed in para. 5.3.2 should be covered, the task and the rationale for not including it in the covered task list shall be documented.

13.3.2 Covered Task List. Document the list of covered tasks determined by the process used to identify them.

13.3.3 Evaluation Criteria. Document the evaluation criteria for each covered task.

13.3.4 Evaluation Method. Document the appropriate evaluation method(s) for each covered task. If the task list in Nonmandatory Appendix A is adopted, further documentation is not required.

13.3.5 Subsequent Qualification Interval. Document the subsequent qualification interval for each covered task. If the subsequent qualification intervals in the task list in Nonmandatory Appendix A are adopted, further documentation is not required.

13.3.6 Span of Control. Document the span of control for each covered task. If the spans of control in the task list in Nonmandatory Appendix A are adopted, further documentation is not required.

13.4 Documenting Abnormal Operating Conditions (AOCs) (Section 6)

Document the list of AOCs that apply.

13.5 Documenting Training Needs (Section 7)

When a need is identified for training to qualify an individual to perform a covered task, the requirement for the individual to complete training shall be documented.

13.6 Documenting Training

When training is required to support an individual's qualification, training information such as an outline of the training course objectives, as well as a record of the individual's successful completion of the training, shall be documented and maintained.

13.7 Documenting an Individual's Qualification

For each qualification granted to an individual, the information specified in paras. 13.7.1 through 13.7.7 shall be on file and recorded as supporting documentation.

13.7.1 Qualified Individual. The name of the qualified individual along with a unique identifier.

13.7.2 Covered Task. The covered task for which the individual was qualified.

13.7.3 AOCs. Document that the qualified individual has been successfully evaluated on his/her ability to recognize and react appropriately to AOCs.

13.7.4 Evaluation Method. The method(s) used to evaluate the individual, if different from that prescribed in the program.

13.7.5 Qualification Date. The date of qualification.

13.7.6 Testing. If testing is used to support an individual's qualification, successful completion of the test shall be documented.

13.7.7 Evaluator. The name of the individual conducting the evaluation along with a unique identifier. A proctor is not considered an evaluator.

13.8 Documenting Credentials of an Evaluator (Section 8)

Evaluator credentials or the process used to select evaluators shall be documented. Refer to para. 8.1.1(b).

13.9 Documenting Program Changes (Section 12)

The following are the documentation requirements for changes to the qualification program:

- (a) date of change
- (b) effective date of change
- (c) description and basis of change
- (d) category of change (refer to section 12)
- (e) communication to affected individuals

13.10 Documenting Program Effectiveness Appraisals (Section 11)

All effectiveness appraisals shall be documented. The documentation shall include the following:

- (a) name of company
- (b) date
- (c) location(s)
- (d) list of the program elements reviewed during the effectiveness appraisal
- (e) name of the individual(s) performing the effectiveness appraisal
- (f) results, recommendations, and changes implemented

13.11 Maintenance of Documents

Individuals responsible for documentation shall ensure that documents are legible, accurate, completed appropriately, and traceable to the item(s) and/or activity(ies) to which they apply.

13.11.1 Formatting. Documents may be originals, copies, or electronic. Electronic documents may be scanned images, spreadsheets, or databases.

13.11.2 Record Life. Documents generated for an individual's qualifications (para. 13.7) shall be maintained for 5 yr after the qualification date expires. The remaining qualification program documents (paras. 13.1 through 13.6 and paras. 13.8 through 13.10) shall be retained while they are effective and for 5 yr from the date the documents' revisions become obsolete.

14 BIBLIOGRAPHY

The following is a list of publications that support this Standard.

API 510, Pressure Vessel Inspection Code: Maintenance Inspection, Rating, Repair, and Alteration

API Spec 12F, Specification for Shop-Welded Tanks for Storage of Production Liquids

API Std 620, Design and Construction of Large, Welded, Low-Pressure Storage Tanks

API Std 650, Welded Steel Tanks for Oil Storage

API Std 1163, In-Line Inspection Systems Qualification

API Std 2510, Design and Construction of LPG Installations

Publisher: American Petroleum Institute (API), 1220 L Street, NW, Washington, DC 20005 (www.api.org)

Constructing Test Items: Multiple-Choice, Constructed-Response, Performance, and Other Formats, Second Edition, Osterlind, Steven J. (1998)

Criterion-Referenced Test Development, Second Edition, Shrock, Sharon and Coscarelli, William (2000)

Guidelines for Chemical Process Quantitative Analysis, Center for Chemical Process Safety (1989)

Introduction to Classical & Modern Test Theory, Crocker and Algina, Holt, Rinehart, and Winston, Inc. (1986)

NACE RP0102-2001, Standard Recommended Practice, In-Line Inspection of Pipelines, NACE International

OQ Guide for Small Distribution Operators (April 2003 Edition)

Reliability and Risk Analysis, Norman J. McCormick, Academic Press (1981)

Risk & Reliability, ASME Press, Second Edition 2002

Standards for Educational and Psychological Testing-1999, American Educational Research Association, American Psychological Association, National Council on Measurement in Education

Testing and Assessment: An Employer's Guide to Good Practices, U.S. Department of Labor Employment and Training Administration (1999)

ASMENORMDOC.COM : Click to view the full PDF of ASME B31Q-2016

INTENTIONALLY LEFT BLANK

ASMENORMDOC.COM : Click to view the full PDF of ASME B31Q 2016

NONMANDATORY APPENDIX A INTEGRATED TASK LIST

A-1 DEFINITIONS

covered task hierarchy: covered tasks are organized and ranked as follows:

task: a defined unit of work having an identifiable beginning and end, evaluated in accordance with section 8.

step: an action evaluated in accordance with section 8, completed during the performance of a task.

criteria: the knowledge, skills, and ability to perform a step.

D, G, and L: these provide guidance on the potential applicability of a task to

- D:* local distribution operation.
- G:* gas transmission operation.
- L:* hazardous liquids operation.

Inclusion of these applicability designations does not relieve an entity from the responsibility to review the Nonmandatory Appendix A tasks and finalize a list of tasks that is applicable to their pipeline operations.

difficulty: level of difficulty rated as 1 = least, 5 = most

documentation (if applicable): the act of completing and submitting required records for the purpose of creating verifiable, traceable, and complete pipeline records as specified by company policy or procedure [pipe installation tasks may require records for pipe grade, heat numbers, elevation changes, offsets, lateral measurements, distances, direction changes, leak survey, cathodic protection, in-line inspection (ILI) results, repairs, print line data, manufacturer information, etc.].

identify requirements: to define the requirements, as necessary, for performing the task, such as procedures, specifications, and manufacturer instructions or recommendations.

importance: level of importance rated as 1 = least, 5 = most

inspection: examination (visually or with test equipment) to determine compliance with specified requirements.

job: a unit of work comprised of one or more tasks, e.g., line abandonment.

maintenance, corrective: the repair, replacement, alteration, or refurbishment of pipeline equipment and components.

maintenance, preventive: actions to keep components and equipment operating safely and efficiently.

place in service: to place pipeline, equipment, or components in operation and introduce product.

perform test equipment check: to verify test equipment is functioning within specified operating parameters.

P and W/O: these designations indicate the evaluation methods for initial and subsequent (sub) qualifications.

P: performance evaluation method.

W/O: written or oral evaluation method.

SCADA: supervisory control and data acquisition.

visual inspection: visual examination to determine compliance with identified requirements.

A-2 TASK LIST

Task 0001 Measure Structure-to-Electrolyte Potential

(a) *Task Guidance.* This task includes using measurement equipment to take a reading of the potential between the structure (pipe, tanks, etc.) being tested and the soil and recording data.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check.

(-a) Verify half-cell condition.

(-b) Verify calibration of proper equipment.

(-c) Verify equipment functions within specified parameters.

(3) Identify and locate correct test point.

(-a) Verify location.

(-b) Verify location of half-cell placement.

(4) Measure the structure-to-electrolyte potential.

(-a) Connect lead to structure.

(-b) Contact half-cell with electrolyte.

(-c) Verify polarity.

(-d) Obtain reading.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 1

(d) Importance: 2

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0011 Conduct Close Interval Survey

(a) *Task Guidance.* This task includes gathering electrical potential readings along the pipeline at specified intervals and recording data.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check to verify equipment functions within specified parameters.

(-a) balance of half-cell to reference cell

(-b) calibration of meter and equipment

(-c) installation of interrupter

(-1) synchronization

(-2) current flow

(3) Verify identity and location of correct test point.

(-a) geographical and structure location

(-b) connection point to structure

(-c) location of half-cell placement

(-d) physical start/stop locations

(-e) accurate survey of system routing

(4) Perform survey.

(-a) Verify position of line and spacing of electrode(s).

(-b) Identify any A/C voltage interference.

(-c) Verify location of insulation/isolation points, bonds, cased crossings, and other variances.

(-d) Confirm connections of instruments to facility.

(-e) Ensure appropriate information is captured.

(-f) Return system to original condition.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 4

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0021 Measure Soil Resistivity

(a) *Task Guidance.* This task includes using measurement equipment to measure soil resistivity and recording data.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check to verify equipment functions within specified parameters.

(-a) current and proper equipment certification as applicable

(-b) continuity of instrument leads

(-c) acceptable energy source and level

(3) Identify and locate correct soil resistivity measurement location by performing the following as applicable:

(-a) Confirm physical survey area.

(-b) Identify soil condition and potential influences.

(-c) Identify spacing and orientation at specified intervals.

(4) Measure and ensure accuracy of soil resistivity.

(-a) Take reading.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0031 Inspect and Monitor Galvanic Ground Beds/Anodes

(a) *Task Guidance.* This task includes inspecting and monitoring the electric potential of galvanic ground beds/anodes.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check.

(-a) Verify half-cell condition.

(-b) Verify calibration of proper equipment.

(-c) Verify equipment functions within specified parameters.

(3) Identify and locate corrected test point(s).

(-a) Verify location(s).

(-b) Verify location of half-cell placement.

(4) Obtain current (anode) output.

(-a) Connect lead to structure.

(-b) Contact half-cell with electrolyte.

(-c) Obtain voltage reading.

(-d) Obtain amperage reading if anode leads/shunt are accessible.

(-e) Verify polarity.

(5) Monitor ground bed/anode, if applicable.

(-a) Compare present voltage reading with past reading history.

(-b) Compare present amperage with past history if available.

(6) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 1

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0041 Installation and Maintenance of Mechanical Electrical Connections

(a) *Task Guidance.* This task includes making the mechanical connections and repair of tracer wire, test leads, bonds, shunts, etc.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform test equipment check to verify equipment functions within specified parameters.
 - (-a) Verify calibration of test equipment.
 - (-b) Inspect equipment.
 - (-c) Confirm acceptable energy source levels.
 - (-d) Test continuity of test leads.
- (3) Install, repair, or replace mechanical connection by performing the following as applicable:
 - (-a) Identify volt/current requirements of systems to be connected.
 - (-b) Determine size and type of connection.
 - (-c) De-energize and secure system.
 - (-d) Verify metallic compatibility.
 - (-e) Prepare surface or wires.
 - (-f) Perform mechanically secure and electrically conductive connection.
- (4) Verify mechanical integrity and electrical continuity.
 - (-a) Apply tension test connection.
 - (-b) Test continuity through connection.
 - (-c) Waterproof connection, if applicable.
- (5) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 2
- (d) Importance: 2
- (e) Interval: 5 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 0051 Installation of Exothermic Electrical Connections

- (a) *Task Guidance.* This task includes making exothermic (e.g., thermite, cadweld and pin-brazing) connections of tracer wire, test leads, bonds, shunts, etc.
- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform test equipment check to verify equipment functions within specified parameters.
 - (-a) Inspect equipment.
 - (-b) Verify calibration of test equipment.
 - (-c) Confirm acceptable energy source levels.
- (3) Perform exothermic connection as applicable.
 - (-a) Identify location.
 - (-b) Prepare surface.
 - (-c) Verify integrity of connection site to accept exothermic bond.
 - (-d) Select appropriate connection device.
 - (-e) Apply the appropriate energy source to activate connection weld.
- (4) Verify mechanical integrity and electrical continuity.
 - (-a) Apply tension test connection.

- (-b) Test continuity through connection.
- (5) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 2
- (d) Importance: 5
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 0061 Inspect or Test Cathodic Protection Bonds

- (a) *Task Guidance.* This task includes inspecting the physical integrity and testing of cathodic protection bonds.
- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform test equipment check to verify equipment functions within specified parameters.
 - (-a) Inspect equipment.
 - (-b) Verify calibration of test equipment.
 - (-c) Confirm acceptable energy source levels.
 - (-d) Test continuity of test leads.
- (3) Inspect or test bonds by performing the following as applicable:
 - (-a) Identify location.
 - (-b) Verify mechanical connection and electrical continuity.
 - (-c) Take structure to soil potential on each side of shunt.
 - (-d) Attach instrument leads at correct points, and take voltage readings.
 - (-e) Determine direction of current flow.
 - (-f) Perform calculation and compare with expected shunt size.
- (4) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 2
- (d) Importance: 2
- (e) Interval: 5 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 0071 Inspect or Test Cathodic Protection Electrical Isolation Devices

- (a) *Task Guidance.* This task includes inspecting the physical integrity and testing electrical isolation devices.
- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform test equipment check to verify equipment functions within specified parameters.
 - (-a) Perform half-cell maintenance.
 - (-b) Check test lead continuity.
 - (-c) Calibrate, if necessary.
- (3) Inspect or test isolation devices.

(-a) Visually inspect (e.g., for cracks or electrical arcing).

(-b) Identify and locate correct test points.

(-c) Connect test lead and reference electrode.

(-d) Confirm proper polarity.

(-e) Take readings.

(-f) Analyze readings to ensure they are within the desired range.

(4) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 2

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0081 Install Cathodic Protection Electrical Isolation Devices

(a) *Task Guidance.* This task includes the installation of electrical isolation devices.

(1) Select task procedure(s) and appropriate equipment.

(2) Install isolation devices.

(-a) Identify appropriate locations for isolation devices.

(-b) Identify appropriate type of insulator to be installed.

(-c) Bond all identified installation locations as applicable.

(-d) Install isolation device(s).

(3) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 2

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0091 Troubleshoot Active Cathodic Protection System

(a) *Task Guidance.* This task applies to operational cathodic protection (CP) systems and includes activities to determine why the CP system and components are not functioning and the identification of corrective action.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Verify equipment is calibrated.

(-c) Test equipment, as applicable.

(3) Troubleshoot Cathodic Protection System — Electrical.

(-a) Troubleshoot rectifier/impressed current source.

(-b) Troubleshoot cathodic protection ground bed.

(-c) Analyze and interpret test results.

(-1) Test to locate cable breaks.

(-2) Identify and isolate or correct sources of interference.

(-d) Identify system areas with inadequate CP test potentials.

(-e) Interrupt the cathodic protection system.

(-f) Repair or replace cathodic protection system components.

(-g) Identify and address structure to metallic contacts.

(4) Troubleshoot Cathodic Protection System — Anodes.

(-a) Determine potential on pipe.

(-b) If deficient, perform current requirement checks.

(-1) Determine lack of protection.

(-2) Determine shorted conditions.

(-c) Perform audio test, if required.

(-d) Recommend remedial action for the condition.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 4

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0101 Inspect Rectifier and Obtain Readings

(a) *Task Guidance.* This task includes inspecting the rectifier for damage and deterioration and obtaining readings as specified.

(1) Select task procedure and appropriate equipment.

(2) Perform test equipment check.

(-a) Ensure voltmeter has adequate battery life.

(-b) Ensure half-cell is filled adequately with the correct chemical and calibrated, if applicable.

(3) Visually examine for

(-a) security of facility

(-b) condition of rectifier case, cables, and supports

(4) Ensure there is no short across the rectifier case to ensure a safe condition exists to perform inspection.

(5) Connect voltmeter to correct points on the rectifier to a location determined to give the most accurate readings.

(6) Obtain voltage and current output readings.

(7) Make appropriate notifications if conditions warrant remediation.

(8) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 1

(d) Importance: 1

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0111 Maintain Rectifier

(a) *Task Guidance.* This task includes verification that the rectifier is functioning within specified parameters, after a rectifier has been hung and AC power connected and prior to or during placing in service. This task also includes actions to repair or replace in-service rectifiers or components.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Verify equipment is calibrated.

(-c) Test equipment, as applicable.

(3) Test rectifier, and troubleshoot problems.

(-a) Monitor requirements of all impressed current sources.

(-b) Visually inspect components of the rectifier.

(-c) Check electrical connections (anode, ground beds, power supply, structure, electrical ground, etc.).

(-d) Identify and locate correct test points.

(-e) Connect instruments and test leads to correct locations.

(-f) Operate test equipment, and take readings.

(-1) rectifier voltage and current output to include current drains, shunt using a high-impedance voltmeter, ammeter (direct or indirect), and shunt, if applicable

(-2) watt-hour reading, if applicable

(-3) internally mounted voltage and amperage meter

(-g) Analyze and interpret test results.

(-1) maximum rated outputs

(-2) common component failures and output indications

(4) Repair or replace defective rectifier components, as applicable.

(-a) AC/DC circuit breakers

(-b) power connection/safety ground

(-c) fuses

(-d) diodes

(-e) disconnects

(-f) rectifying elements

(-g) transformer

(-h) lightning arresters

(-i) shunts

(-j) AC filters/chokes

(-k) stack

(-l) meters

(5) Place in service.

(-a) Verify that there are no electrical shorts.

(-b) Verify that the potential on the pipe shifts negatively when the rectifier is energized.

(6) Make coarse and fine output adjustments as necessary to protect the system.

(7) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0121 Collect Sample for Internal Corrosion Monitoring

(a) *Task Guidance.* This task includes the collection and handling of samples (gas, liquid, solids) for internal corrosion monitoring and preventing contamination of the sample.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform equipment check.

(-a) Visually inspect the fittings to avoid contamination of the sample.

(-b) Install appropriate pressure control device, if applicable.

(-c) Test for sample container leaks.

(3) Collect sample.

(-a) Purge connections and sample container.

(-b) Obtain sample.

(-c) Test container for leaks, and secure for shipment, if applicable.

(4) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0131 Insert and Remove Coupons/Probes for Internal Corrosion Monitoring

(a) *Task Guidance.* This task includes inserting and removing coupons/probes for internal corrosion monitoring and preventing contamination or damage of the coupons/probes.

(1) Select task procedure(s) and appropriate equipment.

(2) Prior to removal or installation

(-a) Verify pipeline status (In or Out of Service).

(-b) Notify the Pipeline Control Center, if required.

(-c) Record coupon identification information.

(3) Retract and remove coupon/probe.

(-a) Isolate coupon probe site (Lockout/Tagout).

(-b) Relieve pressure of product.

(-c) Remove cap and coupon holder.

(4) Install coupon/probe in holder.

(-a) Ensure coupon/probe is installed without contamination.

(-b) Pressurize, and ensure no leaks.

(-c) Insert coupon to proper position for contact with product.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 5

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0141 Visual Inspection for Atmospheric Corrosion

(a) *Task Guidance.* This task includes the inspection of pipe and pipeline components exposed to the atmosphere for the purpose of detecting atmospheric corrosion.

(1) Select task procedure(s) and appropriate equipment.

(2) Inspect the following locations for atmospheric corrosion as applicable:

(-a) pipe, pipe supports, and other pipeline components

(-b) under thermal insulation

(-c) at ground level on risers and other pipe to soil-air interfaces

(-d) spans over water

(-e) other areas necessary to determine extent of corrosion

(3) Inspect the following indications of corrosion:

(-a) indications of rust

(-b) surface pitting

(-c) missing, damaged, or disbonded coating

(-d) other forms of corrosion

(4) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 1

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0151 Visual Inspection of Buried Pipe and Components When Exposed

(a) *Task Guidance.* This task includes the inspection of buried pipe and pipeline components when exposed for the purpose of detecting external corrosion and evaluating coating integrity.

(1) Select task procedure(s) and appropriate equipment.

(2) Inspect and evaluate protective coating for

(-a) deterioration

(-b) cracks

(-c) holidays

(-d) disbondment

(3) Inspect external surfaces of pipe and components when exposed.

(-a) Examine bare pipe for external corrosion.

(-b) Investigate circumferentially and horizontally if external corrosion found.

(4) Make notifications, as appropriate.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0161 Visual Inspection for Internal Corrosion

(a) *Task Guidance.* This task includes the inspection of the internal surface of pipe and pipeline components, including tapping coupons, when exposed for the purpose of detecting internal corrosion.

(1) Select task procedure(s) and appropriate equipment.

(2) Clean surface, if applicable.

(3) Inspect available internal surfaces.

(-a) metal loss

(-b) scaling

(-c) rust

(4) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 3

(e) Interval: 3 yr

- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 0171 Measure External Corrosion

(a) *Task Guidance.* This task includes activities to measure and characterize external corrosion, including investigation to determine the extent of corrosion and recording data.

(1) Select task procedure and appropriate equipment.

(2) Prepare surface.

(-a) Ensure that pipe surface is cleaned and prepared for measurement.

(-b) Place grid patterns, as appropriate.

(3) Perform test equipment check.

(-a) Ensure adequate power source, as appropriate.

(-b) Calibrate using known pipe sample.

(4) Take measurements.

(-a) Use adequate conductive material, as appropriate.

(-b) Ensure measurements of length, depth, and thickness are taken.

(-c) Ensure the location of each indication of external corrosion is mapped.

(5) Record the characteristics of corrosion for each indication.

(-a) dent or gouge with corrosion

(-b) generalized pitting

(-c) localized pitting

(6) Make notifications, as appropriate.

(7) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:1

Task 0181 Measure Internal Corrosion

(a) *Task Guidance.* This task includes activities to measure and characterize internal corrosion, including investigation to determine the extent of corrosion and recording data.

(1) Select task procedure(s) and appropriate equipment.

(2) Clean the internal surface of the pipe.

(3) Visually inspect the pipe surface for signs of corrosion.

(4) Visually inspect the internal surface of the pipe for damage. If found, make notifications as required.

(5) Perform test equipment check.

(-a) Ensure adequate power source.

(-b) Use adequate conduit material.

(-c) Calibrate using known pipe sample.

(6) Take measurements.

(-a) Ensure measurements of length, depth, and thickness are taken correctly.

(-b) Ensure the location of each indication on the pipe surface of internal corrosion is correctly mapped.

(7) Record the characteristics of corrosion for each indication.

(-a) indications of bacterial growth

(-b) dent or gouge with corrosion

(-c) generalized pitting

(-d) localized pitting

(8) Make notifications, as appropriate.

(9) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 4

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:1

Task 0191 Measure Atmospheric Corrosion

(a) *Task Guidance.* This task includes activities to measure and characterize atmospheric corrosion, including investigation to determine the extent of corrosion and recording data.

(1) Select task procedure(s) and appropriate equipment.

(2) Assess/confirm surface condition for the following:

(-a) deterioration

(-b) flaking

(-c) peeling

(-d) cracking

(-e) sags

(-f) blisters

(-g) wrinkles

(3) Prepare surface.

(-a) Remove foreign material and/or damaged coating to expose corrosion, as applicable.

(4) Perform test equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Verify equipment is calibrated.

(-c) Test equipment with known sources, as applicable.

(5) Take measurements by the following methods, as applicable:

(-a) pit depth gage

(-b) ultrasonic thickness meter

- (6) Identify corrosion associated with
 - (-a) gouges
 - (-b) dents
 - (-c) scratches
- (7) Identify characteristics of corrosion.
 - (-a) pitting
 - (-b) scale
 - (-c) rust
- (8) Record findings.
 - (-a) depth, length, and spacing of corrosion (pits)
 - (-b) type of damage to pipe
- (9) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 3
- (d) Importance: 3
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 0201 Visual Inspection of Installed Pipe and Components for Mechanical Damage

(a) *Task Guidance.* This task includes activities associated with the inspection of installed pipe and components for the purpose of detecting mechanical damage (e.g., dents, gouges, cracks).

(1) Select task procedure(s) and appropriate equipment.

(2) Inspect the following locations for damage, as applicable:

- (-a) pipe, pipe supports, and other pipeline components
- (-b) at ground level on risers
- (-c) spans over water
- (-d) under damaged or missing thermal insulation
- (-e) other areas necessary to determine extent of damage

(3) Inspect the following indications of mechanical damage, as applicable:

- (-a) missing, damaged, or disbonded coating
- (-b) cuts, dents, gouges, and cracks
- (-c) wrinkle bends and buckling

(4) Inspect internal surfaces of pipe and components for physical damage, as applicable.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:1

Task 0211 Measure and Characterize Mechanical Damage on Installed Pipe and Components

(a) *Task Guidance.* This task includes activities to measure and characterize mechanical damage (e.g., dents, gouges, cracks) on installed pipe and components, including investigation to determine the extent of damage and recording data.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform equipment check.

(3) Prepare surface for type of

(-a) measurement

(-b) device

(-c) damage

(4) Measure and characterize mechanical damage.

(-a) Measure depth and length.

(-b) Determine orientation and location.

(-c) Look for deformation associated with the mechanical damage.

(-d) Determine if the mechanical damage involves a girth weld or longitudinal seam.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:1

Task 0221 Inspect, Test, and Maintain Sensing Devices

(a) *Task Guidance.* This task includes verification that the sensing device (e.g., pressure switches; pressure, temperature, and differential transmitters) is functioning within specified parameters, after a sensing device has been installed and prior to or during placing in service. This task also includes actions to repair or replace sensing devices and adjust set points or output.

(1) Select task procedure(s) and appropriate equipment.

(2) Verify identification.

(-a) Ensure sensing device(s) identification is not damaged, missing, etc.

(-b) Note where device information can be found if it is missing or damaged.

(3) Perform test equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Verify equipment is calibrated.

(-c) Test equipment with known sources, as applicable.

(4) Visually inspect sensing device for

(-a) dirt, debris, or corrosion

(-b) bare or frayed electrical wires (if installed)

- (-c) physical damage to sensor body/housing
- (-d) leaks
- (-e) missing or damaged components
- (-f) proper set point/output setting, as applicable
- (5) Isolate device from system.
 - (-a) Notify appropriate personnel.
 - (-b) Bypass system, as appropriate.
 - (-c) Relieve/verify pressure in isolated section.
 - (-d) Monitor pressure if bypass is non-regulated.
- (6) Conduct performance test.
 - (-a) Test device for appropriate operation.
 - (-b) Ensure device does not exceed its operating parameters.
- (7) Remove and replace sensing device.
 - (-a) Disconnect all energy sources (e.g., electrical, pneumatic), and properly release stored energy, as applicable.
 - (-b) Remove device.
 - (-c) Verify the sensor selected is compatible with system.
 - (-d) Install device.
 - (-e) Reconnect energy sources, as applicable.
 - (-f) Inspect for proper installation.
- (8) Adjust/verify set point or output parameters.
 - (-a) Adjust device to required set point.
 - (-b) Test device using appropriate test equipment to ensure proper operation over intended operating range.
 - (-c) Ensure pressure/temperature limits of the device are not exceeded.
- (9) Place in service.
 - (-a) Verify proper operation and set points prior to returning to service.
 - (-b) Place the device in service, and return to normal operation.
 - (-c) Check for leaks.
 - (-d) Notify appropriate personnel, as required.
- (10) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 3
- (d) Importance: 5
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 0231 Inspect, Test, and Maintain Programmable Logic Controllers (PLC)

(a) *Task Guidance.* This task includes verification that the PLC is functioning within specified parameters, after a PLC has been installed and prior to or during placing in service. This task also includes actions to repair or

replace PLCs and components and to adjust set points or output as specified.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Isolate PLC from system.
 - (-a) Notify appropriate personnel.
 - (-b) Verify point-to-point communication prior to disconnection.
 - (-c) Bypass system, as appropriate.
- (3) Perform test equipment check to verify that PLC functions within specified parameters.
 - (-a) Inspect equipment.
 - (-b) Verify equipment is calibrated.
 - (-c) Test equipment with known sources, as applicable.
- (4) Visually inspect PLC for
 - (-a) dirt, debris, or corrosion
 - (-b) bare or frayed electrical wires
 - (-c) physical damage to unit
 - (-d) missing or damaged components
 - (-e) proper set point/output setting, as applicable
- (5) Conduct performance test.
 - (-a) Test PLC for appropriate operation. Verify
 - (-1) input/output (I/O) points between devices
 - (-2) critical control sequences
 - (-3) alarms match between location and control center
- (6) Maintain PLC.
 - (-a) Disconnect all energy sources (e.g., electrical, pneumatic).
 - (-b) Remove device, if applicable.
 - (-c) Download and install software updates, if applicable.
 - (-d) Reconnect energy sources, as applicable.
 - (-e) Inspect for proper installation.
 - (-f) Adjust PLC to required set point.
 - (-g) Test PLC using appropriate test equipment to ensure proper operation.
- (7) Place PLC back in service.
 - (-a) Test device for appropriate operation.
 - (-b) Ensure device does not exceed operating parameters.
 - (-c) Verify proper operation and set points.
 - (-d) Return to normal operation.
 - (-e) Notify appropriate personnel, as required.
- (8) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 4
- (d) Importance: 5
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 0241 Inspect, Test, and Maintain Liquid Leak Detection Flow Computers

(a) *Task Guidance.* This task includes verification that the flow computer, when used in a computational pipeline monitoring leak detection system, is functioning within specified parameters, after a flow computer has been installed and prior to or during placing in service. This task also includes actions to repair or replace flow computers and components and to adjust set points or output as specified.

(1) Select task procedure(s) and appropriate equipment.

(2) Notify Pipeline Control Center and/or affected personnel prior to performing work.

(3) Visually inspect device and associated equipment, checking for

(-a) mechanical condition

(-b) corrosion

(-c) electrical connections

(4) Repair/replace device/equipment, following the manufacturer's recommendations.

(5) Verify input/output of device meets parameter values.

(-a) Adjust/repair, as appropriate.

(6) Verify flow computer configuration meets parameters.

(-a) Adjust/repair, as appropriate.

(7) Verify communication links are functioning.

(8) Notify Pipeline Control Center and/or affected personnel when work is completed.

(9) Document, as required.

(b) Potential applicability: L

(c) Difficulty: 4

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0251 Inspection and Testing, Corrective and Preventive Maintenance — Overfill Protection Systems

(a) *Task Guidance.* This task includes verification that the overfill protection system is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the overfill protection system and actions to verify operation and maintain the overfill protection system. This task includes adjusting the set point as specified.

(1) Select task procedure(s) and appropriate equipment.

(2) Notify Pipeline Control Center and/or affected personnel prior to performing test.

(3) Visually inspect overfill protective device.

(-a) corrosion

(-b) damage

(-c) abnormal wear

(-d) water inside enclosure

(-e) cracks

(-f) broken threads

(4) Conduct performance test.

(-a) Visually inspect displacers and chain/cable integrity.

(-b) Manually trip lever or move displacer until contact(s) change state.

(-c) Verify the following:

(-1) alarms received at Pipeline Control Center, if applicable

(-2) alarms cleared appropriately after returning to normal conditions

(-3) correct sequence of events occurs

(5) Clean, repair, or replace overfill protective device as specified by the manufacturer's recommendations.

(6) Confirm alarm(s) are consistent with the predetermined product levels.

(7) Adjust the set point by moving the float or displacer to a new position on the rod, cable, or chain, if necessary.

(8) Notify Pipeline Control Center and/or affected personnel that work is complete.

(9) Document, as required.

(b) Potential applicability: L

(c) Difficulty: 4

(d) Importance: 5

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0261 Inspection and Testing, Corrective and Preventive Maintenance — Tank Level Indicator Devices

(a) *Task Guidance.* This task includes verification that the tank level indicator is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the tank level indicator and actions to verify operation and maintain the tank level indicator.

(1) Select task procedure(s) and appropriate equipment.

(2) Make notifications, as appropriate.

(3) Perform test equipment check.

(4) Visually inspect component(s) for damage or leaks.

(5) Confirm if the tank level indicator is within the manufacturer's specified tolerance/range. If not, calibrate so it is within the specified tolerance range.

(6) If the tank level indicator cannot be calibrated to within the manufacturer's specified tolerances/ranges, replace.

(7) Put the tank level indicator back into service.

(8) Make notifications, as appropriate.

(9) Conduct performance test.

(10) Document, as required.

(b) Potential applicability: L

(c) Difficulty: 4

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0271 Prove Flowmeters for Hazardous Liquid Leak Detection

(a) *Task Guidance.* This task includes data recording and calculations to manually verify (prove) the accuracy of flowmeters for hazardous leak detection. This includes activities to bring prover online and take off line. Qualification is not required when verification is performed automatically by flow computers or PLCs.

(1) Select task procedure(s) and appropriate equipment.

(2) Notify Pipeline Control Center and/or affected personnel prior to performing meter proving.

(3) Verify that equipment is calibrated.

(4) Make connections to appropriate meter equipment, if necessary (e.g., portable prover).

(5) Line up appropriate valves and flush prover with the pipeline product.

(6) Check seal integrity on double-block-and-bleed valves.

(7) Verify pressure, temperature, and flow rate are stable between prover and meter.

(8) Start proving run(s). Complete number of runs as specified in company or industry standards.

(9) Verify proving data, and calculate meter factor.

(-a) Check measurement system prior to recalculating meter factor, if necessary (e.g., meter factor is more than 0.25% difference).

(-b) Check measurement system, and inspect/repair/recondition meter, if necessary (e.g., meter factor is more than 0.50% difference).

(10) Implement new meter factor, if necessary.

(11) Drain/depressurize/disconnect from meter equipment, if necessary (e.g., portable prover).

(12) Reset valves to normal operating conditions.

(13) Notify Pipeline Control Center that proving is completed.

(14) Document, as required.

(b) Potential applicability: L

(c) Difficulty: 3

(d) Importance: 2

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0281 Maintain Flowmeters for Hazardous Liquid Leak Detection

(a) *Task Guidance.* This task includes verification that the flowmeter (e.g., line integrity meters), when used for hazardous liquid leak detection, is functioning within specified parameters, after a flowmeter has been installed and prior to or during placing in service. This task also includes actions to repair or replace flowmeters and components and adjusting output.

(1) Select task procedure(s) and appropriate equipment.

(2) Notify Pipeline Control Center and/or appropriate personnel prior to performing maintenance.

(3) Visually inspect meter and components.

(-a) physical condition

(-b) corrosion

(-c) leaks

(-d) electrical connections

(4) Perform diagnostics to determine if repairs are needed.

(-a) pulse output diagnostics

(-b) meter factor trend analysis

(-c) vibration

(-d) noise

(-e) electrical power and connections

(5) Repair/replace flowmeter, if necessary.

(-a) Isolate, depressurize, and purge piping.

(-b) Remove meter from pipeline.

(-c) Perform repair, or replace.

(-d) Reinstall meter, confirming correct orientation for product flow.

(-e) Remove isolation devices.

(-f) Conduct visual inspection of meter.

(-g) Ensure the meter is proved.

(6) Notify Pipeline Control Center that maintenance work is completed.

(7) Document, as required.

(b) Potential applicability: L

(c) Difficulty: 4

(d) Importance: 2

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 0291 Inspect, Test, and Maintain Gravitometers/Densitometers for Hazardous Liquid Leak Detection

(a) *Task Guidance.* This task includes verification that the gravitometers/densitometers when used for leak

detection are functioning within specified parameters, after gravitometers/densitometers have been installed and prior to or during placing in service. This task also includes actions to repair or replace gravitometers/densitometers and components and to adjust output.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check to verify that equipment functions within specified parameters.

(3) Visually inspect the gravitometer/densitometer for signs of physical damage or leakage.

(4) Clean measuring tube as needed.

(5) Determine calibration and accuracy of the gravitometer/densitometer by checking output measurement of known source(s).

(6) Adjust the equipment as needed.

(7) Document, as required.

(b) Potential applicability: L

(c) Difficulty: 3

(d) Importance: 2

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 0301 Manually Opening and Closing Valves

(a) *Task Guidance.* This task includes manually opening and closing valves (e.g., pipeline startup and shut-down, flow direction, pigging, tank switching) at the valve site, either manually or using the valve actuator. It also includes valve identification, notifications, and pressure verification. It does not include the operation of valves for

- adjusting and monitoring flow or pressure as addressed in Task 0311, Adjust and Monitor Flow or Pressure — Manual Valve Operation

- temporary isolation of service lines and service discontinuance as addressed in Task 1201, Temporary Isolation of Service Lines and Service Discontinuance

(1) Select task procedure(s) and appropriate equipment.

(2) Prepare to manually operate valve.

(-a) Identify segment and impact of pressure changes due to valve operation.

(-b) Identify valve type and method of operation.

(-c) Verify valve position (open, closed, etc.).

(-d) Communicate with appropriate personnel (operations, Pipeline Control Center, customers, etc.).

(3) Open/close valve.

(-a) Remove security device, if applicable.

(-b) Open or close valve, as applicable.

(-c) Verify valve operates and changes position, as expected.

(-d) Replace security device, if applicable.

(-e) Complete notifications with appropriate personnel (operations, Pipeline Control Center, customers, etc.).

(4) Confirm anticipated pressure/flow changes.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:3

Task 0311 Adjust and Monitor Flow or Pressure — Manual Valve Operation

(a) *Task Guidance.* This task includes the adjustment of flow or pressure either manually or using the valve actuator at the valve site. It also includes valve identification, notifications, and pressure verification. It does not include

- manually opening and closing valves as addressed in Task 0301, Manually Opening and Closing Valves

- temporary isolation of service lines and service discontinuance as addressed in Task 1201, Temporary Isolation of Service Lines and Service Discontinuance

(1) Select task procedure(s) and appropriate equipment.

(2) Prepare to manually operate valve.

(-a) Identify segment and impact of pressure changes due to valve operation.

(-b) Identify valve type and method of operation.

(-c) Verify valve position (open, closed, etc.).

(-d) Communicate with appropriate personnel (operations, Pipeline Control Center, customers, etc.).

(3) Operate valve to adjust and maintain required pressure/flow.

(-a) Remove security device, if applicable.

(-b) Verify that the valve is in the proper position.

(-c) Ensure valve changes position, as expected.

(-d) Ensure anticipated pressure/flow change is achieved.

(-e) Replace security device, if applicable.

(4) Monitor pressure/flow by appropriate methods.

(-a) Ensure anticipated pressure/flow change is achieved.

(-b) Ensure maximum allowable operating pressure (MAOP)/maximum operating pressure (MOP) is not exceeded.

(-1) If MAOP/MOP is exceeded, take appropriate actions.

(-c) Communicate with appropriate personnel (operations, Pipeline Control Center, customers, etc.).

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 4

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:1

Task 0321 Valve Corrective Maintenance

(a) *Task Guidance.* This task includes the repair, replacement, alteration, or refurbishment of valves, except valves for the temporary isolation of service lines and service discontinuance as addressed in Task 1191, Maintenance of Service Valves Upstream of Customer Meter.

(1) Select task procedure(s) and appropriate equipment.

(2) Verify valve identification, as applicable.

(-a) Identify valve location.

(-b) Confirm valve position (open/closed).

(-c) Communicate with appropriate personnel (operations, control center, customers, etc.).

(3) Perform valve corrective maintenance, as applicable.

(-a) Repair or replace locking device.

(-b) Clean valve box.

(-c) Replace or adjust valve box.

(-d) Flush valve.

(-e) Set adjustments.

(-f) Replace or adjust packing or seals.

(4) Lubricate valve, as applicable.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 4

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 0331 Valve — Visual Inspection and Partial Operation

(a) *Task Guidance.* This task includes visual inspection, partial operation (function test), and lubrication of valves, except valves for the temporary isolation of service lines and service discontinuance as addressed in Task 1191, Maintenance of Service Valves Upstream of Customer Meter.

(1) Select task procedure(s) and appropriate equipment.

(2) Identify correct valve to be inspected and operated by

(-a) review of records

(-b) use of identification cards or tags

(-c) location description

(-d) size and type (plug/gate)

(-e) valve position (open/closed)

(-f) system feed (one way or two way)

(3) Make notifications, as appropriate.

(4) Perform inspection and partial operation.

(-a) Check for the correct locking device installed, if applicable.

(-b) Verify the valve is accessible.

(-c) Check for damage.

(-d) Check for signs of corrosion.

(-e) Use correct valve key or tool to perform partial operation of valve. (Valve should move freely.)

(-f) Return valve to its operational position.

(5) Lubricate valve as specified by manufacturer, if applicable.

(6) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 0341 Valve — Preventive Maintenance

(a) *Task Guidance.* This task encompasses actions (e.g., lubrication, winterization, packing adjustment) to keep valves operating safely and efficiently, except relief valves as addressed in

- Task 0411, Spring-Loaded, Pressure-Limiting, and -Relief Device — Inspection, Testing, Preventive and Corrective Maintenance

- Task 0421, Pilot-Operated, Pressure-Limiting, and -Relief Device — Inspection, Testing, Preventive and Corrective Maintenance

- Task 0431, Pneumatic-Loaded, Pressure-Limiting, and -Relief Device — Inspection, Testing, Preventive and Corrective Maintenance

(1) Select task procedure(s) and appropriate equipment.

(2) Prepare to perform valve preventive maintenance.

(-a) Identify valve location.

(-b) Confirm valve position (open/closed).

(-c) Communicate with appropriate personnel (operations, control center, customers, etc.).

(3) Perform the following preventive maintenance, as applicable:

(-a) Inspect all valve components for abnormal conditions (e.g., corrosion, leaks, excessive wear), and correct as necessary.

(-b) Isolate valve, if required.

- (-c) Blowdown (bleed) valve body.
- (-d) Drain liquids (e.g., water) from valve body.
- (-e) Clean stem threads.
- (-f) Inspect and/or replace stem packing.
- (-g) Winterize valves subject to freezing.
- (-h) Operate injection equipment, and inject corrosion inhibitor.
- (-i) Perform lubrication of components (e.g., stem, bearings).
- (-j) Check for valve seat leak-by, and inject valve sealant/flush.
- (-k) Confirm proper valve operation.
- (-l) Remove isolation, and return to service.
- (4) Lubricate valve.
 - (-a) Identify type and quantity of lubricant for service and valve type.
 - (-b) Identify pressure rating of valve.
 - (-c) Monitor grease pressure to ensure valve pressure rating is not exceeded during lubrication.
- (5) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0351 Pneumatic Actuator/Operator Inspection and Testing, Preventive and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the actuator/operator is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair, replacement, alteration, or refurbishment of the actuator/operator and actions to keep the actuator/operator operating safely and efficiently.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Prepare to perform actuator/operator inspection and testing.
 - (-a) Identify valve location.
 - (-b) Confirm valve position (open/closed).
 - (-c) Communicate with appropriate personnel (operations, control center, customers, etc.).
- (3) Perform test equipment check to verify that equipment functions within specified parameters.
 - (-a) Inspect equipment.
 - (-b) Verify equipment is calibrated.
 - (-c) Test equipment with known sources, as applicable.
- (4) Visually inspect actuator/operator.
 - (-a) Inspect for leaks, wear, corrosion, damage, etc.
 - (-b) Verify accessibility.

- (5) Perform the following preventive and corrective maintenance steps, as applicable:
 - (-a) Isolate valve.
 - (-b) Isolate actuator/operator from energy source(s).
 - (-c) Calibrate actuator/operator.
 - (-d) Align actuator/operator, and verify actuator tie down bolts are tight and torqued correctly.
- (6) Adjust set point(s) of the following, as applicable:
 - (-a) valve stroke
 - (-b) limit switches for proper valve position
 - (-c) torque switches
 - (-d) valve and operator stops
 - (-e) speed of travel
- (7) Conduct performance test.
 - (-a) Notify appropriate personnel.
 - (-b) Restore energy source(s).
 - (-c) Test in appropriate modes (e.g., manual/local, automatic/remote).
 - (-d) Confirm valve positions are properly displayed on SCADA, if applicable.
- (8) Place in service.
 - (-a) Restore energy source(s).
 - (-b) Notify appropriate personnel.
 - (-c) Return actuator/operator to required settings (e.g., manual, automatic, remote control).
- (9) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0361 Electric Actuator/Operator Inspection and Testing, Preventive and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the actuator/operator is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair, replacement, alteration, or refurbishment of the actuator/operator and actions to keep the actuator/operator operating safely and efficiently.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Prepare to perform actuator/operator inspection and testing.
 - (-a) Identify valve location.
 - (-b) Confirm valve position (open/closed).
 - (-c) Communicate with appropriate personnel (operations, control center, customers, etc.).
- (3) Perform test equipment check to verify that equipment functions within specified parameters.
 - (-a) Inspect equipment.

- (-b) Verify equipment is calibrated.
- (-c) Test equipment with known sources, as applicable.
- (4) Visually inspect actuator/operator.
 - (-a) Inspect for leaks, wear, corrosion, damage, etc.
 - (-b) Verify accessibility.
- (5) Perform the following preventive and corrective maintenance steps, as applicable:
 - (-a) Isolate valve.
 - (-b) Isolate actuator/operator from energy source(s).
 - (-c) Calibrate actuator/operator.
 - (-d) Align actuator/operator, and verify actuator tie down bolts are tight and torqued correctly.
- (6) Adjust set point(s) of the following, as applicable:
 - (-a) valve stroke
 - (-b) limit switches for proper valve position
 - (-c) torque switches
 - (-d) valve and operator stops
 - (-e) speed of travel
- (7) Conduct performance test.
 - (-a) Notify appropriate personnel.
 - (-b) Restore energy source(s).
 - (-c) Test in appropriate modes (e.g., manual/local, automatic/remote).
 - (-d) Confirm valve positions are properly displayed on SCADA, if applicable.
- (8) Place in service.
 - (-a) Restore energy source(s).
 - (-b) Notify appropriate personnel.
 - (-c) Return actuator/operator to required settings (e.g., manual, automatic, remote control).
- (9) Document, as required.
 - (b) Potential applicability: L, G, D
 - (c) Difficulty: 4
 - (d) Importance: 4
 - (e) Interval: 3 yr
 - (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
 - (g) Span of control: 1:2

Task 0371 Hydraulic Actuator/Operator Inspection and Testing, Preventive and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the actuator/operator is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair, replacement, alteration, or refurbishment of the actuator/operator and actions to keep the actuator/operator operating safely and efficiently.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Prepare to perform actuator/operator inspection and testing.

- (-a) Identify valve location.
- (-b) Confirm valve position (open/closed).
- (-c) Communicate with appropriate personnel (operations, control center, customers, etc.).
- (3) Perform test equipment check to verify that equipment functions within specified parameters.
 - (-a) Inspect equipment.
 - (-b) Verify equipment is calibrated.
 - (-c) Test equipment with known sources, as applicable.
- (4) Visually inspect actuator/operator.
 - (-a) Inspect for leaks, wear, corrosion, damage, etc.
 - (-b) Verify accessibility.
- (5) Perform the following preventive and corrective maintenance steps, as applicable:
 - (-a) Isolate valve.
 - (-b) Isolate actuator/operator from energy source(s).
 - (-c) Calibrate actuator/operator.
 - (-d) Align actuator/operator, and verify actuator tie down bolts are tight and torqued correctly.
- (6) Adjust set point(s) of the following, as applicable:
 - (-a) valve stroke
 - (-b) limit switches for proper valve position
 - (-c) torque switches
 - (-d) valve and operator stops
 - (-e) speed of travel
- (7) Conduct performance test.
 - (-a) Notify appropriate personnel.
 - (-b) Restore energy source(s).
 - (-c) Test in appropriate modes (e.g., manual/local, automatic/remote).
 - (-d) Confirm valve positions are properly displayed on SCADA, if applicable.
- (8) Place in service.
 - (-a) Restore energy source(s).
 - (-b) Notify appropriate personnel.
 - (-c) Return actuator/operator to required settings (e.g., manual, automatic, remote control).
- (9) Document, as required.
 - (b) Potential applicability: L, G, D
 - (c) Difficulty: 4
 - (d) Importance: 4
 - (e) Interval: 3 yr
 - (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
 - (g) Span of control: 1:2

Task 0381 Spring-Loaded, Pressure-Regulating Device — Inspection and Testing, Preventive and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the pressure-regulating device is functioning within specified parameters, after installation and prior to or

during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the pressure-regulating device and actions to keep the pressure-regulating device operating safely and efficiently. This task excludes customer regulation addressed in

- Task 1161, Installation of Customer Meters and Regulators: Residential and Small Commercial

- Task 1181, Installing and Maintaining Customer Pressure-Regulating, Pressure-Limiting, and -Relief Devices: Large Commercial and Industrial

(1) Select task procedure(s) and appropriate equipment.

(2) Review and verify records for identification of

(-a) location

(-b) model and size

(-c) operating capacity

(-d) valves and position of valves (open/closed, locking devices installed)

(-e) primary/secondary regulator(s) if applicable

(-f) communication to appropriate personnel (operations, control center, customers, etc.), as applicable

(3) Perform test equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Verify equipment is calibrated.

(-c) Test equipment with known sources, as applicable.

(4) Visual inspection of the following, including but not limited to:

(-a) appropriate location

(-b) proper installation

(-c) coating

(-d) atmospheric venting of spring housing

(-e) worn parts, if internal inspection is applicable

(-f) signs of atmospheric corrosion

(5) Testing of operation

(-a) Shut down or start up as specified by the manufacturer.

(-b) Adjust pressure range, if applicable.

(-c) Correct set point(s) identified.

(-d) Check lock up.

(6) Preventive and maintenance activities

(-a) Replace worn or broken parts, if applicable.

(-b) Protect against elements.

(-c) Adjust set point to operational requirement.

(-d) Monitor pressure.

(-e) Install locking devices.

(7) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 4

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0391 Pilot-Operated, Pressure-Regulating Device — Inspection, Testing, Preventive and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the pressure-regulating device is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the pressure-regulating device and actions to keep the pressure-regulating device operating safely and efficiently. This task excludes customer regulation addressed in

- Task 1161, Installation of Customer Meters and Regulators: Residential and Small Commercial

- Task 1181, Installing and Maintaining Customer Pressure-Regulating, Pressure-Limiting, and -Relief Devices: Large Commercial and Industrial

(1) Select task procedure(s) and appropriate equipment.

(2) Review and verify records for identification of

(-a) location

(-b) model and size

(-c) operating capacity

(-d) valves and position of valves (open/closed, locking devices installed)

(-e) primary/secondary regulator(s) if applicable

(-f) communication to appropriate personnel (operations, control center, customers, etc.), as applicable

(3) Perform test equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Verify equipment is calibrated.

(-c) Test equipment with known sources, as applicable.

(4) Perform visual inspection for

(-a) appropriate location

(-b) proper installation

(-c) coating condition

(-d) atmospheric venting of spring housing

(-e) worn parts, if internal inspection is applicable

(-f) signs of atmospheric corrosion

(5) Conduct performance test.

(-a) Shut down or start up as specified by manufacturer.

(-b) Adjust pressure range, if applicable.

(-c) Correct set point(s) identified.

(-d) Check lock up.

(6) Perform preventive and corrective maintenance activities.

(-a) Replace worn or broken parts, if applicable.

- (-b) Ensure protection against the elements.
- (7) Verify MAOP/MOP.
- (8) Adjust set point to operational requirement.
- (9) Place in service.

- (-a) Monitor pressure.
- (-b) Install locking devices.

(10) Document, as required.

- (b) Potential applicability: L, G, D
- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 0401 Controller-Type, Pressure-Regulating Device — Inspection, Testing, Preventive and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the pressure-regulating device is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the pressure-regulating device and actions to keep the pressure-regulating device operating safely and efficiently.

(1) Select task procedure(s) and appropriate equipment.

(2) Review and verify records for identification of

- (-a) location
- (-b) model and size
- (-c) operating capacity

(-d) valves and position of valves (open/closed, locking devices installed)

(-e) primary/secondary regulator(s) if applicable

(-f) communication to appropriate personnel (operations, control center, customers, etc.), as applicable

(3) Perform test equipment check to verify that equipment functions within specified parameters.

- (-a) Inspect equipment.
- (-b) Verify equipment is calibrated.

(-c) Test equipment with known sources, as applicable.

(4) Perform visual inspection for

- (-a) appropriate location
- (-b) proper installation
- (-c) coating condition
- (-d) atmospheric venting of spring housing
- (-e) worn parts if internal inspection applicable

(-f) signs of atmospheric corrosion

(5) Conduct performance test.

(-a) Shut down or start up as specified by manufacturer.

(-b) Adjust pressure range, if applicable.

(-c) Correct set point(s) identified.

(-d) Check lock up.

(6) Perform preventive and corrective maintenance activities.

(-a) Replace worn or broken parts, if applicable.

(-b) Ensure protection against the elements.

(7) Verify MAOP/MOP.

(8) Adjust set point to operational requirement.

(9) Verify point-to-point communication, if applicable.

(10) Place in service.

(-a) Monitor pressure.

(-b) Install locking devices.

(11) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 4

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0411 Spring-Loaded, Pressure-Limiting, and -Relief Device — Inspection, Testing, Preventive and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the pressure-limiting or -relief device is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of pressure-limiting or -relief device and actions to keep the pressure-limiting or -relief device operating safely and efficiently. This task excludes customer regulation addressed in

- Task 1161, Installation of Customer Meters and Regulators: Residential and Small Commercial
- Task 1181, Installing and Maintaining Customer Pressure-Regulating, Pressure-Limiting, and -Relief Devices: Large Commercial and Industrial

(1) Select task procedure(s) and appropriate equipment.

(2) Review and verify records for identification of

- (-a) location
- (-b) model and size
- (-c) operating capacity

(-d) valves and position of valves (open/closed, locking devices installed)

(-e) primary/secondary regulator(s), if applicable

(3) Select appropriate gages for pressure ranges and operations.

(-a) gages used have been annually tested for calibration

(-b) inlet feed test point

(-c) outlet feed test point

(-d) operation of valves

(4) Perform visual inspection for

(-a) appropriate location

(-b) proper installation

(-c) coating condition

(-d) atmospheric venting of spring housing

(-e) worn parts if internal inspection applicable

(-f) signs of atmospheric corrosion

(5) Conduct performance test.

(-a) Shut down or start up as specified by manufacturer.

(-b) Adjust pressure range, if applicable.

(-c) Correct set point(s) identified.

(-d) Check lock up.

(6) Perform preventive and corrective maintenance activities.

(-a) Replace worn or broken parts, if applicable.

(-b) Ensure protection against the elements.

(7) Verify MAOP/MOP.

(8) Adjust set point to operational requirement.

(9) Place in service.

(-a) Monitor pressure.

(-b) Install locking devices.

(10) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0421 Pilot-Operated, Pressure-Limiting, and -Relief Device – Inspection, Testing, Preventive and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the pressure-limiting or -relief device is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the pressure-limiting or -relief device and actions to keep the pressure-limiting or -relief device operating safely and efficiently. This task excludes customer regulation addressed in

• Task 1161, Installation of Customer Meters and Regulators: Residential and Small Commercial

• Task 1181, Installing and Maintaining Customer Pressure-Regulating, Pressure-Limiting, and -Relief Devices: Large Commercial and Industrial

(1) Select task procedure(s) and appropriate equipment.

(2) Review and verify records for identification of

(-a) location

(-b) model and size

(-c) operating capacity

(-d) valves and position of valves (open/closed, locking devices installed)

(-e) primary/secondary regulator(s), if applicable

(3) Select appropriate gages for pressure ranges and operations.

(-a) gages used have been annually tested for calibration

(-b) inlet feed test point

(-c) outlet feed test point

(-d) operation of valves

(4) Perform visual inspection for

(-a) appropriate location

(-b) proper installation

(-c) coating condition

(-d) atmospheric venting of spring housing

(-e) worn parts if internal inspection applicable

(-f) signs of atmospheric corrosion

(5) Conduct performance test.

(-a) Shut down or start up as specified by manufacturer.

(-b) Adjust pressure range, if applicable.

(-c) Correct set point(s) identified.

(-d) Check lock up.

(6) Perform preventive and corrective maintenance activities.

(-a) Replace worn or broken parts, if applicable.

(-b) Ensure protection against the elements.

(7) Verify MAOP/MOP.

(8) Adjust set point to operational requirement.

(9) Place in service.

(-a) Monitor pressure.

(-b) Install locking devices.

(10) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0431 Pneumatic-Loaded, Pressure-Limiting, and -Relief Device — Inspection, Testing, Preventive and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the pressure-limiting or -relief device is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the pressure-limiting or -relief device and actions to keep the pressure-limiting or -relief device operating safely and efficiently. This task excludes customer regulation addressed in

- Task 1161, Installation of Customer Meters and Regulators: Residential and Small Commercial
- Task 1181, Installing and Maintaining Customer Pressure-Regulating, Pressure-Limiting, and -Relief Devices: Large Commercial and Industrial

(1) Select task procedure(s) and appropriate equipment.

(2) Review and verify records for identification of

- (-a) location
- (-b) model and size
- (-c) operating capacity
- (-d) valves and position of valves (open/closed, locking devices installed)
- (-e) primary/secondary regulator(s), if applicable

(3) Select appropriate gages for pressure ranges and operations.

- (-a) gages used have been calibrated annually
- (-b) inlet feed test point
- (-c) outlet feed test point
- (-d) operation of valves
- (4) Perform visual inspection for
 - (-a) appropriate location
 - (-b) proper installation
 - (-c) coating condition
 - (-d) atmospheric venting of spring housing
 - (-e) worn parts if internal inspection applicable

(-f) signs of atmospheric corrosion

(5) Conduct performance test.

(-a) Shut down or start up as specified by manufacturer.

(-b) Adjust pressure range, if applicable.

(-c) Correct set point(s) identified.

(-d) Check lock up.

(6) Perform preventive and corrective maintenance activities.

(-a) Replace worn or broken parts, if applicable.

(-b) Ensure protection against the elements.

(7) Verify MAOP/MOP.

(8) Adjust set point to operational requirement.

(9) Place in service.

(-a) Monitor pressure.

(-b) Install locking devices.

(10) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0441 Compressor Startup and Shutdown — Manual

(a) *Task Guidance.* This task includes manual startup and shutdown of a compressor (e.g., reciprocating, centrifugal, rotary) at the driver control panel.

(1) Select task procedure(s) and appropriate equipment.

(2) Determine if startup, return to service, or shutdown is required.

(-a) Review system operational conditions and requirements.

(-b) Confirm directions from system control, if applicable.

(3) Complete notifications.

(-a) Notify system control.

(-b) Notify on-location personnel.

(-c) Notify downstream/upstream customers, if applicable.

(-d) Notify systems adjacent stations, if applicable.

(4) Start compressor.

(-a) Perform unit prestart inspection.

(-b) Review and position valves for proper positions.

(-c) Engage unit prelube, if applicable.

(-d) Perform or engage unit starting sequence.

(-e) Perform poststart inspection.

(5) Return to service.

(-a) Ensure operational parameters are acceptable before loading.

(-b) Arrange valve(s) in proper position for desired operations.

(-c) Monitor operating parameters for expected levels.

(-d) Notify appropriate entities.

(6) Remove from service.

(-a) Ensure operational parameters are acceptable for removing unit from service.

(-b) Perform sequential compressor unloading, if applicable.

(-c) Reduce speed of unit.

(-d) Arrange valves in sequence to remove unit from online service.

(7) Shut down.

(-a) Allow sufficient cool-down period, if applicable.

- (-b) Perform unit shutdown sequence.
- (-c) Ensure valves are in proper position.
- (-d) Perform postrun inspection.
- (-e) Notify appropriate entities.

(8) Document, as required.

- (b) Potential applicability: G, D
- (c) Difficulty: 4
- (d) Importance: 3
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 0451 Pump Startup and Shutdown — Manual

(a) *Task Guidance.* This task includes manual startup and shutdown of a pump (e.g., reciprocating, centrifugal, rotary, screw) at the driver control panel.

(1) Select task procedure(s) and appropriate equipment.

(2) Determine if startup or shutdown is required.

(-a) Review system operational conditions and requirements (e.g., pumps, flow rate, MOP, line pack).

(-b) Verify product source.

(-c) Review product delivery schedule/order.

(3) Complete notifications.

(-a) Notify system Pipeline Control Center.

(-b) Notify field personnel.

(-c) Notify downstream/upstream customers, if applicable.

(4) Start pump.

(-a) Perform pump(s) prestart inspection.

(-b) Review and position pump station valves for proper positions.

(-c) Verify open flow path from start to end of system.

(-d) Engage booster pump(s), if applicable.

(-e) Perform or engage mainline pump(s) starting sequence.

(-f) Monitor for steady state.

(-g) Perform poststart inspection.

(5) Shut down.

(-a) Perform unit shutdown sequence.

(-b) Shut down in conjunction with valve closure at the delivery terminals or stations to maintain minimum pressures and line pack, as applicable.

(-c) Ensure valves are in proper position.

(-d) Perform postrun inspection.

(-e) Notify appropriate entities.

(6) Document, as required.

- (b) Potential applicability: L
- (c) Difficulty: 4
- (d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0461 Compressor Preventive Maintenance

(a) *Task Guidance.* This task encompasses actions (e.g., lubrication, adjustment) to keep compressors operating safely and efficiently. This task does not include maintenance of the compressor driver.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment checks, as applicable.

(-a) Verify calibration of equipment.

(-b) Inspect equipment for abnormal conditions (broken or missing parts, etc.).

(-c) Verify equipment against known sources.

(3) Walk around inspection with applicable test equipment.

(-a) leaks

(-b) unusual noises

(-c) unusual heat

(-d) excessive vibration

(-e) abnormal pressure

(4) Perform preventive maintenance, as applicable.

(-a) Check lubrication/oil/grease.

(-b) Check compressor seal failure system.

(-c) Check alarms/shutdowns.

(-d) Analyze compressor operation.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 0471 Reciprocating Compressor Inspection, Testing, and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that a new, replaced, or rebuilt compressor is functioning within specified parameters, prior to or during placing in service. This task includes the repair, alteration, or refurbishment of reciprocating compressors. This task does not include maintenance of the compressor driver.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment checks, as applicable.

(-a) Verify calibration of equipment.

(-b) Inspect equipment for abnormal conditions (broken or missing parts, etc.).

(-c) Verify equipment against known sources.

- (3) Perform walk-around inspection, with applicable equipment, to check for
 - (-a) leaks
 - (-b) unusual noises
 - (-c) unusual heat
 - (-d) excessive vibration
 - (-e) abnormal pressure
- (4) Diagnose/troubleshoot the following:
 - (-a) abnormal noise
 - (-b) fluid level analysis
 - (-c) packing gland seal effectiveness
 - (-d) rod run-out readings
 - (-e) comparing equipment operation to established OEM commissioning parameters
 - (-1) lubrication rate
 - (-2) flow rate
 - (-3) temperatures
 - (-4) vibration
- (5) Perform corrective maintenance.
 - (-a) Obtain required compatible material/parts and specialized tools.
 - (-b) Make repairs per OEM specifications.
- (6) Conduct function and performance tests.
 - (-a) Follow OEM commissioning schedule.
 - (-b) Verify operating parameters are met.
- (7) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0481 Centrifugal Compressor Inspection, Testing, and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that a new, replaced, or rebuilt compressor is functioning within specified parameters, prior to or during placing in service. This task includes the repair, alteration, or refurbishment of centrifugal compressors. This task does not include maintenance of the compressor driver.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform test equipment checks, as applicable.
 - (-a) Verify calibration of equipment.
 - (-b) Inspect equipment for abnormal conditions (broken or missing parts, etc.).
 - (-c) Verify equipment against known sources.
- (3) Perform walk-around inspection, with applicable equipment, to check for
 - (-a) leaks
 - (-b) unusual noises
 - (-c) unusual heat
 - (-d) excessive vibration

- (-e) abnormal pressure
- (4) Diagnose/troubleshoot the following:
 - (-a) abnormal noise
 - (-b) fluid level analysis
 - (-c) packing gland seal effectiveness
 - (-d) comparing equipment operation to established OEM commissioning parameters
 - (-1) lubrication rate
 - (-2) flow rate
 - (-3) temperatures
 - (-4) vibration
- (5) Perform corrective maintenance.
 - (-a) Obtain required compatible material/parts and specialized tools.
 - (-b) Make repairs per OEM specifications.
- (6) Conduct function and performance tests.
 - (-a) Comply with OEM commissioning schedule.
 - (-b) Verify operating parameters are met.
- (7) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0491 Rotary Compressor Inspection, Testing, and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that a new, replaced, or rebuilt compressor is functioning within specified parameters, prior to or during placement into service. This task includes the repair, alteration, or refurbishment of rotary compressors. This task does not include maintenance of the compressor driver.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform test equipment check to verify that equipment functions within the specified parameters.
 - (-a) Inspect equipment.
 - (-b) Verify equipment is calibrated, as applicable.
 - (-c) Test equipment for proper function.
- (3) Perform walk-around inspection, with applicable equipment, to check for
 - (-a) leaks
 - (-b) unusual noises
 - (-c) unusual heat
 - (-d) excessive vibration
 - (-e) abnormal pressure
- (4) Diagnose/troubleshoot the following:
 - (-a) bearing overheating
 - (-b) bearing vibration

- (-c) bearing failure
- (-d) leaks (gas and/or lubrication)
- (-e) low lubrication oil levels
- (5) Perform corrective maintenance.
 - (-a) Obtain required compatible material/parts and specialized tools.
 - (-b) Make repairs in accordance with the original manufacturer's (OEM) specifications.
- (6) Conduct function and performance tests.
 - (-a) Comply with OEM commissioning schedule.
 - (-b) Verify operating parameters are met.
- (7) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0501 Pump Preventive Maintenance

(a) *Task Guidance.* This task encompasses actions (e.g., lubrication, adjustment) to keep pumps operating safely and efficiently. This task does not include maintenance of the pump driver.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform test equipment check.
 - (-a) Verify equipment is calibrated in accordance with manufacturer's specification.
 - (-b) Inspect equipment for abnormal conditions (broken or missing parts, etc.).
 - (-c) Test equipment with known sources, as applicable.
- (3) Visually examine for
 - (-a) leaks
 - (-b) unusual noises
 - (-c) unusual heat
 - (-d) excessive vibration
 - (-e) pipe misalignment/pipe stress
 - (-f) foundation and support condition
- (4) Perform routine maintenance.
 - (-a) lubrication/oil/grease
 - (-b) alignment check — driver to pump
 - (-c) vibration system or surveys
 - (-d) pump seal failure system — test
 - (-e) pump RTDs/switches
 - (-f) alarms/shutdowns
- (5) Document, as required.
- (b) Potential applicability: L
- (c) Difficulty: 3
- (d) Importance: 3
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O

- (2) Sub: W/O
- (g) Span of control: 1:2

Task 0511 Centrifugal Pump Inspection, Testing, and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that a new, replaced, or rebuilt pump is functioning within specified parameters, prior to or during placing in service. This task includes the repair, alteration, or refurbishment of centrifugal pumps. This task does not include maintenance of the pump driver.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform test equipment check to verify that equipment functions within specified parameters.
 - (-a) Check meter for proper operation.
 - (-b) Check condition of handheld vibration monitor.
 - (-c) Check dead weight test gage for switch calibration.
 - (-d) Check condition of dial indicators and magnetic base.
- (3) Visually inspect the following:
 - (-a) motor high-voltage leads for deterioration, tape or insulator condition, ground wires for signs of arcing, capacitors general condition
 - (-b) motor air filter passageways
 - (-c) pump seals and piping for leaks
 - (-d) pump base concrete for deterioration or flaking
 - (-e) pump base grout condition for cracks where water can enter and freeze
 - (-f) pump-to-motor coupling condition
 - (-g) gaskets for leaks, wear, or damage
- (4) Diagnose/troubleshoot the following:
 - (-a) unusual vibration, noise, or bearing temperatures
 - (-b) bearing lubrication and temperature
 - (-c) suction/discharge pressure
 - (-d) seal drain pot operations
 - (-e) pressure switch operation
- (5) Perform corrective maintenance, as needed.
 - (-a) Change/add bearing lube.
 - (-b) Flush drain lines.
 - (-c) Tighten housing bolts.
 - (-d) Calibrate/repair/replace pressure switches.
 - (-e) Adjust shaft thrust end play.
 - (-f) Adjust alignment.
- (6) Conduct function and performance tests.
 - (-a) Prime pump.
 - (-b) Run pump, and check flow rate and pressure.
 - (-c) Listen for abnormal noise and/or vibration.
 - (-d) Check motor full-load amperage.

- (7) Document, as required.
- (b) Potential applicability: L
- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0521 Reciprocating Pump Inspection, Testing, and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that a new, replaced, or rebuilt pump is functioning within specified parameters, prior to or during placing in service. This task includes the repair, alteration, or refurbishment of reciprocating pumps. This task does not include maintenance of the pump driver.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Verify equipment is calibrated, as applicable.

(-c) Test equipment for proper operation.

(3) Visually inspect the following:

(-a) Pump base and grout for cracks, flaking, splits, or settling.

(-b) Check pump and motor feet bolts for looseness.

(-c) Check gear case oil level.

(-d) Check oil level in rod packing box oiler or grease if manual.

(-e) Inspect gear case for leaks.

(-f) Inspect rod packing for leaks.

(-g) Inspect pump end for porous case leaks and cracks.

(-h) Inspect belts for wear, cracks, and looseness.

(-i) Inspect belt sheaves for wear and looseness.

(-j) Check motor inboard and outboard bearings for signs of wear.

(-k) Remove cover, and check motor lead connections for tightness and insulation for deterioration.

(-l) Check electrical ground connections for tightness.

(4) Check pump performance.

(-a) Run pump, and listen for abnormal noise and vibration.

(-b) Perform amperage test on each phase.

(-c) Evaluate pump performance (with pressure reading or flowmeter output).

(5) Diagnose/troubleshoot the following:

(-a) worn or leaking piston rods
 (-b) low pressure or performance based on flow rate

(-c) low lubrication oil level

(-d) leaks on pump gear case

(-e) abnormally high or low amperage draw (compare with amp rating on motor)

(6) Perform corrective maintenance, as needed.

(-a) Repair pump base.

(-b) Repair or replace motor mounting bolts if loose.

(-c) Repair or replace pump end case as needed.

(-d) Add oil if levels are low.

(-e) Tighten or replace gaskets on pump gear case.

(-f) Tighten or replace packing on piston rods.

(-g) Replace belts as matching sets.

(-h) Replace or repair motor and/or leads as needed.

(-i) Replace worn piston rings.

(-j) Repair/replace worn or bent piston rods.

(7) Conduct function and performance tests.

(-a) Prime pump.

(-b) Run pump, and check flow rate and pressure.

(-c) Listen for abnormal noise and/or vibration.

(-d) Check motor full-load amperage.

(8) Document, as required.

(b) Potential applicability: L

(c) Difficulty: 4

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 0531 Rotary Pump Inspection, Testing, and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that a new, replaced, or rebuilt pump is functioning within specified parameters, prior to or during placing in service. This task includes the repair, alteration, or refurbishment of rotary pumps. This task does not include maintenance of the pump drive.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Verify equipment is calibrated, as applicable.

(-c) Test equipment for proper operation.

(3) Visually inspect the following:

- (-a) suction and discharge valves
- (-b) shaft for scoring and corrosion
- (-c) force feed lubricators if used
- (-d) stuffing box
- (4) Check pump performance.
 - (-a) Prime pump before operation.
 - (-b) Verify suction and discharge valves are open.
 - (-c) Flush suction lines.
- (5) Diagnose/troubleshoot the following:
 - (-a) low pressure or performance based on flow rate
 - (-b) low lubrication oil level
 - (-c) leaks on pump gear case
 - (-d) abnormally high or low amperage draw
- (6) Perform corrective maintenance, as needed.
 - (-a) Adjust, repair, or replace packing.
 - (-b) Flush and relubricate.
 - (-c) Replace gaskets, O-rings, and seals.
 - (-d) Regrease or replace bearings.
- (7) Conduct function and performance tests.
 - (-a) Close all vents.
 - (-b) Prime pump.
 - (-c) Ensure all valves are open.
 - (-d) Run pump, and check flow rate and pressure.
 - (-e) Listen for abnormal noise and/or vibration.
 - (-f) Check motor full-load amperage.
- (8) Document, as required.
- (b) Potential applicability: L
- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0541 Screw Pump Inspection, Testing, and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that a new, replaced, or rebuilt pump is functioning within specified parameters, prior to or during placing in service. This task includes the repair, alteration, or refurbishment of screw pumps. This task does not include maintenance of the pump driver.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Verify equipment is calibrated, as applicable.

(-c) Test equipment for proper operation.

(3) Visually inspect the following:

- (-a) suction and discharge valves
- (-b) shaft for scoring and corrosion
- (-c) force feed lubricators if used
- (-d) stuffing box
- (4) Check pump performance.
 - (-a) Prime pump before operation.
 - (-b) Verify suction and discharge valves are open.
 - (-c) Flush suction lines.
- (5) Diagnose/troubleshoot the following:
 - (-a) low pressure or performance based on flow rate
 - (-b) low lubrication oil level
 - (-c) leaks on pump gear case
 - (-d) abnormally high or low amperage draw
- (6) Perform corrective maintenance, as needed.
 - (-a) Replace or repair stuffing box packing.
 - (-b) Replace stuffing box lubrication.
 - (-c) Replace lubrication.
 - (-d) Replace gaskets, O-rings, and seals.
 - (-e) Replace bearings (if required), and regrease.
 - (-f) Adjust or replace packing.
- (7) Conduct function and performance tests.
 - (-a) Close all vents.
 - (-b) Prime pump.
 - (-c) Ensure all valves are open.
 - (-d) Run pump, and check flow rate and pressure.
 - (-e) Listen for abnormal noise and/or vibration.
 - (-f) Check motor full-load amperage.
- (8) Document, as required.
- (b) Potential applicability: L
- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0551 Explosive Atmosphere Detection and Alarm System Performance Test and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the fixed explosive atmosphere detection and alarm system is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the performance test and the repair or replacement of fixed explosive atmosphere detection and alarm system.

(1) Select task procedure(s) and appropriate equipment.

(2) Visually inspect the detection and audio and visual alarm systems.

(-a) Detection system inspection may include, but is not limited to, the following:

- (-1) identification that the system is activated and operational
- (-2) current reading is within normal range
- (-3) no physical damage to conduit or seals
- (-4) no bent or dislodged sensor head(s)
- (-5) sensor heads are not painted over
- (-6) no obstruction of atmospheric flow by sensor head(s)

(-b) Audio and visual alarm system inspection includes, but is not limited to, the following:

- (-1) identification that the power supply is operational
- (-2) detection of obstructions
- (-3) identification of physical damage

(3) Verify detection systems display current reading.

(4) Conduct performance tests.

- (-a) Make notification as required.
- (-b) Place system in test mode, if applicable.
- (-c) Apply specified calibration gas standard to detector head(s).

(-d) Verify warning and/or shutdown signals are sent at specified levels where required.

(-e) Verify visual and audio warning activation at specified levels where required.

(-f) Return system to active mode when system performance test is complete, if applicable.

(5) Perform corrective maintenance.

(-a) Make calibration adjustments to unit in alignment with calibration gas standard.

(-b) Inspect and replace system components as required.

(-c) Conduct performance test after any calibration, maintenance, or replacement of system component.

(6) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0561 Pressure Test: Nonliquid Medium — MAOP Less Than 100 psi

(a) *Task Guidance.* This task includes achieving test pressure and durations and record keeping.

(1) Select task procedure(s) and appropriate equipment.

(2) Prepare for test.

(3) Review the pressure test design.

(-a) duration of test

(-b) maximum/minimum test pressure

(-c) bleed-off/repressurize pressures

(-d) test medium

(4) Calibrate/certify/test equipment used to perform and monitor the test.

(-a) leak detection equipment

(-b) pressure gages

(-c) pressure-inducing equipment

(5) Perform leak test.

(-a) Install accurate test instruments at points that will provide required test data.

(-b) Install pressure-inducing equipment, and make connections to introduce the test medium into the facility.

(-c) Ensure isolation of the segment, component, or unit.

(-d) Introduce the test medium into the facility.

(-e) Increase pressure, making adjustments to compensate for temperature or other effects.

(-f) Maintain pressure and duration as specified.

(-g) Ensure inspection of pipe segment, fitting, component, or unit for leaks. (Utilize leak detection equipment, as appropriate.)

(-h) Collect/record test data, and log during test execution.

(-i) Depressurize the segment, component, or unit.

(-j) Remove isolation devices and test equipment.

(6) Make notifications, as appropriate.

(7) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 1

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 0571 Pressure Test: Nonliquid Medium — MAOP Greater Than or Equal to 100 psi

(a) *Task Guidance.* This task includes achieving test pressure and durations and record keeping.

(1) Select task procedure(s) and appropriate equipment.

(2) Prepare for test.

(-a) Determine the type of pressure test.

(-1) strength test

(-2) leak test

(-b) Determine appropriate test pressure and duration.

(-c) Install pressure-inducing and test-monitoring equipment.

- (-d) Isolate segment to be tested.
- (3) Perform test. (Include data analysis, and check for leaks.)
 - (-a) Pressurize segment at a controlled rate.
 - (-b) Search for leaks by appropriate methods.
 - (-c) Maintain test pressure for established holding period.
 - (-d) Record test data.
 - (-e) Depressurize segment.
 - (-f) Remove isolation and test equipment.
- (4) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0581 Pressure Test: Liquid Medium

- (a) *Task Guidance.* This task includes achieving test pressure and durations and record keeping.
- (1) Select task procedure(s) and appropriate equipment.
 - (2) Prepare for test.
 - (3) Review the pressure test design.
 - (-a) duration of test
 - (-b) maximum/minimum test pressure
 - (-c) bleed-off/repressurize pressures
 - (-d) liquid test medium
 - (4) Calibrate/certify/test equipment used to perform and monitor the test.
 - (-a) leak detection equipment
 - (-b) pressure gages
 - (-c) pressure-inducing equipment
 - (5) Perform leak test.
 - (-a) Install accurate test instruments at points that will provide required test data.
 - (-b) Install pressure-inducing equipment, and make connections to introduce the liquid test medium into the facility.
 - (-c) Ensure isolation of the segment, component, or unit.
 - (-d) Introduce liquid test medium into the facility in a manner that reduces air entrapment.
 - (-e) Increase pressure, making adjustments to compensate for temperature effects, air entrapment, etc.
 - (-f) Maintain pressure and duration as specified, adding liquid test medium to maintain pressure or bleeding off small quantities to avoid exceeding the maximum test pressure.
 - (-g) Inspect pipe segment, fitting, component, or unit for leaks. (Utilize leak detection equipment, as appropriate.)

- (-h) Collect/record test data, and log during test execution.
- (-i) Evacuate/drain/purge the segment, component, or unit.
- (-j) Remove isolation devices and test equipment.
- (6) Make appropriate notifications for remediation, as applicable.
- (7) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0591 Leak Test at Operating Pressure

- (a) *Task Guidance.* This task includes the detection of leaks at operating pressure either visually (e.g., soap test) or with the use of leak detection equipment.
- (1) Select task procedure(s) and appropriate equipment.
 - (2) Calibrate/certify/test equipment or medium used to perform and monitor the test, as applicable.
 - (-a) leak detection equipment
 - (-b) pressure gages
 - (-c) soap or other medium
 - (3) Perform leak test.
 - (-a) Ensure inspection of pipe segment, fitting, component, or unit for leaks. (Utilize leak detection equipment or medium, as applicable.)
 - (-b) Collect/record test data, and log during test execution, as applicable.
 - (4) Make appropriate notifications for remediation, if applicable.
 - (5) Document, as required.
 - (b) Potential applicability: L, G, D
 - (c) Difficulty: 2
 - (d) Importance: 4
 - (e) Interval: 3 yr
 - (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
 - (g) Span of control: 1:1

Task 0601 NDT: Radiographic Testing

- (a) *Task Guidance.* This task includes radiographic testing and evaluation of test results. Level II qualification should be in accordance with ASNT SNT-TC-1A or other recognized standard or practice.
- (1) Select task procedure(s) and appropriate equipment.
 - (2) Establish radiographic boundaries.

(3) Perform radiography.

(-a) Identify pipe diameter, pipe wall thickness, and other variables that will affect the quality of the radiograph.

(-b) Calculate exposure time.

(-c) Position film and camera source.

(-d) Create radiograph that provides required density, sensitivity, and pipe coverage.

(4) Interpret test results.

(-a) Mark any rejected areas of pipe for repair or removal.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: acceptable standard, therefore, data not collected

(d) Importance: acceptable standard, therefore, data not collected

(e) Interval: as specified by acceptable standard or practice

(f) Evaluation method: as specified by acceptable standard or practice

(g) Span of control: 1:3

Task 0611 NDT: Liquid Penetrant Testing

(a) *Task Guidance.* This task includes liquid (dye) penetrant testing and evaluation of test results. Level II qualification should be in accordance with ASNT SNT-TC-1A or other recognized standard or practice.

(1) Select task procedure(s) and appropriate equipment.

(2) Ensure surface area is properly prepared for inspection.

(3) Ensure surface temperature is within appropriate range.

(4) Perform liquid penetrant testing.

(-a) Apply penetrant, and leave on for applicable dwell time.

(-b) Remove penetrant with absorbent towel containing solvent remover. (Do not spray solvent onto inspection area.)

(-c) Apply developer, and leave on for applicable dwell time.

(5) Interpret test results.

(-a) Mark any rejected areas of pipe for repair or removal.

(6) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: acceptable standard, therefore, data not collected

(d) Importance: acceptable standard, therefore, data not collected

(e) Interval: as specified by acceptable standard or practice

(f) Evaluation method: as specified by acceptable standard or practice

(g) Span of control: 1:2

Task 0621 NDT: Magnetic Particle Testing

(a) *Task Guidance.* This task includes magnetic particle testing and evaluation of test results. Level II qualification should be in accordance with ASNT SNT-TC-1A or other recognized standard or practice.

(1) Select task procedure(s) and appropriate equipment.

(2) Ensure surface area is properly prepared for inspection.

(3) Perform magnetic particle testing.

(-a) Apply particles while magnetizing the inspection surface area.

(-b) Inspect pipe in a multidirectional manner that ensures full coverage of the areas of interest.

(4) Interpret test results.

(-a) Mark any rejected areas of pipe for repair or removal.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: acceptable standard, therefore, data not collected

(d) Importance: acceptable standard, therefore, data not collected

(e) Interval: as specified by acceptable standard or practice

(f) Evaluation method: as specified by acceptable standard or practice

(g) Span of control: 1:2

Task 0631 NDT: Ultrasonic Testing

(a) *Task Guidance.* This task includes ultrasonic testing and evaluation of test results. Level II qualification should be in accordance with ASNT SNT-TC-1A or other recognized standard or practice. This task excludes wall thickness determination with a UT wall thickness device.

(1) Select task procedure(s) and appropriate equipment.

(2) Ensure surface area is properly prepared for inspection.

(3) Perform ultrasonic testing.

(-a) Identify pipe diameter, pipe wall thickness, weld configuration, and other variables that will affect the quality of the inspection.

(-b) Calibrate equipment to ensure proper sensitivity and range are established.

(-c) Apply couplant and scan area of inspection in a manner that ensures full coverage is obtained.

(-d) Verify calibration upon completion of examination.

(4) Interpret test results.

(-a) Mark any rejected areas of pipe for repair or removal.

(5) Document, as required.

(b) Potential applicability: L, G, D

- (c) Difficulty: acceptable standard, therefore, data not collected
- (d) Importance: acceptable standard, therefore, data not collected
- (e) Interval: as specified by acceptable standard or practice
- (f) Evaluation method: as specified by acceptable standard or practice
- (g) Span of control: 1:2

Task 0641 Visually Inspect Pipe and Components Prior to Installation

(a) *Task Guidance.* This task includes the visual inspection of pipe and pipeline components, prior to installation, to identify visually determinable damage and defects.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform visual inspection for the following as applicable:
 - (-a) missing, damaged, or disbonded coating
 - (-b) cuts, dents, gouges, and cracks
 - (-c) bends and buckling
 - (-d) missing or damaged parts and components

- (3) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 2
- (d) Importance: 2
- (e) Interval: 5 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0651 Routine Visual Inspection of Breakout Tanks

(a) *Task Guidance.* This task includes the scheduled visual inspection of breakout tanks and tank components to identify visually determinable damage and defects.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform visual inspection of tank's exterior surfaces.
 - (-a) leak check (shell, nozzles, fittings, foundation, etc.)
 - (-b) foundation
 - (-1) Check for cracks, erosion, and broken concrete.
 - (-2) Check for settlement around perimeter of tank.
 - (-3) Check that rainwater runoff from the shell drains away from the tank.
 - (-c) shell
 - (-1) Check for distortions, dents, damage, and cracking.
 - (-2) Check atmospheric coating (corrosion pitting, paint failure, etc.).

(-3) If insulated tank, check condition of insulation.

- (-d) containment (general housekeeping)
 - (-1) Check for debris, vegetation, or flammable materials. (Remove if could contribute to fire or create hazard.)
- (3) Document, as required.
- (b) Potential applicability: L
- (c) Difficulty: 3
- (d) Importance: 2
- (e) Interval: 5 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0661 Inspection of Breakout Tanks

(a) *Task Guidance.* This task includes the inspection of in-service or out-of-service breakout tanks and tank components. Qualification should be in accordance with API 653 or other acceptable standard or practice.

- (1) Select task procedure(s) and appropriate equipment.
- (2) external inspection
 - (-a) For insulated tanks, remove insulation necessary to determine the condition of the exterior wall of the tank or the roof.
 - (-b) Visually check tank-grounding components, such as shunts, and cable connections.
 - (-c) Perform ultrasonic thickness (UT) measurements of tank shell.
- (3) internal (out-of-service) inspection
 - (-a) Inspect tank bottom for severe corrosion or leaks.

(-b) Gather UT data necessary to determine minimum thickness of shell and bottom for proper evaluation of tank integrity.

(-c) Inspect tank bottom for indications of settlement.

- (4) Evaluate the results, and make the appropriate notifications.
- (5) Document, as required.
- (b) Potential applicability: L
- (c) Difficulty: 3
- (d) Importance: 3
- (e) Interval: as specified by acceptable standard or practice
- (f) Evaluation method: as specified by acceptable standard or practice
- (g) Span of control: 1:3

Task 0671 Joining of Plastic Pipe: Solvent Cement

(a) *Task Guidance.* This task includes the assembly and joining of plastic pipe and components using solvent cement and inspection of completed joints.

- (1) Select task procedure(s) and appropriate equipment.

- (2) Verify materials, as applicable.
 - (-a) pipe
 - (-b) solvent
 - (-c) primer
 - (-d) abrasives
- (3) Perform preparation of pipe and coupling, as applicable.
 - (-a) Verify pipe ends cut square, clean, dry, and free of burrs and other defects.
 - (-b) Abrade surfaces.
 - (-c) Mark stab depth.
 - (-d) Verify fitting condition prior to joining.
- (4) Perform actions to join pipe.
 - (-a) Apply primer.
 - (-b) Apply solvent (joining compound).
 - (-c) Join pipe and fitting. (Ensure proper stab depth obtained.)
 - (-d) Hold until setting process is complete.
- (5) Perform visual inspection.
 - (-a) joint inspected to ensure compliance with documented joining procedure
 - (-b) alignment
 - (-c) maintenance of stab depth
- (6) Document, as required.
 - (b) Potential applicability: G, D
 - (c) Difficulty: 3
 - (d) Importance: 4
 - (e) Interval: 1 yr if no joints made or whenever three joints or 3% of joints made, whichever is greater, are found unacceptable during pressure testing
 - (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
 - (g) Span of control: 1:0

Task 0681 Joining of Plastic Pipe: Stab Fittings

- (a) *Task Guidance.* This task includes the joining and inspection of plastic pipe with stab fittings and inspection of completed joints.
 - (1) Select task procedures and appropriate equipment.
 - (2) Verify correct selection of stab fitting.
 - (-a) pipe materials
 - (-b) pipe diameter
 - (-c) pipe wall thickness
 - (3) Perform preparation of pipe and fitting.
 - (-a) Verify pipe conditions (gouges not to exceed 10% of nominal wall thickness).
 - (-b) Pipe ends cut square.
 - (-c) Pipe and fittings should be clean and dry, with ends chamfered and free of burrs and other defects.
 - (-d) Verify fitting condition.
 - (-e) Prepare pipe for installation by marking stab depth.
 - (4) Perform actions to install fitting.

- (-a) Install fitting to pipe, ensuring proper stab depth is achieved.
- (-b) Verify fitting is locked into place by grip-per ring.
- (-c) Verify proper stab depth has been achieved.
- (5) Document, as required.
 - (b) Potential applicability: G, D
 - (c) Difficulty: 3
 - (d) Importance: 4
 - (e) Interval: 1 yr if no joints made or whenever three joints or 3% of joints made, whichever is greater, are found unacceptable during pressure testing
 - (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
 - (g) Span of control: 1:0

Task 0691 Joining of Pipe: Nonbottom-Out Compression Couplings

- (a) *Task Guidance.* This task includes the joining of pipe 2 in. and less, with nonbottom-out compression couplings and inspection of completed joints. A nonbottom-out compression coupling is one that requires tightening to a specified torque or number of turns.
 - (1) Select task procedure(s) and appropriate equipment.
 - (2) Verify components and tools are adequate for intended service.
 - (-a) coupling size
 - (-b) proper material
 - (-c) type of joint connection (similar or dissimilar pipe material)
 - (-d) type of wrench(es) for installation
 - (3) Prepare pipe and fitting.
 - (-a) Remove burrs and square pipe ends.
 - (-b) Clean and inspect sealing surfaces and fittings/couplings, and remove any debris or obstructions.
 - (-c) Measure and mark stab depth.
 - (4) Install coupling by performing the following, as applicable:
 - (-a) proper alignment
 - (-b) proper stab depth met
 - (-c) tighten to required torque or number of turns
 - (5) Visually inspect completed joint, as applicable.
 - (-a) Inspect with a mirror.
 - (-b) Verify proper alignment of pipe and fitting/coupling.
 - (-c) Check stab depth marks for any movement during installation.
 - (6) Document, as required.
 - (b) Potential applicability: G, D
 - (c) Difficulty: 3
 - (d) Importance: 4

(e) Interval: 1 yr if no joints made or whenever more than three joints or 3% of joints made, whichever is greater, are found unacceptable during pressure testing

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:0

Task 0701 Joining of Pipe: Bottom-Out Compression Couplings

(a) *Task Guidance.* This task includes the joining of pipe 2 in. and less, with bottom-out compression coupling and inspection of completed joints. A bottom-out compression coupling is one that is designed to prevent overtightening by contact (bottoming out) of the nut with a square shoulder or mating surface.

(1) Select task procedure(s) and appropriate equipment.

(2) Verify components and tools are adequate for intended service.

(-a) coupling size

(-b) proper material

(-c) type of joint connection (similar or dissimilar pipe material)

(-d) type of wrench(es) for installation

(3) Prepare pipe and fitting.

(-a) Remove burrs and square pipe ends.

(-b) Clean and inspect sealing surfaces and fittings/couplings, and remove any debris or obstructions.

(-c) Measure and mark stab depth.

(4) Install coupling by performing the following, as applicable:

(-a) proper alignment

(-b) proper stab depth met

(-c) tighten to bottom-out

(5) Visually inspect completed joint, as applicable.

(-a) Inspect with a mirror.

(-b) Verify proper alignment of pipe and fitting/coupling.

(-c) Check stab depth marks for any movement during installation.

(6) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 1 yr if no joints made or whenever more than three joints or 3% of joints made, whichever is greater, are found unacceptable during pressure testing

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:0

Task 0711 Joining of Pipe: Compression Couplings

(a) *Task Guidance.* This task includes the joining of pipe greater than 2 in., with compression couplings and inspection of completed joints.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform selection of compression coupling based on the following:

(-a) pipe materials

(-b) pipe diameter

(-c) pipe wall thickness

(-d) type of joint

(3) Perform preparation of pipe and coupling.

(-a) Verify pipe conditions.

(-b) Verify pipe ends are cut square.

(-c) Keep pipe and coupling clean and dry.

(-d) Verify coupling condition.

(-e) Prepare pipe for installation by marking stab depth.

(4) Perform actions to install coupling.

(-a) Install stiffener if fitting is being installed in conjunction with plastic pipe and is not attached to coupling.

(-b) Correctly align pipe and coupling.

(-c) Install coupling to pipe, ensuring proper stab depth is achieved.

(-d) Tighten and torque as specified.

(5) Inspect installed coupling.

(-a) maintenance of stab depth

(-b) pipe alignment

(6) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 1 yr if no joints made or whenever more than three joints or 3% of joints made, whichever is greater, are found unacceptable during pressure testing

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:0

Task 0721 Joining of Pipe: Threaded Joints

(a) *Task Guidance.* This task includes the joining of threaded pipe with threaded fittings and the inspection of completed joints. The joining of components with threaded connections is addressed in the component-covered task.

(1) Select task procedure(s) and appropriate equipment.

(2) Verify pipe and components are adequate for intended service.

(-a) schedule (wall thickness) and grade

- (-b) diameter
- (-c) thread type
- (-d) pressure rating
- (-e) material
- (3) Perform actions to join threaded pipe with threaded fittings.
 - (-a) Mating surfaces are clean, dry, and free of rust or other contaminants.
 - (-b) Approved thread compound or tape has been applied.
 - (-c) Pipe and fittings are threaded together to obtain a leak-free joint.
- (4) Inspect the completed joint for defects.
 - (-a) cracks
 - (-b) cross-threading
 - (-c) general defects
 - (-d) leaks
 - (-e) proper fit
- (5) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0731 Joining of Pipe: Flange Assembly

- (a) *Task Guidance.* This task includes the assembly of flanges, bolting in sequence, and torquing, as specified.
- (1) Select task procedure(s) and appropriate equipment.
- (2) Verify components to assemble flanges, including bolt sequence and torquing.
 - (-a) gasket type as specified
 - (-b) bolt and nut length and diameter as specified
 - (-c) flange assembly (rating and size)
- (3) Perform actions to prepare flange and components.
 - (-a) Faces are clean, dry, and free of material that might be detrimental to the flange assembly.
 - (-b) Components are free of defects.
 - (-1) nicks or gouges
 - (-2) cracks or other imperfections
 - (-c) Rust and dirt are removed from threads of bolts and nuts before assembly.
- (4) Install gasket as specified.
 - (-a) gasket integrity
 - (-b) alignment
- (5) Align flanges as specified.
 - (-a) Flange faces are square to each other.
 - (-b) Bolt holes are aligned.
- (6) Perform actions to install, as applicable.
 - (-a) insulators

- (-b) washers
- (-c) bolts and nuts
- (7) Perform actions to tighten.
 - (-a) sequence as specified
 - (-b) torquing as specified
- (8) Perform actions to inspect flange assembly, as applicable.
 - (-a) bolt ends similar in length
 - (-b) washers installed
 - (-c) insulators installed
 - (-d) properly aligned
- (9) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 3
- (d) Importance: 3
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:4

Task 0741 Joining of Pipe: Brazing or Soldering

- (a) *Task Guidance.* This task includes the joining of copper pipe by brazing or soldering and the inspection of completed joints. ASME BPVC, Section IX, Welding, Brazing, and Fusing Qualifications is an example of an acceptable standard for qualification for this task.
- (1) Select task procedure(s) and appropriate equipment.
- (2) Verify materials, as applicable.
 - (-a) pipe
 - (-b) solvent
 - (-c) flux
 - (-d) filler metal
 - (-e) abrasives
- (3) Prepare pipe and joint surface.
 - (-a) Take measurements, if required, to ensure proper joint alignment.
 - (-b) Maintain square cuts for optimum fit-up of fittings.
 - (-c) Ream/deburr ends.
 - (-d) Clean/remove surface oxides and contaminants prior to joining.
- (4) Perform brazing or soldering.
 - (-a) Select proper solder/brazing filler for application.
 - (-b) Apply flux to faying surfaces.
 - (-c) Assemble joint.
 - (-d) Apply heat.
 - (-e) Add solder/brazing filler to joint.
 - (-f) Allow heat of joint to melt filler metal.
 - (-g) When completed, remove flux residue.
- (5) Visually inspect joint for uniform fill.
- (6) Document, as required.
- (b) Potential applicability: G, D
- (c) Difficulty: 3

- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
- (g) Span of control: 1:2

Task 0751 Joining of Plastic Pipe — Butt Heat Fusion: Manual

(a) *Task Guidance.* This task includes the assembly and joining of plastic pipe by butt heat fusion and inspection of completed joints.

- (1) Select task procedure(s) and appropriate equipment.
 - (2) Verify materials, as applicable.
 - (-a) pipe
 - (-b) correctly sized equipment to handle pipe size
 - (3) Perform joining equipment check to verify that equipment functions within specified parameters.
 - (-a) Inspect equipment.
 - (4) Clean pipe, inspect pipe surfaces, and install in-fusion equipment.
 - (-a) Align pipe, and clamp into fusion equipment.
 - (-b) Face pipe mating surfaces until square.
 - (-c) Ensure mating surface is square, clean, dry, and free of burrs.
 - (-d) Ensure proper alignment of pipe.
 - (5) Apply heater plate.
 - (-a) Ensure heater plate is at proper temperature.
 - (-b) Insert heater plate.
 - (-c) Bring pipe ends in contact with heater plate as specified in manufacturer recommendations.
 - (-d) Ensure proper melt pattern and bead is formed.
 - (-e) Separate pipe from heater plate.
 - (-f) Inspect mating surface for contaminants.
 - (6) Join pipe surface to complete butt joint.
 - (-a) Bring mating surfaces together (as specified by pipe manufacturer).
 - (-b) Apply and maintain the pressure until cooled.
 - (-c) Visually inspect the bead (i.e., rollback).
 - (-d) Cool prior to movement (as specified by pipe manufacturer).
 - (7) Visually inspect pipe joint.
 - (-a) Remove defective joints.
 - (8) Document, as required.
- (b) Potential applicability: G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 1 yr if no joints made or whenever more than three joints or 3% of joints made, whichever is greater, are found unacceptable during pressure testing

- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
- (g) Span of control: 1:0

Task 0761 Joining of Plastic Pipe — Butt Heat Fusion: Hydraulic Machine

(a) *Task Guidance.* This task includes the assembly and joining of plastic pipe by butt heat fusion using a hydraulic machine and inspection of completed joints.

- (1) Select task procedure(s) and appropriate equipment.
 - (2) Verify materials, as applicable.
 - (-a) pipe
 - (-b) correctly sized equipment to handle pipe size
 - (3) Perform joining equipment check to verify that equipment functions within specified parameters.
 - (-a) Inspect equipment.
 - (-b) Check gages and hydraulic levels for correct operations.
 - (-c) Adjust hydraulic pressure for pipe being joined.
 - (4) Clean pipe, inspect pipe surfaces, and install in-fusion equipment.
 - (-a) Align pipe and clamp into fusion equipment.
 - (-b) Face pipe mating surfaces until square.
 - (-c) Ensure mating surface is square, clean, dry, and free of burrs.
 - (-d) Ensure proper alignment of pipe.
 - (5) Apply heater plate.
 - (-a) Ensure heater plate is at proper temperature.
 - (-b) Insert heater plate.
 - (-c) Bring pipe ends in contact with heater plate as specified in the manufacturer recommendations.
 - (-d) Ensure proper melt pattern and bead are formed.
 - (-e) Separate pipe from heater plate.
 - (-f) Inspect mating surface for contaminants.
 - (6) Join pipe surface to complete butt joint.
 - (-a) Bring mating surfaces together (as specified by pipe manufacturer).
 - (-b) Visually inspect the bead (i.e., rollback).
 - (-c) Cool prior to movement (as specified by pipe manufacturer).
 - (7) Visually inspect pipe joint.
 - (-a) Remove defective joints.
 - (8) Document, as required.
- (b) Potential applicability: G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 1 yr if no joints made or whenever more than three joints or 3% of joints made, whichever is greater, are found unacceptable during pressure testing

- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
- (g) Span of control: 1:0

Task 0771 Joining of Plastic Pipe: Sidewall Heat Fusion

(a) *Task Guidance.* This task includes the assembly and joining of plastic pipe by sidewall heat fusion and inspection of completed joints.

(1) Select task procedure(s) and appropriate equipment.

(2) Verify materials, as applicable.

(-a) pipe

(-b) correctly sized equipment to handle pipe size

(3) Perform joining equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Check gage for correct operation.

(4) Clean and inspect pipe and fitting surfaces to be fused.

(-a) Clean pipe and fitting base, and rough up mating surfaces, in accordance with pipe and fitting manufacturer.

(5) Set up heat fusion equipment.

(-a) Correct heater faces securely attached to fusion iron.

(-b) Saddle machine/clamp securely installed to the pipe.

(-c) Install fitting loosely in saddle machine.

(-d) Dry run to ensure fitting when lowered to pipe surface is square to the pipe surface.

(-e) Make final adjustments, and tighten.

(6) Heat fitting and pipe mating surfaces.

(-a) Ensure heater iron is at proper temperature.

(-b) Bring mating surfaces together with fusion iron.

(-c) Heat surfaces for specified time (as specified in the manufacturer specification).

(-d) Ensure proper melt pattern/bead is formed.

(-e) Separate components from fusion iron.

(-f) Inspect mating surface for contaminants.

(7) Join pipe surface to complete joint.

(-a) Bring mating surfaces together, and apply and maintain pressure in accordance with manufacturer's recommendations.

(-b) Ensure proper bead is formed.

(-c) Visually inspect the bead (rollback).

(-d) Cool prior to movement (as specified by pipe manufacturer).

(8) Visually inspect completed sidewall fusion.

(-a) Inspect for complete melt pattern and potential voids at point of fusion.

(-b) If fusion is faulty, follow recommended practices.

(9) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 1 yr if no joints made or whenever more than three joints or 3% of joints made, whichever is greater, are found unacceptable during pressure testing

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:0

Task 0781 Joining of Plastic Pipe: Electrofusion

(a) *Task Guidance.* This task includes the assembly and joining of plastic pipe by electrofusion and inspection of completed joints.

(1) Select task procedure(s) and appropriate equipment.

(2) Verify materials, as applicable.

(-a) pipe and fittings

(3) Perform joining equipment check.

(-a) checking pipe-scraping tool

(-b) pipe restraint

(-c) electrofusion processor

(-d) correctly sized equipment (e.g., generator to operate processor)

(4) Select fitting, clean, and inspect pipe and fitting surfaces to be fused.

(-a) Clean pipe and fitting.

(-b) Scrape pipe surface at point of fusion. (Avoid contact with fusion surfaces once cleaned and scraped.)

(-c) Mark stab depth on pipe wall, if applicable.

(5) Set up electrofusion equipment.

(-a) Install fitting.

(-b) Install pipe restraint.

(-c) Scan fitting bar code, if applicable.

(-d) Secure processor leads.

(6) Join fitting and pipe.

(-a) Activate fusion processor.

(-b) Remove processor leads once cycle is complete.

(-c) Cool prior to movement (as specified by manufacturer).

(7) Document as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 1 yr if no joints made or whenever more than three joints or 3% of joints made, whichever is greater, are found unacceptable during pressure testing

(f) Evaluation method

- (1) Initial: P&W/O
- (2) Sub: P&W/O
- (g) Span of control: 1:0

Task 0791 Joining of Plastic Pipe: Socket Heat Fusion

(a) *Task Guidance.* This task includes the assembly and joining of plastic pipe by socket heat fusion and inspection of completed joints.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform socket equipment check.
 - (-a) Select proper sized heat adapter that is free of defects and contamination.
 - (-b) Ensure proper iron selection.
 - (-c) Clean and inspect chamfer tool.
 - (-d) Verify socket fusion tool is in good working condition.
- (3) Assemble socket fusion equipment as specified by manufacturer's recommended procedures.
- (4) Select fitting, and prepare pipe surface.
 - (-a) Select the correct fitting, and prepare pipe and fitting for fusion.
 - (-b) Verify pipe and pipe fittings are free from contamination.
- (5) Prepare pipe end and fitting as specified by manufacturer's recommendations.
- (6) Socket fusion on pipe ends.
 - (-a) Follow socket fusion procedures.
 - (-b) Follow all safety regulations and procedures for socket fusion on pipeline.
- (7) Insert fitting on the pipe against cold ring.
- (8) Visually inspect.
 - (-a) Examine the joint for
 - (-1) uniformity
 - (-2) proper alignment
 - (-3) acceptable bead appearance
- (9) Document, as required.
- (b) Potential applicability: G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 1 yr if no joints made or whenever more than three joints or 3% of joints made, whichever is greater, are found unacceptable during pressure testing
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
- (g) Span of control: 1:0

Task 0801 Welding

(a) *Task Guidance.* This task includes the assembly and joining of steel pipe by welding, and repair of welds, in accordance with welding procedures. Qualification should be in accordance with API 1104, ASME BPVC Section IX, or other acceptable standard or practice. Visual inspection of welding and welds is in accordance with Task 0811, Visual Inspection of Welding and Welds.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Verify materials.
- (3) Perform preweld inspection, as applicable.
 - (-a) fire or explosion potential
 - (-b) properly prepared weld-face
 - (-c) weld preparation surface free of laminations
 - (-d) piping components have not been magnetized
 - (-e) proper storage of electrodes
 - (-f) wall thickness
- (4) Perform assembly or fit-up of parts.
 - (-a) Check for ovality.
 - (-b) Check for correct fit-up.
- (5) Perform weld in accordance with welding procedure.
 - (-a) preheat/postheat, as applicable
 - (-b) speed of travel
 - (-c) direction of travel
 - (-d) voltage/amperage
 - (-e) rod selection
- (6) Visually examine quality of weld.
- (7) Remediate weld if any defects are found.
- (8) Document, as required.
 - (b) Potential applicability: L, G, D
 - (c) Difficulty: acceptable standard, therefore, data not collected
 - (d) Importance: acceptable standard, therefore, data not collected
 - (e) Interval: as specified by acceptable standard or practice
 - (f) Evaluation method: as specified by acceptable standard or practice
- (g) Span of control: 1:0

Task 0811 Visual Inspection of Welding and Welds

(a) *Task Guidance.* This task includes inspection of the welding process (e.g., equipment setup, material fit-up/alignment, handling of welding materials) and inspection of welds to identify visually detectable defects. ASNT SNT-TC-1A (level II), ASME BPVC Section IX, and API 1104 are examples of acceptable standards for qualification for this task.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Identify welding conditions and essential variables, as applicable to the procedure being performed.
 - (-a) when visual inspection must be done during the welding procedure
 - (-b) when weather screens/tents are required
 - (-c) how many welders are required
 - (-d) when preheating is required
 - (-e) proper distance between welds
 - (-f) types of branch connections allowed
 - (-g) time allowed between passes

- (-h) bevel preparation and spacing, proper land size
- (3) Verify welding procedure.
 - (-a) preheating
 - (-b) rod/electrode selection
 - (-c) travel direction
 - (-d) travel speed
 - (-e) polarity
 - (-f) alignment
 - (-g) confirming proper weld reinforcement
 - (-h) gap
 - (-i) cleanliness of surface
 - (-j) amperage/voltage ranges
 - (-k) confirming proper grinding and cleaning between each pass and at completion
 - (-l) postheat
- (4) Visually inspect completed weld for the following:
 - (-a) proper leg size for fillet welds
 - (-b) alignment
 - (-c) penetration
 - (-d) fusion
 - (-e) concavity
 - (-f) burn through
 - (-g) slag inclusions
 - (-h) porosity
 - (-i) cracks
 - (-j) undercutting
 - (-k) arc burn
- (5) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 3
- (d) Importance: 3
- (e) Interval: 3 yr
- (f) Evaluation method: as specified by acceptable standard or practice
- (g) Span of control: 1:1

Task 0821 Tubing and Fitting Installation: Instrument, Control, and Sampling

- (a) *Task Guidance.* This task includes the preparation, bending, joining, and installation of instrument, control, and sampling line tubing and fittings containing product.
- (1) Select task procedure(s) and appropriate equipment.
- (2) Identify service requirements for tubing installation.
 - (-a) vertical or horizontal installation
 - (-b) temperature(s)
 - (-c) number of tubing runs
 - (-d) vibration conditions
 - (-e) direction changes
- (3) Verify tubing and fittings are adequate for the intended service.
 - (-a) wall thickness
 - (-b) outer diameter
 - (-c) length

- (-d) pressure rating(s)
- (-e) type
- (-f) fitting(s)
- (-g) material
- (4) Install tubing and fittings.
 - (-a) Cut tubing.
 - (-1) Visually inspect and clean.
 - (-b) Bend with bender.
 - (-1) Do not hand-bend.
 - (-2) Smooth and buckle free.
 - (-3) Appropriate number of bends and radius of bends for application.
 - (-c) Join tubing and fittings as required by the component manufacturer or in accordance with operator installation procedures.
 - (-d) Utilize thread compound, as applicable, on tube fitting threads as required by the component manufacturer or in accordance with operator installation procedures.
 - (-e) Protect and secure.
 - (-f) Provide adequate support.
 - (-g) Cushion and/or allow for flexibility.
- (5) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0831 Cast Iron Caulked Bell and Spigot Joints — Installation and Maintenance of Mechanical Leak Clamp(s)

- (a) *Task Guidance.* This task includes the installation and maintenance of mechanical leak clamps on caulked bell and spigot joints.
- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform clamping equipment check.
 - (-a) Select proper sized mechanical clamp that is free of defects.
 - (-b) Select proper installation tools.
- (3) Prepare pipe surface.
 - (-a) Clean pipe bell face, hub, and spigot.
 - (-b) Ensure pipe and pipe fittings are free from dirt, rust, scale, and corrosion in area of clamp installation.
 - (-c) Ensure a flush bell face.
- (4) Install mechanical leak clamp.
 - (-a) Install all of the following in accordance with manufacturer's instructions.
 - (-b) Install hub flange pieces.
 - (-c) Install rubber gasket.
 - (-d) Ensure that beveled side of gasket is facing away from bell face.

- (-e) Install spigot flange pieces.
- (-f) Join hub, gasket, and spigot pieces with applicable bolts, ensuring nuts are located on spigot side of assembled clamp.
- (-g) Wrench tighten uniformly and progressively, and torque to manufacturer's specifications.
- (-h) Check for leakage.
- (-i) Recheck bolts for proper torque.
- (5) Visually inspect.
 - (-a) Inspect completed clamp for uniformity, ensuring equal spacing between clamp and bell face.
- (6) Document, as required.
- (b) Potential applicability: D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0841 Cast Iron Joints — Sealing: Encapsulation

- (a) *Task Guidance.* This task includes the sealing of cast iron joints by encapsulation and inspection of encapsulation.
 - (1) Select task procedure(s) and appropriate equipment.
 - (2) Prepare pipe surface.
 - (-a) Ensure sufficient excavation around cast iron bell and spigot.
 - (-b) Grit blast bell face, hub, and a minimum of 4 in. of spigot to clean bare metal.
 - (-c) Ensure underside of bell joint is cleaned to bare metal.
 - (-d) If soap is used for cleaning, reblast.
 - (-e) Prime pipe with applicable primer, ensuring complete coverage of bare metal.
 - (3) Install encapsulation kit in accordance with manufacturer's instructions.
 - (-a) Install mold over bell and spigot.
 - (-b) Mix, pour, and pressurize sealant into mold.
 - (-c) Allow completed mold to cure.
 - (4) Visually inspect repair before backfill.
 - (-a) Check underside to ensure integrity of completed mold.
 - (5) Document, as required.
- (b) Potential applicability: D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0851 Internal Sealing: Cast Iron and Ductile Iron

- (a) *Task Guidance.* This task includes the internal sealing of cast iron and ductile iron and inspection of sealant.
 - (1) Select task procedure(s) and appropriate equipment.
 - (2) Clean pipe, and prepare internal pipe surface.
 - (-a) Cut and prepare pipe at determined sending and receiving pits.
 - (-b) Ensure clean internal surface with no obstructions.
 - (-c) Ensure pipe and pipe fittings are free from contamination.
 - (3) Perform internal sealing.
 - (-a) Perform internal sealing in accordance with manufacturer's instructions.
 - (4) Visually inspect.
 - (-a) Inspect lining for proper seating and/or adhesion to internal surface of repaired pipe.
 - (5) Reconnect pipe and test.
 - (-a) Reconnect pipe repaired with liner at sending and receiving pits.
 - (-b) Test relined pipe.
 - (6) Document, as required.
- (b) Potential applicability: D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0855 Internal Sealing: Cast Iron and Ductile Iron — Anaerobic

- (a) *Task Guidance.* This task includes the internal sealing of cast iron and ductile iron anaerobically and inspection of the plugs.
 - (1) Select task procedure(s) and appropriate equipment.
 - (2) Clean pipe and prepare pipe surface.
 - (3) Drill and tap holes.
 - (-a) Select number, size, and position of holes to be drilled and tapped according to pipe size and in accordance with manufacturer's instructions.
 - (-b) Drill and tap.
 - (4) Install injection fittings and sealant injector.
 - (5) Inject sealant in accordance with manufacturer's instructions.
 - (6) Remove injection equipment and plug tapped holes.
 - (7) Soap test and visually inspect.
 - (8) Document, as required.
- (b) Potential applicability: D
- (c) Difficulty: 3

- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0861 Installation of Steel Pipe in a Ditch

(a) *Task Guidance.* After excavation is completed, this task includes the handling, lowering in, and fitting of steel pipe in a ditch to ensure firm support.

(1) Select task procedure(s) and appropriate equipment.

(2) Handle pipe to prevent damage.

(-a) Inspect slings, rollers, or installation equipment.

(-b) Pad boom in case pipe swings back.

(-c) Check pipe coating while handling.

(3) Visually inspect ditch.

(-a) Remove objects that will interfere with adequate uniform support of the pipe.

(-b) Verify ditch depth for coverage after pipe is installed.

(-c) Verify clearance on ditch sides to enable room for padding without damaging the coating.

(-d) Verify soil conditions will support equipment.

(-e) Verify ditch configuration to minimize pipe stress.

(4) Install pipe with firm and even support.

(-a) Install appropriate support (e.g., sandbags, foam, padding dirt), if necessary (e.g., uneven ditch depth, potential pipe sag).

(-b) Verify bends in pipe will not move during backfilling.

(5) Visually inspect prior to backfill to ensure the following:

(-a) proper installation

(-b) no damage occurred during installation

(-c) ditch still free of rocks and debris

(6) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:5

Task 0871 Installation of Steel Pipe in a Bore

(a) *Task Guidance.* After boring is completed, this task includes the handling, pulling in, and inspection of exposed pipe and coating.

(1) Select task procedure(s) and appropriate equipment.

(2) Handle pipe to prevent damage.

(-a) Ensure the use of proper pipe supports at correct spacing, as applicable.

(-b) Ensure the use of proper load rated belts/slides when lifting pipe.

(-c) Use padded material if pipe is to be laid upon wooden skids prior to installation.

(3) Install pipe to prevent pipe damage and coating damage, if applicable.

(-a) Ensure pipe rollers have protective coating.

(-b) Ensure adequate drilling mud circulation at the pipe insertion location.

(-c) Ensure pipe entry and exit angles match the angle of the bore.

(-d) Maintain proper clearance between pipe and bore.

(4) Inspect exposed pipe and coating.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 0881 Installation of Steel Pipe Plowing/Pull-In

(a) *Task Guidance.* This task includes the handling, plowing/pull-in of steel pipe, and inspection of exposed pipe and coating.

(1) Select task procedure(s) and appropriate equipment.

(2) Select proper sized plow for pipe being installed.

(3) Visually inspect coating for holidays.

(4) Prepare pipe for installation.

(-a) Place pipe on protection mat in line with direction of installation.

(-b) Install pulling device.

(5) Plow pipe into ground.

(-a) Attach pipe to plow with pulling device.

(-b) Commence plowing.

(6) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 0891 Field Bending of Steel Pipe

(a) *Task Guidance.* This task includes the field bending of steel pipe as specified and inspection of completed field bends.

(1) Select task procedure(s) and appropriate equipment.

(2) Prepare pipe for bending machine.

(-a) Handle pipe to prevent damage to the coating, pipe, and bevel.

(-b) Ensure the long seam is properly aligned, as applicable.

(-c) Ensure shoe is properly aligned within the tolerances from top to bottom and front to back.

(-d) Ensure mandrel is centered where the bend is to occur on the pipe.

(-e) Ensure pressure for mandrel is set to specifications.

(3) Perform field bending of pipe.

(-a) Set the machine up to perform the bending operation.

(-b) Bend pipe to the designed angle or degree.

(-c) Monitor pipe position, and prevent from rolling.

(-d) Reposition as necessary to complete all bends according to the design criteria.

(-e) Ensure the bend is the proper distance from the end of the pipe.

(4) Inspect pipe bend.

(-a) Verify bend meets design specifications.

(-b) Ensure bend is smooth in contour and free of damage.

(-c) Visually ensure the integrity of the coating.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 0901 Installation of Plastic Pipe in a Ditch

(a) *Task Guidance.* After excavation is completed, this task includes the handling, lowering in, and fitting of plastic pipe in a ditch to ensure firm support. The installation of a tracer wire is addressed in Task 0941, Install Tracer Wire.

(1) Select task procedure(s) and appropriate equipment.

(2) Handle pipe to prevent damage.

(-a) Inspect slings, rollers, or installation equipment.

(-b) Pad boom in case pipe swings back.

(3) Visually inspect ditch to ensure it is

(-a) of proper depth and width

(-b) free of rocks and debris

(-c) padded properly with suitable backfill

material

(-d) able to supply firm support to installed

pipe

(-e) constructed to fit pipe

(4) Visually inspect pipe for the following:

(-a) scrapes

(-b) cuts

(-c) gouges

(-d) kinks

(-e) bends

(5) Install pipe and tracer wire.

(-a) Ensure plastic pipe is installed to

(-1) minimize shear and installation

stresses

(-2) allow for expansion and contraction

(-3) prevent damage to pipe

(-4) fit contour of ditch

(-b) Install tracer wire in accordance with Task

0941.

(6) Visually inspect installed pipe and tracer wire.

(-a) Inspect prior to backfill to ensure the following:

(-1) proper installation

(-2) no damage occurred during

installation

(-3) ditch still free of rocks and debris

(7) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:5

Task 0911 Installation of Plastic Pipe in a Bore

(a) *Task Guidance.* After boring is completed, this task includes the handling, pulling in, and inspection of exposed pipe. The installation of a tracer wire is addressed in Task 0941, Install Tracer Wire.

(1) Select task procedure(s) and appropriate equipment.

(2) Handle pipe to prevent damage (e.g., cuts, gouges, scrapes, overbending, kinks).

(3) Install pipe to prevent pipe damage as applicable.

(-a) Ensure proper bedding.

(-b) Minimize shear and stress.

(-c) Allow for contraction.

(-d) Use weak links during pull back, if applicable.

(-e) Ensure bore hole sufficient size.

- (-f) Ensure proper depth.
- (4) Visually inspect plastic pipe.
 - (-a) damage
 - (-b) allowance for expansion/contraction
 - (-c) proper depth
 - (-d) proper clearance from other utilities
- (5) Document, as required.
- (b) Potential applicability: G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0921 Installation of Plastic Pipe Plowing/Pull-In

(a) *Task Guidance.* This task includes the handling, plowing/pull-in of plastic pipe, and inspection of exposed pipe. The installation of a tracer wire is addressed in Task 0941, Install Tracer Wire.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Select pipe.
 - (-a) Verify material.
- (3) Handle pipe to prevent damage.
 - (-a) Avoid damage to pipe during movement or transportation (e.g., scratching or gouging).
- (4) Install pipe to prevent pipe damage, as applicable.
 - (-a) Identify hazards and obstructions in the plow path.
 - (-b) Ensure utilities are marked.
 - (-c) Dig starting hole for plow blade, and lower blade into hole.
 - (-d) Install weak link.
 - (-e) Secure pipe to plow blade.
 - (-f) Begin pull-in and monitor pipe movement.
 - (-g) Minimize shear and pressure as much as possible.
 - (-h) Handle pipe to prevent damage.
 - (-i) Allow for contraction.
- (5) Document, as required.
- (b) Potential applicability: G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0931 Installation of Plastic Pipe by Plowing/Planting

(a) *Task Guidance.* This task includes the handling, plowing/planting of plastic pipe, and inspection of exposed pipe. The installation of a tracer wire is addressed in Task 0941, Install Tracer Wire.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Select pipe.
 - (-a) Verify material.
- (3) Handle pipe to prevent damage.
 - (-a) Avoid damage to pipe during movement or transportation (e.g., scratching or gouging).
- (4) Install pipe to prevent pipe damage, as applicable.
 - (-a) Identify hazards and obstructions in the plow path.
 - (-b) Ensure utilities are marked.
 - (-c) Dig starting hole for plow blade, install pipe into plow shoot, and lower blade into hole.
 - (-d) Install weak link.
 - (-e) Secure pipe.
 - (-f) Begin pull-in, and monitor pipe movement.
 - (-g) Minimize shear and pressure as much as possible.
 - (-h) Handle pipe to prevent damage.
 - (-i) Allow for contraction.
- (5) Document, as required.
- (b) Potential applicability: G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 0935 Relocation of a Pipeline

(a) *Task Guidance.* This task includes the relocation of a pipeline while protecting it from damage and stress.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Prepare for relocation of a pipeline.
 - (-a) Prior to moving an in-service pipeline, ensure the pipeline pressure has been reduced, if necessary.
 - (-1) Monitor pressure or flow, as appropriate.
 - (-b) Protect exposed pipeline from damage.
 - (-c) Visually inspect ditch.
 - (-1) Remove objects that will interfere with adequate uniform support of the pipe.

(-2) Verify ditch depth for coverage after pipe is relocated.

(-3) Verify clearance on ditch sides to enable room for padding without damaging the coating.

(-4) Verify soil conditions will support equipment.

(-5) Verify ditch configuration to minimize pipe stress.

(3) Move the pipeline.

(-a) Adequately support the pipeline during movement and placement as specified.

(-b) Verify the distance and deflection specified have not been exceeded.

(-c) Handle pipe to prevent damage.

(-1) Inspect slings, rollers, or installation equipment.

(-2) Pad boom in case pipe swings back.

(-3) Check pipe coating while handling.

(-d) Move pipe with firm and even support.

(-1) Install appropriate support (e.g., sand bags, foam, padding dirt), if necessary (e.g., uneven ditch depth, potential pipe sag).

(-2) Verify bends in pipe will not move during backfilling.

(4) Inspect the pipeline after movement has been completed.

(-a) proper installation

(-b) no damage occurred during relocation

(-c) ditch still free of rocks and debris

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 5

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 0941 Install Tracer Wire

(a) *Task Guidance.* This task includes the installation of a tracer wire on plastic pipe, including verification of tracer wire mechanical integrity and electrical continuity. Electrical connections are addressed in

- Task 0041, Installation and Maintenance of Mechanical Electrical Connections

- Task 0051, Installation of Exothermic Electrical Connections

(1) Select task procedure(s) and appropriate equipment.

(2) Install tracer wire.

(-a) Inspect and protect wire against damage during installation.

(-b) Install wire in close proximity to pipe while ensuring contact with pipe is at a minimum.

(-c) Correctly install wire connectors.

(-d) Expose wires for necessary connections where applicable.

(3) Verify mechanical integrity and electrical continuity.

(-a) Test strain relief prior to backfilling.

(-b) Locate facility after backfill.

(-c) Test for electrical continuity.

(4) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:5

Task 0951 Installation of Pipe Aboveground

(a) *Task Guidance.* This task includes the handling and installation of pipe aboveground.

(1) Select task procedure(s) and appropriate equipment.

(2) Handle pipe to prevent damage.

(-a) Use proper equipment to lift, secure, and support pipe.

(-b) Inspect pipe for cuts, gouges, deep scratches, and other imperfections before use.

(3) Install pipe.

(-a) Ensure uniform support of pipe and appurtenances.

(-b) Use select bedding materials, if applicable.

(-c) Inspect pipe at air-to-soil interface for coating damage.

(-d) Secure installation as necessary to protect from possible damage due to outside forces.

(4) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:3

Task 0961 Aboveground Supports and Anchors: Inspection, Preventive, and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the aboveground supports and anchors are installed in accordance with specifications, prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of aboveground supports and anchors and actions to keep the aboveground supports and anchors functioning as specified.

(1) Select task procedure(s) and appropriate equipment.

(2) Visually inspect supports and anchors.

(-a) Check for undue strain on connected equipment.

(-b) Ensure expansion and contraction of pipe are not restricted.

(-c) Check corrosion that may affect the structural integrity of supports and anchors.

(-d) Check for disengagement of support equipment due to land movement or soil subsidence.

(3) Perform preventive or corrective maintenance.

(-a) Repair or replace supports and anchors, as required.

(-b) Remediate soil subsidence or other land movement concerns.

(4) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 4

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:4

Task 0971 Installation and Maintenance of Casing Spacers, Vents, and Seals

(a) *Task Guidance.* This task includes the installation of casing spacers, vents, and seals. This task also includes the evaluation, repair, or replacement of casing vents and seals.

(1) Select task procedure(s) and appropriate equipment.

(2) Visually inspect installation.

(-a) spacers, seals, and vents properly sized for casing

(-b) spacer separation not exceeding design specifications

(-c) spacers properly secured to carrier pipe

(-d) casing seals and vents installed properly to prevent entry of water into casing

(3) Perform corrective maintenance as identified during routine surveys and patrols (e.g., cathodic protection issues, damaged casing vents).

(4) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:3

Task 0981 Backfilling

(a) *Task Guidance.* This task includes visually inspecting backfill material, installation of pipe protective material (e.g., padding, shading, and rock shield), verification of firm support, and placing backfill in lifts or layers as specified.

(1) Select task procedure(s) and appropriate equipment.

(2) Visually inspect backfill material.

(-a) Remove items that may damage pipe or pipe coating (rocks, metal, masonry, frozen chunks, etc.).

(-b) Ensure backfill material meets standards or adheres to special instructions.

(3) Install pipe protective material (e.g., padding, shading, and rock shield).

(4) Place the backfill material around the pipe to provide firm support under and around the pipe.

(-a) Avoid damage to the pipe or coating.

(-b) Ensure the pipe is properly supported and no voids exist.

(-c) Layer and compact as applicable.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:3

Task 0991 Coating Application and Repair: Brushed or Rolled

(a) *Task Guidance.* This task includes the surface preparation and application or repair of coatings using a brush or roller. This task includes painting to inhibit corrosion and internal or external applications of coatings on pipes, tanks, etc.

(1) Select task procedure(s) and appropriate equipment.

(2) Prepare surface.

(-a) Check for loose material or surface rust.

(-b) Remove loose materials/rust.

(-c) Remove moisture and contaminants from surface.

(-d) Clean surface.

(3) Apply coating.

(-a) Prepare approved coating materials.

(-b) Apply approved coating materials in uniform layer/thickness.

(-c) Cover all prepared/cleaned surfaces.

(4) Inspect applied coating.

(-a) Visually inspect for areas of inadequate coverage/thickness.

(-b) Perform wet film and/or dry film thickness measurement, as applicable.

(-c) Ensure coating is protected until cured.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:5

Task 1001 Coating Application and Repair: Sprayed

(a) *Task Guidance.* This task includes the surface preparation and application or repair of coatings using a sprayer. This task includes painting to inhibit corrosion, and internal or external applications of coatings, on pipes, tanks, etc.

(1) Select task procedure(s) and appropriate equipment.

(2) Prepare surface.

(-a) Remove moisture and contaminants from surface.

(-b) Clean surface.

(-c) Check for loose material or surface rust.

(-d) Remove loose materials/rust.

(3) Apply coating.

(-a) Prepare approved coating materials.

(-b) Apply approved coating materials in uniform layer/thickness.

(-c) Cover all prepared/cleaned surfaces.

(4) Inspect applied coating.

(-a) Visually inspect for areas of inadequate coverage/thickness.

(-b) Perform wet film and/or dry film thickness measurement, as applicable.

(-c) Ensure coating is protected until cured.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:5

Task 1011 External Coating Application and Repair: Wrapped

(a) *Task Guidance.* This task includes the surface preparation and application or repair of coatings using a wrap.

(1) Select task procedure(s) and appropriate equipment.

(2) Prepare surface according to the following steps, as applicable:

(-a) Remove moisture and contaminants from surface.

(-b) Clean surface.

(-c) Remove loose materials/rust.

(-d) Ensure surface temperature is within appropriate range.

(-e) Apply primer, and allow to cure.

(3) Apply coating according to the following steps, as applicable:

(-a) Prepare coating material for application, including heating as applicable.

(-b) Apply coating in spiral motion. Use sufficient force to remove voids.

(-c) Overlap coating seams.

(-d) Wrap from bottom to top, if coating a vertical section of pipe.

(-e) Smooth/seal all seams.

(-f) Ensure coating is protected until cured.

(4) Inspect coating for the following, as applicable:

(-a) areas of inadequate coverage

(-b) smooth seams to ensure required seal

(-c) proper coating thickness

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:5

Task 1031 Install or Repair Internal Liner

(a) *Task Guidance.* This task includes the surface preparation, installation, repair, and inspection of an internal liner.

(1) Select task procedure(s) and appropriate equipment.

(2) Clean pipe, and prepare internal pipe surface for installation.

(3) Install liner, as specified by the manufacturer.

(-a) Ensure correct positioning.

(-b) Ensure liner adheres correctly to internal surface, if applicable.

(4) Visually inspect liner after installation.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 4

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:3

Task 1041 Install Mechanical Clamps and Sleeves: Bolted

(a) *Task Guidance.* This task includes the preparation, installation, and inspection of bolted mechanical clamps and sleeves.

(1) Select task procedure(s) and appropriate equipment.

(2) Select clamp or sleeve material and size.

(3) Perform equipment check.

(-a) Calibrate fastener tool, if applicable.

(4) Prepare pipe for installation of clamp or sleeve.

(-a) Verify safe atmospheric levels prior to installing the repair sleeve.

(-b) Ensure adequate surface preparation for type of sleeve.

(5) Install clamp or sleeve.

(-a) Take precautions when installing each type of sleeve (e.g., Skinner-type, Dresser-type), including operating pressure of pipeline.

(-b) Install clamp or sleeve.

(-c) Torque bolts, if applicable.

(-d) Support pipe, as necessary.

(6) Inspect the installed clamp or sleeve for

(-a) leaks

(-b) pullout

(-c) rubber roll

(-d) insertion depth

(7) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 1051 Fit-Up of Weld-Type Repair Sleeve

(a) *Task Guidance.* This task includes the preparation and fit-up of weld-type repair sleeves. Welding the repair sleeve is covered in Task 0801, Welding.

(1) Select task procedure(s) and appropriate equipment.

(2) Select and prepare sleeve.

(-a) Select sleeve material, design, and size.

(3) Prepare pipe for fit-up of sleeve.

(-a) Ensure adequate surface preparation for type of sleeve.

(-b) Prepare bevels on sleeve.

(4) Fit up sleeve.

(-a) Take precautions when fitting each type of sleeve.

(-b) Install filler material, if applicable.

(-c) Fit up sleeve.

(-d) Support pipe, as necessary.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 1061 Install Composite Sleeves

(a) *Task Guidance.* This task includes the preparation and installation of composite sleeves.

(1) Select task procedure(s) and appropriate equipment.

(2) Prepare pipe surface, as specified by the manufacturer, so that

(-a) the pipe surface is clean and free of rust

(-b) the surface has the proper profile

(3) Ensure correct working clearance around pipe.

(4) Install composite wrap, as specified by the manufacturer, to ensure

(-a) sufficient surface adhesiveness

(-b) correct overlap, if applicable

(-c) no sagging or wrinkles are present

(-d) no dry spots are present

(-e) composite material is thoroughly coated, as applicable

(-f) correct tightness, as applicable

(5) Visually inspect, as specified by the manufacturer, for

(-a) curing

(-b) dry spots

(6) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O or Mfr's Rec

(g) Span of control: 1:2 or Mfr's Rec

Task 1071 Repair of Steel Pipe by Grinding

(a) *Task Guidance.* This task includes the verification of minimum wall thickness requirements and removal of defects by grinding.

(1) Select task procedure(s) and appropriate equipment.

(2) Determine wall thickness is acceptable.

(3) Initiate removal of defect by grinding.

(-a) Take precautions when grinding, with consideration of the operating pressure of pipeline.

(-b) Perform grinding operation.

(-c) Confirm defect is removed and minimum wall thickness remains.

- (4) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 1081 Tapping a Pipeline (Tap Diameter 2 in. and Less)

(a) *Task Guidance.* This task includes performing tapping, including the installation of the isolation valve and tapping equipment and removal of isolation valve, as specified. Installation of fittings is addressed in

- Task 0801, Welding
- Task 1041, Install Mechanical Clamps and Sleeves: Bolted

(1) Select task procedure(s) and appropriate equipment.

(2) Verify equipment matches line conditions and install the following:

- (-a) gaskets or thread sealing compound
- (-b) valve
- (-c) tapping machine
- (-d) cutter and pilot combination

(3) Prepare to perform tap.

- (-a) Inspect fittings.
- (-b) Verify alignment on valve to fitting.
- (-c) Verify equipment alignment.
- (-d) Take proper measurements, and record

for reference.

(4) Functional leak test

(-a) Verify equipment valve and fitting will hold pipeline pressure.

(-b) Close valve to ensure lower section of valve will hold pipeline pressure. (Purge pressure between valve and machine.)

(-c) Perform leak test.

(5) Make tap.

- (-a) Verify valve is open.
- (-b) Verify pilot drill position.
- (-c) Get proper approval to start tap.
- (-d) Perform tap.

(6) Recover equipment.

- (-a) Retract tapping machine to "0."
- (-b) Close valve.
- (-c) Vent product safely.
- (-d) Check for leaks.
- (-e) Remove machine.

(7) Document, as required.

- (b) Potential applicability: L, G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr

- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
- (g) Span of control: 1:2

Task 1091 Tapping a Pipeline (Tap Diameter Greater Than 2 in.)

(a) *Task Guidance.* This task includes performing tapping, including the installation of the isolation valve and tapping equipment and removal of isolation valve, as specified. Installation of fittings is addressed in

- Task 0801, Welding
- Task 1041, Install Mechanical Clamps and Sleeves: Bolted

(1) Select task procedure(s) and appropriate equipment.

(2) Verify equipment matches line conditions and install the following:

- (-a) gaskets
- (-b) valve
- (-c) tapping machine
- (-d) cutter and pilot combination

(3) Prepare to perform tap.

- (-a) Inspect fitting.
- (-b) Verify alignment on valve to fitting.
- (-c) Verify equipment alignment.
- (-d) Take proper measurements, and record for reference.

(4) Functional leak test

(-a) Verify equipment valve and fitting will hold pipeline pressure.

(-b) Close valve to ensure lower section of valve will hold pipeline pressure. (Purge pressure between valve and machine.)

(-c) Perform leak test.

(5) Make tap.

- (-a) Verify valve is open.
- (-b) Verify pilot drill position.
- (-c) Get proper approval to start tap.
- (-d) Perform tap.

(6) Recover equipment.

- (-a) Retract tapping machine to "0."
- (-b) Close valve.
- (-c) Vent product safely.
- (-d) Check for leaks.
- (-e) Remove machine.

(7) Document, as required.

- (b) Potential applicability: L, G, D
- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
- (g) Span of control: 1:2

Task 1101 Tapping a Pipeline With a Built-In Cutter

(a) *Task Guidance.* This task includes tapping a pipe with an installed fitting that contains a built-in cutter. Installation of fittings is addressed in

- Task 0771, Joining of Plastic Pipe: Sidewall Heat Fusion

- Task 0781, Joining of Plastic Pipe: Electrofusion

- Task 0801, Welding

- Task 1041, Install Mechanical Clamps and Sleeves: Bolted

(1) Select task procedure(s) and appropriate equipment.

(2) Determine the travel or tap requirements of the fitting selected.

(3) Perform the tap.

(-a) Lower cutter.

(-b) Bottom out cutter.

(4) Isolate the tap.

(-a) Raise cutter.

(-b) Replace cap to fitting.

(-c) Check for leaks.

(5) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 1111 Tapping Cast and Ductile Iron Pipe and Low-Pressure Steel Pipe

(a) *Task Guidance.* This task includes tapping a pipe with or without an installed fitting. Installation of fittings, as specified, is addressed in Task 1041, Install Mechanical Clamps and Sleeves: Bolted.

(1) Select task procedure(s) and appropriate equipment.

(2) Verify equipment matches line conditions, and install the following:

(-a) fitting

(-b) gaskets

(-c) valve

(-d) tapping machine

(-e) cutter and pilot combination

(3) Prepare to perform tap.

(-a) Verify alignment on valve to fitting.

(-b) Verify equipment alignment.

(-c) Take proper measurements, and record for reference.

(4) Functional leak test

(-a) Verify equipment valve and fitting will hold pipeline pressure.

(-b) Close valve to ensure lower section of valve will hold pipeline pressure. (Purge pressure between valve and machine.)

(-c) Perform leak test.

(5) Make tap.

(-a) Verify valve is open.

(-b) Verify pilot drill position.

(-c) Get proper approval to start tap.

(-d) Perform tap.

(6) Recover equipment.

(-a) Retract tapping machine to "0."

(-b) Close valve.

(-c) Vent product safely.

(-d) Check for leaks.

(-e) Remove machine.

(7) Document, as required.

(b) Potential applicability: D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:2

Task 1121 Bagging and Stopping Low-Pressure Pipe

(a) *Task Guidance.* This task includes the insertion and removal of a bag on low-pressure pipe. It also includes pressure verification and monitoring pressure to ensure system pressure requirements are maintained.

(1) Select task procedure(s) and appropriate equipment.

(2) Verify segment(s) that requires bagging and/or stopping.

(-a) Utilize maps and/or records to identify segment requiring bagging or stopping.

(-b) Identify segments affected by action of bagging or stopping.

(-c) Minimize the number of customers out of service.

(3) Complete notifications.

(-a) Notify applicable operator, agency, or affected customers.

(-b) Temporarily discontinue service to affected customers.

(4) Install bags or stoppers.

(-a) Visually inspect bags or stoppers.

(-b) Test bags or stoppers.

(-c) Install gages.

(-d) Install bag- or stopper-watching gages to determine

(-1) if feed or installed bypass is adequate

(-2) if any blockages exist

(-e) Install required number of bags or stoppers and vents and/or purges in proper sequence.

- (5) Monitor pressure and atmosphere for leaks.
 - (-a) during initial bag or stopper installation
 - (-b) while work is performed that required bagging or stopping
 - (-c) during gassing-out operation
 - (-d) during removal of bags or stoppers
- (6) Remove bag or stopper.
 - (-a) Remove bags or stoppers in required sequence while monitoring gages.
 - (-b) Remove vents or purges.
 - (-c) Remove gages.
- (7) Restore service.
 - (-a) Restore service to any affected customer.
- (8) Document, as required.
- (b) Potential applicability: D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
- (g) Span of control: 1:2

Task 1131 Stopper (Stoppie) Pipe

(a) *Task Guidance.* This task includes the insertion and removal of a stopper (stoppie). Also, it includes pressure verification and monitoring pressure to ensure system pressure requirements are maintained.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Identify the segments to be affected by the stopping procedure.
 - (-a) Identify single or multiple feeds.
 - (-b) Identify operating pressure.
 - (-c) Verify multiple fitting(s) or valve(s) to be used in stopping procedure.
- (3) Complete notifications, as appropriate.
- (4) Install equipment, in accordance with manufacturer's specifications.
 - (-a) Perform equipment check.
 - (-b) Install valve.
 - (-c) Install appropriate equipment to remove the completion plug, if applicable.
 - (-d) Verify sealing element size.
 - (-e) Select appropriate gaskets, if applicable.
 - (-f) Install machine.
 - (-g) Install equalization hose, and equalize equipment with line product, if applicable.
 - (-h) Open valve.
 - (-i) Verify functional leak test.
 - (-j) Install pressure gage(s) to monitor system pressures.
 - (-k) Insert, and properly seat.
- (5) Monitor pressure.
- (6) Remove equipment, in accordance with manufacturer's specifications.
 - (-a) Remove from pipeline.

- (-b) Close valve, and relieve pressure from equipment.
- (-c) Install completion equipment, and equalize, if applicable.
- (-d) Open valve, and insert the completion plug.
- (-e) Close valve, if applicable.
- (-f) Remove completion machine from valve.
- (7) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
- (g) Span of control: 1:2

Task 1141 Squeeze Off Plastic Pipe

(a) *Task Guidance.* This task includes the squeeze off of plastic pipe. This also includes the selection, installation, and removal of squeeze-off tools and monitoring pressure to ensure system pressure requirements are maintained.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Identify segment(s) of pipe that will need to be squeezed off.
 - (-a) Verify single feed or multiple feeds.
 - (-b) Verify operating pressure.
- (3) Make notifications, as appropriate.
- (4) Ensure static ground equipment is in place, as applicable.
- (5) Install squeeze-off tool, in accordance with manufacturer's specifications.
 - (-a) Ensure the tool is square to the pipe with the squeeze plates parallel to each other.
 - (-b) Inspect the pipe for cuts, scrapes, gouges, or anomalies before placing of the squeeze-off tool.
 - (-c) Ensure squeeze location is free of obstruction.
 - (-d) Ensure pipe is supported.
 - (-e) Verify stop blocks are correct for the pipe size.
- (6) Squeeze pipe.
 - (-a) Engage the squeeze-off tool.
 - (-b) Continue steady squeeze while allowing pipe to cold flow in accordance with pipe manufacturer's specifications.
 - (-c) Discontinue squeeze once the blocks engage each other.
- (7) Monitor pressure, as applicable.
- (8) Release and remove squeezer, in accordance with pipe manufacturer's specifications.
- (9) Mark squeeze point on pipe.
 - (-a) Ensure tape or some other method is used to identify the squeeze-off point.

- (10) Document, as required.
- (b) Potential applicability: G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
- (g) Span of control: 1:2

Task 1151 Squeeze Off Steel Pipe

(a) *Task Guidance.* This task includes the squeeze off of steel pipe. This also includes the selection, installation, and removal of squeeze-off tools and monitoring pressure to ensure system pressure requirements are maintained.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Identify segment(s) of pipe that will need to be squeezed off.
 - (-a) Verify single feed or multiple feeds.
 - (-b) Verify operating pressure.
- (3) Make notifications, as appropriate.
- (4) Install squeeze-off tool, in accordance with manufacturer's specifications.
 - (-a) Ensure the tool is square to the pipe with the squeeze plates parallel to each other.
 - (-b) Identify the seam, if applicable.
 - (-c) Inspect the pipe for cuts, scrapes, gouges, or anomalies before placing of the squeeze-off tool.
 - (-d) Ensure squeeze location is free of obstruction.
- (5) Squeeze pipe.
 - (-a) Engage the squeeze-off tool.
 - (-b) Continue steady squeeze while allowing pipe to cold flow.
 - (-c) Discontinue squeeze once metal-to-metal contact has been made.
 - (-d) Avoid oversqueezing pipe.
- (6) Monitor pressure, as applicable.
- (7) Remove squeezer.
- (8) Document as required.
- (b) Potential applicability: G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:2

Task 1161 Installation of Customer Meters and Regulators: Residential and Small Commercial

(a) *Task Guidance.* This task includes locating and hanging/setting the meter. Attaching a meter bracket does not require qualification as long as a qualified

individual completes the installation in accordance with the steps in this task. Proving the integrity of customer piping and lighting customer utilization equipment is not included.

The removal and replacement of a meter is a job made up of at least this task and Task 1201, Temporary Isolation of Service Lines and Service Discontinuance. As such, a covered task has not been identified for the removal and replacement of residential and small commercial meters and regulators.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Verify meter and regulator to be installed.
 - (-a) proper size meter
 - (-b) regulator(s) specification(s) within pressure range
- (3) Locate meter set to ensure the following:
 - (-a) accessibility
 - (-b) protection from corrosion
 - (-c) protection from other damages (crash barriers/bollards)
 - (-d) proper distance from ignition sources
 - (-e) proper ventilation requirements (piping to safe atmosphere) are met
 - (-f) protection from flooding
- (4) Install or verify the installation of the meter bracket, if applicable.
- (5) Assemble meter set.
 - (-a) Select proper fittings.
 - (-b) Install fittings to service riser (use of pipe dope/tape).
- (6) Install and test relief device as specified.
- (7) Document, as required.
- (b) Potential applicability: G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 1171 Installing Customer Meters: Large Commercial and Industrial

(a) *Task Guidance.* This task includes locating and hanging/setting the meter. Attaching a meter bracket/support does not require qualification as long as a qualified individual completes the installation in accordance with the steps in this task. Proving the integrity of customer piping and lighting customer utilization equipment is not included.

The removal and replacement of a meter is a job made up of at least this task and Task 1201, Temporary Isolation of Service Lines and Service Discontinuance. As such, a covered task has not been identified for the removal and replacement of large commercial and industrial meters and regulators.

- (1) Select task procedure(s) and appropriate materials and equipment.
- (2) Identify meter(s) to be installed.
 - (-a) size
 - (-b) type
 - (-1) diaphragm
 - (-2) rotary
 - (-3) turbine
 - (-4) ultrasonic
 - (-5) other
- (3) Identify meter installation location.
 - (-a) location restrictions
 - (-1) outdoor
 - (+a) not under fire escape, etc.
 - (-2) indoor
 - (+a) not under interior stairways, in engine or boiler rooms, etc.
 - (-b) regulator vent requirements
 - (-1) free escape of gas to the atmosphere
 - (-2) away from openings into the building
 - (-3) away from sources of ignition
 - (-c) protection from flooding
 - (-d) protection from vehicular damage
 - (-e) protection from snow loads
 - (4) Install meter(s).
 - (-a) Assemble meter set.
 - (-b) Support meter, as needed.
 - (-c) Purge meter set.
 - (-d) Check delivery and lock-up pressures.
 - (-e) Determine if any pressure abnormalities exist, and respond appropriately.
 - (-f) Check all components for leakage.
 - (-g) Ensure adequate coating.
 - (5) Document, as required.
 - (b) Potential applicability: G, D
 - (c) Difficulty: 3
 - (d) Importance: 4
 - (e) Interval: 3 yr
 - (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
 - (g) Span of control: 1:1

Task 1181 Installing and Maintaining Customer Pressure-Regulating, Pressure-Limiting, and -Relief Devices: Large Commercial and Industrial

(a) *Task Guidance.* This task includes installing and maintaining pressure-regulating, pressure-limiting, and -relief devices. It also includes locating vent and installation of vent piping.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Install customer pressure-regulating, pressure-limiting, or -relief device.

- (-a) Select pressure-regulating, pressure-limiting, or -relief device.
 - (-1) size
 - (-2) type
 - (-b) Assemble components.
 - (-c) Connect sense lines, as needed.
 - (-d) Check operating (set) pressures.
 - (-e) Check all components for leakage.
 - (-f) Ensure adequate coating.
- (3) Visually inspect customer pressure-regulating, pressure-limiting, and -relief devices for the following, as applicable:
 - (-a) atmospheric corrosion
 - (-b) adequate coating and/or damage
 - (-c) signs of mechanical damage
 - (-d) signs of leakage
- (4) Test customer pressure-regulating and pressure-limiting devices.
 - (-a) Install pressure gages.
 - (-b) Check as-found pressures.
 - (-c) Determine if any pressure abnormalities exist, and respond as appropriate.
 - (-d) Isolate pressure-regulating and pressure-limiting devices.
 - (-e) Apply test pressure.
 - (-f) Check delivery (flow) pressures.
 - (-g) Check lock-up pressures, and adjust as appropriate.
 - (-h) Record as-left pressures.
- (5) Test customer relief devices.
 - (-a) Install pressure gages.
 - (-b) Check as-found pressures.
 - (-c) Determine if any pressure abnormalities exist, and respond as appropriate.
 - (-d) Isolate relief device.
 - (-e) Apply test pressure.
 - (-f) Check relief pressure and flow, and adjust as appropriate.
 - (-g) Record as-left pressures.
- (6) Document, as required.
 - (b) Potential applicability: G, D
 - (c) Difficulty: 3
 - (d) Importance: 4
 - (e) Interval: 3 yr
 - (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
 - (g) Span of control: 1:1

Task 1191 Maintenance of Service Valves Upstream of Customer Meter

(a) *Task Guidance.* This task includes removing, replacing, and maintaining service valves upstream of customer meter.

- (1) Select task procedure(s) and appropriate equipment.

(2) Inspect service valve for the following, as applicable:

- (-a) atmospheric corrosion
- (-b) coating damage
- (-c) signs of mechanical damage
- (-d) note valve position as-found

(3) Maintain (lubricate, etc.).

(-a) Check for leaks (e.g., soap test), and correct as necessary.

- (-b) Apply valve lubricant, if applicable.
- (-c) Ensure valve operates properly.

(4) Replace valve.

- (-a) Install valve replacement equipment.
- (-b) Plug pipe below valve.
- (-c) Remove old valve.
- (-d) Rethread pipe, if needed.
- (-e) Install new valve.
- (-f) Remove plug.
- (-g) Remove valve replacement equipment.
- (-h) Return to service as appropriate.

(5) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 1201 Temporary Isolation of Service Lines and Service Discontinuance

(a) *Task Guidance.* This task includes closing and locking service valves upstream of the customer meter or installation of a mechanical device or fitting to prevent the flow of gas.

(1) Select task procedure(s) and appropriate equipment.

(2) Discontinue service or isolate service line by the following, as applicable:

- (-a) Verify meter/address.
- (-b) Close valve.
- (-c) Lock valve.
- (-d) Install mechanical device or fitting.
- (-e) Cut, and cap.

(3) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 1

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 1211 Odorization: Periodic Sampling

(a) *Task Guidance.* This task includes the periodic sampling of gas to verify concentration of odorant by use of instrumentation.

(1) Select task procedure(s) and appropriate equipment.

(2) Verify odorant concentration by obtaining a gas sample.

(-a) Identify appropriate location(s) to test concentration.

(-b) Identify conditions that could interfere with obtaining accurate test results.

(-c) Ensure instrument is calibrated and functioning properly.

(-d) Select appropriate settings (e.g., gas type, concentration range).

(-e) Connect instrument to sample site.

(-f) Take gas sample, as specified by the manufacturer, and determine concentration.

(-g) Take appropriate actions if improper concentration is discovered.

(3) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 2

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:1

Task 1221 Odorization: Odorizer Inspection, Testing, Preventive and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the odorizer is functioning within specified parameters, after installation or replacement and prior to or during placing in service. This task includes the repair, replacement, alteration, or refurbishment of the odorizer and actions to keep the odorizer operating safely and efficiently.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check.

(3) Visually inspect odorizer.

(-a) Inspect fittings, connections, and odorization equipment for defects and spills.

(-b) Check odorant tank levels.

(4) Evaluate odorizer performance, if applicable.

(-a) Analyze quantity of odorant used.

(-b) Review alarm log.

(-c) Verify proper operation of odorizer.

(-d) Determine and set injection/drip rates.

(5) Perform preventive or corrective maintenance or repairs.

(6) Check odorant concentration at appropriate location(s).

(7) Adjust odorant output, if required.

(-a) Perform odorant level test after adjustment.

(-b) Make appropriate notifications, if required.

(8) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 1

(d) Importance: 2

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:5

Task 1231 Inside Gas Leak Investigation

(a) *Task Guidance.* This task includes the investigation of reported or discovered leaks of operators' lines inside a building in relation to emergency response. This also includes initiation of precautionary actions (make safe). Repairing and proving the integrity of customer piping and lighting customer utilization equipment are not included.

(1) Select task procedure(s) and appropriate equipment.

(2) Field startup of equipment in a clean air environment.

(-a) Check filters, probes, fuel supply, batteries, etc.

(-b) Perform operational check as required by manufacturer.

(-c) Perform periodic calibration check.

(3) Perform leak investigation.

(-a) Make customer/caller contact.

(-b) Advise supervisor if inaccessible or if access is denied.

(-c) Check for the presence of a combustible gas throughout the structure, including areas such as the following:

(-1) floor drains

(-2) electrical outlets

(-3) other areas where gas could accumulate

(-d) Initiate emergency response if necessary.

(4) Initiate precautionary actions.

(-a) Eliminate sources of ignition.

(-b) Evacuate the structure if necessary.

(-c) Shut off meter if necessary.

(-d) Continue to monitor.

(5) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 5

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:1

Task 1241 Outside Gas Leak Investigation

(a) *Task Guidance.* This task includes the investigation of reported or discovered outside leaks of the operators' lines. This also includes initiation of precautionary actions (make safe).

(1) Select task procedure(s) and appropriate equipment.

(2) Field startup of equipment, as applicable.

(-a) Check filters, probes, fuel supply, batteries, etc.

(-b) Perform operational check as required by manufacturer.

(-c) Perform periodic calibration check.

(3) Perform leakage investigation.

(-a) Make customer/caller contact, if applicable.

(-b) Review documentation to determine where the facilities are located.

(-c) Check for the presence of a combustible gas throughout the area, such as in the following:

(-1) electric, telephone, sewer, and water system manholes

(-2) cracks in pavement and sidewalks

(-3) other locations that provide an opportunity for finding gas leaks

(-d) Grade (classify) the leak, if applicable.

(4) Initiate precautionary actions if leak detected, based on leak grade (classification), as applicable.

(-a) Implement emergency response actions.

(-b) Evacuate.

(-c) Secure the area.

(-d) Eliminate sources of ignition.

(-e) Request emergency services.

(-f) Continue to monitor, and determine leak spread.

(5) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 5

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:1

Task 1251 Hazardous Liquid Leak Investigation

(a) *Task Guidance.* This task includes the investigation of reported or discovered leaks. This also includes initiation of precautionary actions (make safe).

(1) Select task procedure(s) and appropriate equipment.

(2) Gather and/or verify information regarding the suspected leak.

- (-a) location
- (-b) pipeline contents
- (-c) why leak is suspected

(3) Mobilize to the site.

(4) Make notifications upon arrival.

- (-a) operations control
- (-b) field location(s)

(5) Visually assess the scene for any leak hazards.

(6) Identify pipeline location and any other possible leak sources in the area.

(7) Assess the area of the suspected/reported leak.

- (-a) petroleum or hazardous liquid odors
- (-b) vapor cloud
- (-c) hissing or spraying noises
- (-d) dead animals or vegetation
- (-e) sheen on any water nearby
- (-f) wet/soggy ground

(8) If no leak exists, make notifications as required.

(9) If a leak is found, verify the operator of the pipeline.

(-a) If the pipeline is operated by a different company, secure the area, and make notifications as required.

(-b) If the pipeline is operated by the individual's company, make notifications to Pipeline Control Center to close valves.

(10) Manually close applicable valves, if required.

(11) Make notifications, as appropriate.

(12) Document, as required.

(b) Potential applicability: L

(c) Difficulty: 3

(d) Importance: 5

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:1

Task 1261 Walking Gas Leakage Survey

(a) *Task Guidance.* This task includes conducting a walking gas leak survey utilizing gas detection survey equipment, documentation, and reporting an emergency condition.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Verify equipment is calibrated.

(-c) Test equipment with known sources, as applicable.

(3) Perform survey.

(-a) Survey appropriate locations in accordance with requirements.

(-b) Classify leaks per requirements.

(4) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:1

Task 1271 Mobile Gas Leakage Survey

(a) *Task Guidance.* This task includes conducting a mobile (other than walking) gas leakage survey utilizing leak-detection survey equipment (e.g., flame ionization, optical methane, laser), documentation, and reporting an emergency condition.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Verify equipment is calibrated.

(-c) Test equipment with known sources, as applicable.

(3) Perform survey.

(-a) Set instrument sensitivity if necessary.

(-b) Survey at appropriate speed in accordance with requirements.

(-c) Investigate leaks per requirements.

(4) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 1285 Inspect Water Crossing

(a) *Task Guidance.* This task includes using visual inspection by divers and/or instrumented detection equipment (sonar, probing, etc.) to inspect underwater pipeline facilities and crossing conditions. Locating underwater pipelines is addressed in Task 1481, Diving: Temporary Marking of Underwater Pipelines.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment check to verify that equipment functions within specified parameters.

(3) Determine various pipeline attributes, as applicable:

(-a) water elevation

(-b) waterway bed elevation

(-c) pipeline elevation

- (-d) slope of banks
- (-e) depth of cover
- (4) Locate buried underwater pipelines. This may include use of probing, sonar, and/or diving.
- (5) Inspect waterway crossing for the following conditions, as applicable:
 - (-a) landfall of the pipeline crossing
 - (-b) location of submerged pipeline
 - (-c) depth/amount of cover
 - (-d) pipeline damage
 - (-e) length of span of unsupported pipe
 - (-f) debris/obstructions on the exposed or submerged pipeline
 - (-g) exposed pipe
- (6) Inspect adjacent banks for the following issues, as applicable:
 - (-a) evidence of release of product
 - (-b) excessive vegetation
 - (-c) encroachment activities
 - (-d) exposed pipe
 - (-e) missing/damaged signs
 - (-f) missing/damaged support structures
- (7) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 2
- (d) Importance: 3
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 1291 Locate Underground Pipelines

(a) *Task Guidance.* This task includes locating underground pipelines utilizing maps, records, and locating equipment. It also includes placing temporary markers or markings.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Select method for locating the following:
 - (-a) direct connection/conductive
 - (-b) indirect connection/inductive
 - (-c) appropriate frequency, if applicable
- (3) Perform test equipment check to verify that equipment functions within specified parameters. Inspect equipment.
 - (-a) Verify battery strength.
 - (-b) Verify audible and visual indicators.
 - (-c) Check gain adjustments, as applicable.
 - (-d) Test equipment with known sources, as applicable.
- (4) Visually inspect locate area for the following, as applicable:
 - (-a) identification of the locate area (white lines)
 - (-b) pipeline markers
 - (-c) pipeline facilities (valve box, meter sets, regulator stations, etc.)

- (-d) evidence of excavations
- (-e) evidence of other utilities
- (-f) previous locate marks (paint, whiskers, flags, etc.)
- (-g) high-tension lines or other foreign lines that may have any effect on the signal
- (5) Locate pipeline.
 - (-a) Evaluate signal strength, as applicable.
 - (-b) Identify direction changes.
- (6) Pothole/expose/probe pipeline, as applicable.
- (7) Place temporary markers on successfully located pipeline following universal color codes and marking procedures/methods, as applicable. Use methods such as the following:
 - (-a) paint
 - (-b) flags/chasers/whiskers
 - (-c) stakes
- (8) Validate/compare physical locate with existing documentation, including, but not limited to, the following:
 - (-a) maps
 - (-b) service cards
 - (-c) as-builts
 - (-d) construction drawings
- (9) Make notifications, as appropriate.
- (10) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 3
- (d) Importance: 3
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
- (g) Span of control: 1:1

Task 1301 Install and Maintain Pipeline Markers

(a) *Task Guidance.* This task includes determining the location, placing, and maintaining of permanent pipeline markers.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Evaluate existing pipeline marker against requirements.
 - (-a) Verify identified lines marked in accordance with requirements.
 - (-b) Verify marker information/legibility.
 - (-c) Verify documentation of markers/locations.
 - (-d) Observe ROW (right-of-way), and report abnormalities to appropriate personnel.
- (3) Prepare to install pipeline marker.
 - (-a) Determine marker type and method of installation/repair.
 - (-b) Identify locations for marker placement.
 - (-c) Confirm pipe location.
- (4) Install pipeline markers.
 - (-a) Observe ROW, and report abnormalities to appropriate personnel.

(-b) Clear location where marker is going to be placed.

(-c) Verify line location.

(-d) Verify marker information matches line specifications.

(-e) During installation, verify proper depth to prevent movement and contact/damage on the pipe.

(-f) Verify proper placement over pipe.

(-g) Verify pipeline is sufficiently identified by the markers.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 1

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: W/O

(2) Sub: W/O

(g) Span of control: 1:4

Task 1311 Inspect Pipeline Surface Conditions: Patrol Right-of-Way or Easement

(a) *Task Guidance.* This task includes performing right-of-way or easement patrol (e.g., walking, flying, or driving) to visually identify signs of leaks, encroachments, conditions of the right-of-way, or any other signs of potential impact to pipeline safety or integrity. Includes reporting an emergency condition.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform patrol, examining for the following:

(-a) signs of leaks

(-1) dead vegetation

(-2) vapor cloud

(-3) odor

(-4) visual or auditory evidence of escaped product

(-b) encroachments

(-1) disturbed or displaced soil

(-2) unauthorized structures/equipment on or near the right-of-way

(-c) signs of conditions with potential impact to pipeline safety or integrity

(-1) unintentional exposed pipeline

(-2) earth movement

(-3) vandalism

(-4) missing or damaged markers

(3) Make notifications, as appropriate.

(4) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 1

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 1321 Damage Prevention During Excavation Activities by or on Behalf of the Operator

(a) *Task Guidance.* This task includes ensuring the performance of damage prevention activities during excavation activities (e.g., verifying underground pipelines are marked, providing required notifications, use of spotter/swamper to guide equipment operator, probing, hand digging, pot holing to verify location of bore-head).

(1) Select task procedure(s) and appropriate equipment.

(2) Damage prevention activities prior to excavation.

(-a) Verify that company facilities are located and marked.

(-b) Verify physical location, as applicable.

(3) Implement damage prevention actions during excavation activities, as applicable.

(-a) Provide spotter for equipment operator.

(-b) Properly support and protect pipeline when exposed.

(-c) Hand dig when necessary.

(4) If damage occurs or is found, stop excavation, and notify proper personnel.

(5) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: W/O

(2) Sub: W/O

(g) Span of control: 1:1

Task 1331 Damage Prevention Inspection During Third-Party Excavation or Encroachment Activities as Determined Necessary by Operator

(a) *Task Guidance.* When an operator inspects third-party excavations or encroachment activities, this task includes the inspection of those activities and actions to protect the operators' facilities, such as work stoppage and requiring proper support for operators' pipeline facility.

(1) Select task procedure(s) and appropriate equipment.

(2) Damage prevention activities prior to excavation.

(-a) Identify encroachment restrictions.

(-b) Verify that company facilities are located and marked.

(-c) Verify physical location, as applicable.

(3) Perform inspection to enforce damage prevention during and after third-party excavation or encroachment activities, as applicable.

- (-a) Provide a company spotter.
- (-b) Visually inspect pipeline for damage.
- (-c) Ensure the pipe is physically located prior to any excavation with equipment.
- (-d) Ensure the exposed pipeline is supported or protected.
- (-e) Inform excavator to stop excavation, and notify operator if any unusual operating condition occurs.
- (4) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 1341 Provide or Ensure Adequate Pipeline Support During Operator-Initiated Excavation Activities

(a) *Task Guidance.* This task includes the actions necessary to provide or ensure adequate pipeline support during excavation activities (e.g., installing bridging, bracing).

- (1) Select task procedure(s) and appropriate equipment.
- (2) Obtain pipeline support factors and select supports.
 - (-a) pipe composition (plastic, cast iron, steel, etc.)
 - (-b) length of exposed pipe
 - (-c) weight of exposed pipe
 - (-d) depth of trench underneath pipe
 - (-e) length of time pipe will be exposed
 - (-f) type of existing pipe joining
 - (-g) type of supports
 - (-h) quantity of supports
- (3) Identify locations to install supports.
 - (-a) distance from girth welds
 - (-b) distance from other pipeline components
 - (-c) horizontal distance between supports
- (4) Install bridging, bracing, or other specified support.
- (5) Visually inspect pipe and supports for the following:
 - (-a) coating damage
 - (-b) sagging
 - (-c) slippage
- (6) Take appropriate actions if any adverse support issues are observed.
 - (-a) Add additional supports.
 - (-b) Add different type of supports.
 - (-c) Make notifications, as appropriate.
- (7) Document, as required.
- (b) Potential applicability: L, G, D

- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: W/O
 - (2) Sub: W/O
- (g) Span of control: 1:3

Task 1351 Vault Inspection and Maintenance

(a) *Task Guidance.* This task applies to the inspection and maintenance of vaults housing pressure-regulating and -limiting equipment, having a volumetric internal content of 200 ft³ or more. It includes inspection of ventilating equipment, vault cover, sufficient drainage, and structural integrity. Investigation to identify product leakage is addressed in

- Task 1231, Inside Gas Leak Investigation
- Task 1241, Outside Gas Leak Investigation
- Task 1251, Hazardous Liquid Leak Investigation
 - (1) Select task procedure(s) and appropriate equipment.
 - (2) Verify materials and procedures, as applicable.
 - (3) Obtain entry permit, as applicable.
 - (4) Inspect vault and ventilating equipment, as appropriate.
 - (-a) Ensure cover is tight-fitting, without openings, except to provide a means for venting.
 - (-b) Check locking devices.
 - (-c) Check vault and overall structure, including walls, ceiling, ladder, rails, and other components.
 - (-d) Check for drainage.
 - (-e) Ensure vents are free of debris and operating as designed.
 - (-f) Perform maintenance, as needed.
 - (5) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 2
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 1361 Station Emergency Shutdown System: Inspection, Testing, and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the station emergency shutdown system is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the station emergency shutdown system and actions to verify operation and maintain the station emergency shutdown system.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Visually inspect each Emergency Shutdown Device (ESD) for the following:

- (-a) loose electrical connections
- (-b) mechanical defects
- (-c) loose bolted or screwed connections
- (-d) evidence of physical damage
- (3) Conduct the required tests to determine each ESD is functioning correctly.
- (4) Perform corrective maintenance on components of the ESD.
 - (-a) Correct any deficiencies found during the testing process.
 - (-1) If repairs cannot be made in a timely manner, make appropriate notifications.
 - (-b) Retest to confirm correct operation of the ESD component.
 - (5) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:1

Task 1371 Operate Gas Pipeline: System Control Center Operations

- (a) *Task Guidance.* This task includes the remote operation of a gas pipeline (e.g., monitoring operating parameters, notifications, remotely adjusting and maintaining pressure, remotely starting and stopping compressors).
- (1) Select task procedure(s), including operating, monitoring, and alarm management.
 - (2) Monitor system operation.
 - (-a) Verify that flow, pressure, and gas characteristics are within normal range.
 - (-b) Recognize unexpected pressure variation, and take appropriate action, such as the following:
 - (-1) Remotely adjust system pressure.
 - (-2) Adjust system pressure by directing manual operation of compressors, pressure-regulating equipment, and valves.
 - (-3) Call for additional resources.
 - (-c) Recognize loss of communications, and take appropriate action.
 - (-d) Recognize if SCADA is updating properly, and take appropriate action.
 - (-e) Recognize alarms, and take appropriate action.
 - (3) Operate system.
 - (-a) Recognize when the line is packing, drafting, or running in steady state.
 - (-b) Determine if action is needed to adjust or maintain pressure.
 - (-c) Remotely adjust or maintain pressure by the following, as applicable:

- (-1) identifying appropriate equipment for pressure adjustment
- (-2) starting, stopping, or changing parameters of compressors
- (-3) changing pressure-regulating set points
- (-4) operating valves
- (-d) Adjust or maintain pressure by directing manual operation of compressors, pressure-regulating equipment, and valves.
- (-e) Verify that pressure adjustment brings system within required operating parameters.
- (-f) Recognize equipment that fails to respond to commands, and take appropriate action.
- (4) Document, as required.
- (b) Potential applicability: G, D
- (c) Difficulty: 5
- (d) Importance: 4
- (e) Interval: 3 yr, plus annual AOC training or evaluation
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
- (g) Span of control: 1:1

Task 1381 Operate Gas Pipeline: Local Facility Remote-Control Operations

- (a) *Task Guidance.* This task includes the local facility remote-control operations of a gas pipeline (e.g., monitor operating parameters, notifications, remotely adjusting and maintaining pressure, remotely starting and stopping compressors).
- (1) Select task procedure(s).
 - (2) Monitor system operation.
 - (-a) Verify that flow, pressure, and gas characteristics are within normal range.
 - (-b) Recognize unexpected pressure variation, and take appropriate action.
 - (3) Monitor local facility for alarms and notifications.
 - (-a) Recognize pressure alarms.
 - (-b) Evaluate the severity of the condition.
 - (-1) immediate response
 - (-2) scheduled response
 - (-c) Recognize information-only notifications.
 - (4) Initiate appropriate response.
 - (-a) Remotely adjust local facility pressure.
 - (-b) Adjust pressure by directing manual operation of compressors, pressure-regulating equipment, and valves.
 - (-c) Call for additional resources.
 - (5) Operate local facility.
 - (-a) Recognize the operating state of the local facility.
 - (-b) Determine if action is needed to adjust or maintain pressure.

(-c) Remotely adjust or maintain pressure by the following, as applicable:

(-1) identifying appropriate equipment for pressure adjustment

(-2) starting, stopping, or changing parameters of compressors

(-3) changing pressure-regulating set points

(-4) operating valves

(-d) Adjust or maintain pressure by directing manual operation of compressors, pressure-regulating equipment, and valves.

(-e) Verify that pressure adjustment brings local facility within required operating parameters.

(-f) Recognize loss of communication, and take appropriate action.

(-g) Recognize valve, pressure-regulating equipment, or compressors failing to respond to command, and take appropriate action.

(6) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 4

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:1

Task 1391 Operate Liquids Pipeline: System Control Center Operations

(a) *Task Guidance.* This task includes the remote operation of a hazardous liquids pipeline (e.g., monitor operating parameters, notifications, remotely adjusting and maintaining pressure and flow, remotely starting and stopping pumps, monitor for pipeline leaks).

(1) Select task procedure(s), including operating, monitoring, and alarm management.

(2) Verify that flows, pressure, and product characteristics are within normal range.

(3) Continuously monitor the pressures and flow rates of the pipeline to look for any changes. Monitor the line balance for changes by monitoring volume in and out.

(-a) Recognize when line is packing, unpacking, or running in a steady state.

(-b) Recognize loss of communications, and take appropriate action.

(-c) Recognize if SCADA is updating properly, and take appropriate action.

(-d) Recognize pressure alarms, and take appropriate action.

(-e) Recognize leak alarm, and take appropriate action.

(4) If there is an unexpected variation, take appropriate action, such as starting or stopping a pump, opening a valve, etc.

(5) Verify open flow path from origination to destination.

(6) Activate the pump at the origination point, and proceed downstream to the delivery point.

(7) Activate downstream station upon arrival of a pressure rise from upstream station.

(8) Identify when pressure and/or flow is appropriate to remotely open or close valves or other equipment.

(-a) Identify why operation is necessary and the expected outcome on operations.

(9) Identify appropriate valve, unit, or other equipment, and send appropriate command.

(-a) Recognize valve or pumps failing to respond to command, and take appropriate action.

(10) Shut down pump(s) beginning at the origination point, and proceed downstream to the destination. Some pumps may remain operational depending on the line profile.

(-a) Maintain appropriate pressure to minimize contamination of products, and leave pipeline in proper condition for startup.

(-b) Predict/prevent pressure waves during shutdown, and take appropriate action.

(11) Document, as required.

(b) Potential applicability: L

(c) Difficulty: 5

(d) Importance: 4

(e) Interval: 3 yr plus annual AOC training or evaluation

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:1

Task 1401 Operate Liquids Pipeline: Local Facility Remote-Control Operations

(a) *Task Guidance.* This task includes the local facility remote operation of a hazardous liquids pipeline (e.g., monitoring operating parameters, notifications, remotely adjusting and maintaining pressure and flow, remotely starting and stopping pumps, monitoring for pipeline leaks).

(1) Select task procedure(s).

(2) Ensure operational parameters are within normal range, and take appropriate action when changes are needed, as applicable. Possible parameters may include, but are not limited to, the following:

(-a) flow

(-b) pressure

(-c) gravity

(-d) temperature

(-e) fluid levels

(3) Monitor alarms, and take appropriate action, as applicable. Possible alarms may include, but are not limited to, the following:

- (-a) pressure
- (-b) flow
- (-c) temperature
- (-d) gravity
- (-e) leak
- (-f) fluid level
- (-g) loss of communications
- (4) Pump startup
 - (-a) Verify correct valves, station piping, and tanks are aligned prior to startup of local pump, as applicable.
 - (-b) Make appropriate notifications prior to startup of pump.
 - (-c) Initiate pump startup sequence, and monitor operating parameters.
- (5) Pump shutdown
 - (-a) Make appropriate notifications prior to shutdown of pump.
 - (-b) Initiate pump shutdown sequence, and monitor operating parameters.
 - (-c) Verify correct valves, station piping, and tanks are aligned after shutdown is complete, as applicable.
- (6) Document, as required.
- (b) Potential applicability: L
- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
- (g) Span of control: 1:1

Task 1411 Indirect Inspection Techniques

- (a) *Task Guidance.* This task includes indirect inspection [e.g., alternating current voltage gradient, close interval survey (Task 0011), direct current voltage gradient, soil resistivity (Task 0021)].
- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform test equipment check to verify that equipment functions within specified parameters.
 - (-a) Inspect equipment.
 - (-b) Verify equipment is calibrated.
 - (-c) Test equipment with known sources, as applicable.
- (3) Conduct indirect inspection.
 - (-a) Identify segment being inspected.
 - (-b) Collect and verify data.
- (4) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 2
- (d) Importance: 3
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O

- (2) Sub: W/O
- (g) Span of control: 1:1

Task 1431 Diving: Measure Structure-to-Electrolyte Potential

(a) *Task Guidance.* This task includes using measurement equipment to take a reading of the potential between the underwater structure and electrolyte (fresh or salt water) and record data. Pipeline locating is addressed separately in Task 1481, Diving: Temporary Marking of Underwater Pipelines.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Review the job requirements for the specific application. Utilize survey data, initial construction blueprints, construction maps, GPS, etc. Topside and diver personnel are involved in this step.
 - (-a) location characteristics
 - (-b) depth of water
 - (-c) client preference
- (3) Perform test equipment check.
 - (-a) Verify half-cell condition.
 - (-b) Verify calibration of proper equipment.
 - (-c) Verify equipment functions within specified parameters.
- (4) Identify and locate test point (performed by diver personnel). Verify using drawings, maps, survey data, pneumofathometer readings, diver video, or supervisor/diver communications.
- (5) Measure structure-to-electrolyte potential. Topside and diver personnel are involved in this step.
 - (-a) Connect lead to structure.
 - (-b) Take proximity and/or contact readings.
 - (-c) Verify polarity.
 - (-d) Record cathodic protection readings.
 - (-e) Recognize/identify readings outside of normal range.

- (6) Make notifications, as appropriate.
- (7) Document, as required.
- (b) Potential applicability: L, G, D
- (c) Difficulty: 1
- (d) Importance: 3
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:0

Task 1461 Diving: Measure and Describe Corrosion and Mechanical Damage — Buried or Submerged Pipeline

(a) *Task Guidance.* This task includes activities to measure and characterize corrosion or mechanical damage on buried or submerged pipeline. It includes the investigation to determine the extent of corrosion and recording data.

(1) Select task procedure(s) and appropriate equipment.

(2) Review the job requirements for the specific application. Utilize survey data, initial construction blueprints, construction maps, GPS, etc. Topside and diver personnel are involved in this step.

(-a) location characteristics

(-b) depth of water

(-c) client preference

(3) Perform test equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Verify equipment is calibrated.

(-c) Test equipment with known sources, as applicable.

(4) Prepare surface (performed by diver).

(-a) Thoroughly clean area to be tested (e.g., marine growth, sediment, scale).

(-b) Remove coating to expose pipe, as applicable.

(-c) Ensure pits are free of debris.

(5) Perform visual/tactile inspection of the pipeline/facility and report findings (performed by diver). Identify types and characteristics of the following:

(-a) corrosion: pits, rust, scale, etc.

(-b) mechanical damage: dent, gouge, buckle, ovality, etc.

(6) Measure and classify marine growth (performed by diver).

(-a) Classify marine growth as soft or hard growth.

(-b) Measure thickness using probe, soft tape measure, or other appropriate equipment.

(-c) Report type, thickness, and coverage percentage.

(7) Measure pit depth and diameter with pit gauge. Obtain multiple readings and outline or map areas of severe pitting (performed by diver).

(-a) depth, width, and length

(-b) orientation and location

(8) Place transducer to take ultrasonic thickness measurements (performed by diver).

(-a) Hold firmly in contact with the surface.

(-b) Obtain multiple readings.

(-c) Post-calibrate the ultrasonic thickness meter after taking measurements.

(9) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:0

Task 1471 Diving: Install Galvanic Anodes on Submerged Pipelines

(a) *Task Guidance.* This task includes the installation of galvanic anodes on submerged pipelines. It does not include:

- Task 0801, Welding

- Task 1431, Diving: Measure Structure-to-Electrolyte Potential

(1) Select task procedure(s) and appropriate equipment.

(2) Review the job requirements for the specific application. Topside and diver personnel are involved in this step. Utilize survey data, initial construction blueprints, construction maps, GPS, etc.

(-a) location characteristics

(-b) depth of water

(-c) client preference

(3) Prepare surface.

(-a) Prepare area for installation of U-bolts, clamps, electrical connection, etc.

(-b) Diver uses: hand tools, tugger, scraper, barnacle buster, hydraulic impact tools, etc.

(4) Install anode(s). Install bracelet anodes, sled anodes, or platform anodes in accordance with manufacturer's instructions.

(5) Perform electrical connection.

(-a) Attach bonding strap, pigtail, or cable to achieve electrical contact according to appropriate procedures (clamp-and-contact bolt or wet welding).

(-b) Verify anode has electrical contact with the pipeline or structure, and take cathodic protection readings, if applicable.

(6) Perform post-installation inspection. Diver and topside personnel are both involved in this step.

(-a) Check connections for gaps, and verify anode position with pneumofathometer readings.

(-b) Confirm the presence of calcareous deposits (white powder) and bubbles on the surface of the new anodes.

(7) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 1

(e) Interval: 5 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:0

Task 1481 Diving: Temporary Marking of Underwater Pipelines

(a) *Task Guidance.* This task includes locating buried underwater pipelines utilizing probes or water jets, etc. It also includes placing temporary markers (e.g., sonar reflectors, buoys).

(1) Select task procedure(s) and appropriate equipment.

(2) Review the job requirements for the specific application. Topside and diver personnel are involved in this step. Utilize survey data, initial construction blueprints, construction maps, GPS, etc.

(-a) location characteristics

(-b) depth of water

(-c) client preference

(3) Perform test equipment check to verify that equipment functions within specified parameters.

(-a) Inspect equipment.

(-b) Verify equipment is calibrated.

(-c) Test equipment with known sources, as applicable.

(4) Locate the line. Techniques vary depending on pipeline diameter and water conditions.

(-a) topside personnel locating method: scanning sonar

(-b) diving personnel locating methods: hand jet, hand probing, water probing, gradiometer, bottom sweeps

(5) Determine pipeline depth using probe or pneumofathometer, as applicable. Topside and diver personnel are involved in this step.

(6) Select and install pipeline markers using cane poles, buoys (secured to pipeline or clump weight), sonar reflectors, and sonar pingers, as appropriate.

(7) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 3

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: W/O

(2) Sub: W/O

(g) Span of control: 1:0

Task 1491 Diving: Movement of Active Underwater Pipeline

(a) *Task Guidance.* This task includes movement of active underwater pipeline (e.g., installation of slings, water jetting).

(1) Select task procedure(s) and appropriate equipment.

(2) Review the job requirements for the specific application. Topside and diver personnel are involved in this step. Utilize survey data, initial construction blueprints, construction maps, GPS, etc.

(-a) location characteristics

(-b) depth of water

(-c) client preference

(3) Review the plan for movement.

(-a) Notify appropriate personnel prior to pipeline movement activity.

(-b) Verify pressure reduction, as appropriate.

(-c) Identify isolation valves upstream and downstream.

(-d) Ensure that all members of movement team understand the plan.

(-e) Plan for small incremental movements to reduce stress.

(4) Prepare pipeline for movement.

(-a) Ensure excavation activities are performed according to appropriate procedures.

(-b) Complete a visual/tactile inspection of the pipeline.

(-c) Install rigging and lifting devices.

(5) Move segment to new location.

(-a) Apply lifting devices for lowering to an even grade (e.g., crane, vessel, lift bags, rigging).

(-b) Perform hand jetting for lowering pipeline to an even grade.

(-c) Move pipe into new position according to appropriate procedures outlined in movement plan.

(6) Provide support during segment disturbance. Apply lifting devices and any appropriate rigging at predetermined locations.

(7) Inspect for physical damage, coating damage, and/or unacceptable stresses.

(-a) Conduct visual/tactile inspection of the pipeline.

(-b) Check for insufficient support or free-span pipe.

(-c) Inspect for physical or coating damage from improper use of rigging or lifting equipment.

(-d) Take pneumofathometer readings to ensure the pipeline is at the correct depth or grade.

(8) Make notifications, as appropriate.

(9) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: W/O

(2) Sub: W/O

(g) Span of control: 1:0

Task 1501 Diving: Install, Replace, or Repair Support Structures on Existing Underwater Pipelines

(a) *Task Guidance.* This task includes installing, replacing, and repairing support structures on existing underwater pipelines.

(1) Select task procedure(s) and appropriate equipment.

(2) Review the job requirements for the specific application. Topside and diver personnel are involved in this step. Utilize survey data, initial construction blueprints, construction maps, GPS, etc.

(-a) location characteristics

(-b) depth of water

(-c) client preference

(3) Inspect existing support (performed by diver). Clean and inspect area on the pipeline or structure for damage.

(4) Confirm reduction in pipeline pressure according to appropriate specifications. Topside personnel verify with operator and check gauges.

(5) Install, replace, or repair supports using appropriate equipment (e.g., hand tools, lift bags, grout bags, sand/cement bags, concrete mat, clamps, bolts, riser caps, isolation material, and knee brace):

(-a) Install temporary supports to stabilize pipeline: lift bags, cranes, etc.

(-b) Remove damaged support, if applicable.

(-c) Properly install or repair support structures according to appropriate procedures.

(-d) Remove temporary supports according to appropriate procedures.

(6) Perform a final inspection of the replaced or repaired support structure.

(-a) Ensure correct position and that support structure is secured correctly.

(-b) Inspect for adequate support.

(-c) Install additional structures as necessary to rectify unacceptable stress and at crossings: Pipeline separation should be 18 in. or more. Determine pipeline separation by pneumofathometer readings.

(-d) Install support structures between pipelines (mats or bags).

(-e) Inspect for physical or coating damage from improper use of rigging or lifting equipment.

(7) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 2

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:0

Task 1511 Diving: Perform Underwater Flange Assembly and Disassembly

(a) *Task Guidance.* This task includes the assembly of flanges, disassembly of flanges, bolting in sequence, and torquing, as specified.

(1) Select task procedure(s) and appropriate equipment.

(2) Review the job requirements for the specific application. Utilize survey data, initial construction blueprints, construction maps, GPS, etc. Topside and diver personnel are involved in this step.

(-a) location characteristics

(-b) depth of water

(-c) client preference

(3) Confirm that lockout/tagout, purging, and depressurization procedures have been performed.

(4) Prepare/inspect the flange surface and seals.

(-a) Inspect (visual/tactile) flange for existing damage that may interfere with mating procedures.

(-b) Prepare surface and seals typically without lubricant to avoid collection of debris.

(-c) Clean debris from seals and O-ring groove with pneumo hose.

(5) Properly align flanges.

(-a) Inspect to ensure proper rating, condition, alignment, and gasket installation.

(-b) Align using handling frame, drift pins, and lacing slings.

(-c) Support using cranes and forklifts.

(6) Install preliminary bolts and gasket.

(-a) Install preliminary bolts to hold flanges together and allow insertion of O-ring or ring gasket.

(-b) Install gasket using skillet.

(7) Install and tighten remaining bolts.

(-a) Install remaining bolts.

(-b) Tighten bolts in the specified sequence to the specified torque.

(8) Inspect the assembled flange. Check for proper alignment, damage, missing bolts, and properly seated O-ring or ring gasket.

(9) Perform general flange disassembly.

(-a) Identify differential pressure, stored energy/tension, and hazardous fluids.

(-b) Loosen and remove flange bolts.

(-c) Remove ring gasket.

(-d) Plug or cap the pipeline ends according to appropriate procedures (e.g., blind flange, internal plug).

(-e) Remove pipeline components as required using cranes, rigging, and other lifting equipment.

(10) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:0

Task 1521 Diving: Install Pipe-End Connectors

(a) *Task Guidance.* This task includes the installation of pipe-end connectors (e.g., mechanical gripping, cold forged) on underwater pipelines.

(1) Select task procedure(s) and appropriate equipment.

(2) Review the job requirements for the specific application. Topside and diver personnel are involved

in this step. Utilize survey data, initial construction blueprints, construction maps, GPS, etc.

(-a) location characteristics

(-b) depth of water

(-c) client preference

(3) Identify and use appropriate equipment: drift pins, lacing slings, wrench, hydraulic impact, lift bags, cranes, tugger, davits, come-alongs, handling frame, etc.

(4) Prepare end connector. Topside personnel can assist with this step.

(-a) Confirm type of end connector to be installed.

(-b) Ensure seals are free of debris.

(-c) Check the integrity of the seals according to manufacturer's specifications.

(5) Identify segment characteristics. Inspect pipeline condition: flat spots, ovality, corrosion, wall thickness, seams, etc.

(6) Prepare pipe for installation of end connector.

(-a) Ensure appropriate isolation measures have been implemented.

(-b) Ensure pipeline is prepared to manufacturer's specifications using appropriate tools including grit blaster, cavi blaster, water blaster, circular saw, wedges/mauls, buffing wheels or pads, etc.

(7) Install end connector to specified insertion depth.

(-a) Ensure seals are free of debris.

(-b) Perform pressure test, if applicable.

(8) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 4

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:0

Task 1531 Diving: Install Mechanical Clamps or Sleeves

(a) *Task Guidance.* This task includes the installation of mechanical clamps or sleeves on underwater pipelines.

(1) Select task procedure(s) and appropriate equipment.

(2) Review the job requirements for the specific application. Topside and diver personnel are involved in this step. Utilize survey data, initial construction blueprints, construction maps, GPS, etc.

(-a) location characteristics

(-b) depth of water

(-c) client preference

(3) Identify and use appropriate equipment: drift pins, lacing slings, wrench, hydraulic impact, lift bags, cranes, tugger, davits, come-alongs, handling frame, etc.

(4) Prepare clamp or sleeve. Topside personnel can assist with this step.

(-a) Confirm type of clamp or sleeve to be installed.

(-b) Ensure seals are free of debris.

(-c) Check the integrity of the seals according to manufacturer's specifications.

(5) Identify segment characteristics. Inspect pipeline condition: flat spots, ovality, corrosion, wall thickness, seams, etc.

(6) Prepare pipe for installation of clamp or sleeve.

(-a) Ensure appropriate isolation measures have been implemented.

(-b) Monitor appropriate pressure and flow rate during repair activities.

(-c) Ensure pipeline is prepared to manufacturer's specifications using appropriate tools including grit blaster, cavi blaster, water blaster, circular saw, wedges/mauls, buffing wheels or pads, etc.

(7) Install clamp or sleeve.

(-a) Ensure seals are free of debris.

(-b) Center the clamp over the defect.

(-c) Tighten bolts in the specified sequence to the specified torque.

(-d) Check the integrity of the seals.

(-e) Perform pressure test, if applicable.

(8) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:0

Task 1541 Diving: Perform an Underwater Mechanical Tap

(a) *Task Guidance.* This task includes performing tapping, including the installation of the isolation valve and tapping equipment.

(1) Select task procedure(s) and appropriate equipment.

(2) Review the job requirements for the specific application. Topside and diver personnel are involved in this step. Utilize survey data, initial construction blueprints, construction maps, GPS, etc.

(-a) location characteristics

(-b) depth of water

(-c) client preference

(3) Identify necessary equipment, and remove coating for the length of the hot tap clamp plus 1 ft to 2 ft on either side. Clean pipeline to reveal bare shiny metal with a smooth surface.

(-a) water blaster

(-b) buffer

(-c) grit blaster

(-d) scraper

(4) Conduct pipeline quality checks, and ensure surface preparation for the type of sleeve, including the following, as applicable:

(-a) Perform visual/tactile inspection.

(-b) Conduct ovality checks.

(-c) Check wall thickness and integrity with UT thickness gauge. Wall thickness may be determined by topside personnel or by using a gauge with an underwater indicator.

(-d) Grind the length of the hot tap flush.

(5) Install clamp according to appropriate procedures.

(-a) Inspect pipeline and ditch/work area.

(-b) Place dead-man anchor on bottom as connection point for the inverter line of the lift bag.

(-c) Ensure equipment is not lowered directly above the pipeline.

(-d) Avoid accidental contact of equipment with the pipeline or natural bottom during installation.

(-e) Ensure proper alignment of clamp on pipeline.

(-f) Close clamp using appropriate procedures (e.g., hydraulic rams, manually).

(6) Engage sealing elements. Tighten appropriate bolts according to manufacturer procedures.

(7) Conduct pressure test to check integrity of the seals. Monitor the clamp seal areas for seal failure.

(8) Perform the tap.

(-a) Install pollution dome.

(-b) Ensure valve is open.

(-c) Connect hydraulic hoses, if applicable.

(-d) Check indicator to confirm the valve is open.

(-e) Advance the tool until it contacts the pipeline.

(-f) Engage and monitor the cutting device.

(-g) Monitor the cutting device during operation for proper travel distance.

(9) Isolate the tapping equipment.

(-a) Disengage and retract the cutting device according to appropriate procedures.

(-b) Close the valve.

(-c) Check indicator to confirm valve position.

(10) Remove the tapping equipment.

(-a) Bleed pressure from the hot tapping tool by opening the bleeder valve.

(-b) Remove the hot tapping tool.

(-c) Install blind flange or complete tie-in according to operator specifications.

(-d) Recover tool to the surface.

(11) Retrieve coupon.

(-a) Check for presence of coupon.

(-b) Secure coupon, if present.

(-c) Follow retrieval or notification procedures, if not present.

(12) Ensure coating is repaired, and pipeline is buried, as required.

(-a) Use wrap or two-part epoxy repair as appropriate.

(-b) Support and cover pipeline, as required.

(13) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 4

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:0

Task 1551 Diving: Stopper (Stoppie) Pipe

(a) *Task Guidance.* This task includes the insertion and removal of a stopper (stoppie). It also includes pressure verification. Hot tapping is covered in Task 1541, Diving: Perform an Underwater Mechanical Tap.

(1) Select task, procedure(s) and appropriate equipment.

(2) Review the job requirements for the specific application. Topside and diver personnel are involved in this step. Utilize survey data, initial construction blueprints, construction maps, GPS, etc.

(-a) location characteristics

(-b) depth of water

(-c) client preference

(3) Identify necessary equipment to remove coating and clean pipeline.

(-a) water blaster

(-b) buffer

(-c) grit blaster

(-d) scraper

(4) Identify segment(s) that requires stopping, confirm pipeline operations, and conduct pipeline quality checks.

(-a) Locate site, and remediate excavated area, as required.

(-b) Ensure coating is removed.

(-c) Perform visual/tactile inspection.

(-1) Inspect plugs, fittings, and equipment.

(-2) Verify sealing elements are in good condition.

(-d) Check wall thickness and integrity with UT thickness gauge. Wall thickness may be determined by topside personnel or by using a gauge with an underwater indicator.

(-e) Ensure pipeline pressure and flow rate are appropriate according to requirements.

(-f) Ensure isolation measures have been implemented.

(5) Install plugging machine according to appropriate procedures.

(-a) Place dead-man anchor on bottom as connection point for the inverter line of the lift bag.

(-b) Ensure equipment is not lowered directly above the pipeline.

(-c) Avoid accidental contact of equipment with the pipeline or natural bottom during installation.

(-d) Ensure proper alignment of plugging machine on flange.

(-e) Install and tighten bolts according to manufacturer procedures.

(-f) Pressure test equipment seals, if required.

(6) Install stopper.

(-a) Equalize pressure, open valve, and lower the plug into the pipeline until a seal is obtained.

(-b) Retract plugging shaft.

(-c) Ensure seals are holding properly, and drain pipeline section as required.

(-d) Close valve and relieve the pressure from the plugging machine.

(7) Remove stopper.

(-a) Equalize pressure in isolated segment.

(-b) Retract plugs, close valves, release static pressure, and remove plugging machine.

(8) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 4

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: P&W/O

(g) Span of control: 1:0

Task 1631 Launching and/or Receiving Internal Devices (Pigs) With a Temporary Launcher and/or Receiver for Lines Out of Service

(a) *Task Guidance.* This task consists of inserting or removing internal devices (pigs) on pipeline systems not in service. The installation of the temporary launchers and receivers are covered under Task 0731, Joining of Pipe: Flange Assembly, or Task 0801, Welding.

(1) Select task procedure(s) and appropriate equipment.

(2) Identify and locate the following:

(-a) associated valve(s) for launching and/or receiving operation

(-b) proper sized device to be used

(3) Load device (pig).

(-a) Insert device.

(-b) Install temporary launcher and/or receiver, as applicable.

(-c) Close access point prior to pressurization.

(4) Ensure receiving component(s) is set to properly receive cleaning device.

(5) Operate valves to launch, and move device (pig).

(-a) Open proper valve(s) to pressurize system.

(-b) Monitor pressure to ensure proper launching and receiving of device.

(6) Receive/remove identified internal devices.

(-a) Depressurize pipe, as applicable.

(-b) Remove device from pipe.

(-c) Verify realignment of pipeline system by opening/closing proper valve(s), as applicable.

(7) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 5

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: P&W/O

(2) Sub: W/O

(g) Span of control: 1:2

Task 1641 Launching or Receiving Internal Devices (Pigs) Using Traps

(a) *Task Guidance.* This task consists of isolating pipeline barrels, relieving pressure, inserting or removing internal devices, pressurizing barrel, and launching/receiving internal devices. These devices may include, but are not limited to, inspection, cleaning, batching, or plugging. Manually opening and closing valves are addressed in Task 0301.

(1) Select task procedure(s) and appropriate equipment.

(2) Identify and locate the following:

(-a) associated valve(s) for launching and/or receiving operation

(-b) proper sized device to be used

(3) Follow appropriate isolation procedures for launching or receiving operation.

(-a) Ensure liquids or vapors are not accidentally introduced into the work area.

(-b) Ensure system block valve(s) are properly positioned.

(-c) Ensure launcher/receiver doors are properly sealed.

(4) Depressurize launching or receiving barrels.

(-a) Monitor pressure to ensure proper launching and receiving of device.

(5) Load, launch, and monitor identified internal devices.

(-a) Monitor for hazardous vapors before and during the pigging operation.

(-b) Load device.

(-c) Open proper valve(s) to pressurize barrel/system, and then introduce device into system.

(-d) Monitor pressure to maintain the pig run.

(-e) Monitor pressure at receiver to allow for device to be received, as applicable.

(6) Receive/remove identified internal devices.

- (-a) Isolate receiver.
- (-b) Depressurize receiving barrel.
- (-c) Ensure liquids or vapors are not accidentally introduced into the work area.
- (-d) Remove device from barrel.
- (7) Realign all identified valve(s) to normal operations.
 - (-a) Verify realignment of pipeline system by opening/closing proper valve(s).
- (8) Document, as required.
 - (b) Potential applicability: L, G, D
 - (c) Difficulty: 3
 - (d) Importance: 5
 - (e) Interval: 3 yr
 - (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
 - (g) Span of control: 1:2

Task 1651 Purge — Flammable or Inert Gas

(a) *Task Guidance.* This task includes actions to be taken to safely purge pipeline facilities using natural gas, inert gas, or air. Other tasks that may be performed during purging include the operation of valves, adjusting or monitoring flow or pressure, or operating gas pipelines addressed in

- Task 0301, Manually Opening and Closing Valves
- Task 0311, Adjust and Monitor Flow or Pressure — Manual Valve Operation
- Task 1201, Temporary Isolation of Service Lines and Service Discontinuance
- Task 1381, Operate Gas Pipeline: Local Facility Remote-Control Operations (if performed)

(1) Select task procedure(s) and appropriate equipment.

(2) Identify and verify valves/control methods on pipeline facilities are in correct position.

- (-a) Ensure direction of flow for purge.
- (-b) Ensure segment to be purged is bonded as required.

(-c) Isolate the pipeline sections to be purged, where required.

(-d) Ensure gages are set as specified by procedure.

(3) Verify adequate handling capability for purge (flares, silencers, stacks, etc.), if required.

(-a) Monitor weather conditions to ensure safe environment for the purge.

(-b) Establish use of flares, silencers, stacks, etc., as specified by procedure(s) when applicable.

(4) Ensure proper placement and grounding of air handler(s) as specified by procedure, if required.

(5) Perform purge.

(-a) Open control point valve.

(-b) Establish purge pressure as specified by procedure and purge plan, if applicable.

(6) Verify the pipeline facilities have been purged of all air or hazardous vapors by use of an acceptable instrument.

(-a) Sample air at purge outlet with use of calibrated equipment.

(-b) Continue purge as specified by procedure and purge plan, if applicable.

(-c) Upon successful purge, close all purge points as specified by procedure.

(7) Document, as required.

(b) Potential applicability: L, G, D

(c) Difficulty: 3

(d) Importance: 5

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: W/O & P

(2) Sub: W/O

(g) Span of control: 1:1

Task 1661 Purge: Hazardous Liquids

(a) *Task Guidance.* This task includes actions to be taken to safely purge or drain down hazardous liquids pipeline facilities. Other tasks that may be performed during purging or drain down include the operation of valves, adjusting or monitoring flow or pressure of operating liquids pipelines addressed in

- Task 0301, Manually Opening and Closing Valves
- Task 0311, Adjust and Monitor Flow or Pressure — Manual Valve Operation

• Task 1391, Operate Liquids Pipeline: System Control Center Operations (if performed)

(1) Select task procedure(s) and appropriate equipment.

(2) Identify the requirements for purging hazardous liquids from pipeline facilities.

(-a) Determine what method of product isolation will be used.

(3) Identify the correct valves for isolating the segment of pipeline to be purged.

(-a) Ensure each valve identified for isolation is in its correct position, open or closed.

(-b) Ensure all appropriate lockout/tagout procedures and permitting are followed.

(-c) Identify pipeline condition-monitoring points to determine tight shut-off of isolation valves.

(-d) Ensure pipeline condition-monitoring points indicate the pipeline is empty and no residual product remains.

(4) Ensure the identification of any drain-down equipment has been made and the equipment is staged correctly for the purging process.

(-a) Locate low-point drain connections as required to evacuate any remaining product.

(-b) Install any low-point drain connections as required to evacuate any remaining product.

(-c) Ensure all connecting components are compatible with the product in the pipeline being purged.

(-d) Ensure any flaring equipment is properly located and configured to process pipeline product as it exits the pipeline.

(5) Following the purging procedure for the pipeline facilities being purged, perform the following procedure:

(-a) Properly monitor the pipeline facility operating conditions to determine the extent of the purge.

(-b) Ensure all temporary connections are leak free.

(-c) Ensure any temporary product tankage is monitored for proper level and pressure.

(6) Using the drain connections, ensure all product has been purged from the pipeline.

(-a) Using operating condition-monitoring equipment (pressure and temperature indicators), verify all product is purged from the pipeline segment.

(-b) Isolate the segment being purged, and monitor pressures and temperatures to determine if any trapped product remains in the pipeline.

(-c) Ensure proper use of flammable mixture detectors is followed to ensure the purge material doesn't interfere with the detector's operation.

(7) Document, as required.

(b) Potential applicability: L, G

(c) Difficulty: 3

(d) Importance: 5

(e) Interval: 3 yr

(f) Evaluation method

(1) Initial: W/O & P

(2) Sub: W/O

(g) Span of control: 1:1

Task 1671 Pipeline Heater — Inspection and Preventive Maintenance

(a) *Task Guidance.* This task includes verification that the pipeline heater is functioning within specified parameters. This task also includes actions to keep the pipeline heater operating safely and efficiently. Inspection of pressure-regulating and -relief devices is addressed in:

- Task 0381, Spring-Loaded, Pressure-Regulating Device — Inspection and Testing, Preventive and Corrective Maintenance

- Task 0411, Spring-Loaded, Pressure-Limiting, and -Relief Device — Inspection, Testing, Preventive and Corrective Maintenance

(1) Select task procedure(s) and appropriate equipment.

(2) Visually inspect overall condition of heater, including the following:

(-a) presence of corrosion
(-b) condition of supports
(-c) glycol level in tank (if heater is operating upon arrival)

(-d) signs of glycol leak (e.g., tank leakage)

(-e) external cover of shell for signs of deterioration or damage (e.g., metal disbanding, holes in cover exposing shell insulation)

(-f) readability and spanning of gauges

(3) Inspect first- and second-stage regulators/reliefs, if applicable.

(4) Inspect water bath and gas temperature control valves, verifying that

(-a) control valve set point equals water bath temperature.

(-b) heater is cycling at required temperature.

(-c) control valve is seated and operating properly.

(-d) safety devices are operating properly (e.g., low water shutoff, high stack temperature), if applicable.

(5) Verify pilot safety/alarm functioning properly.

(-a) Extinguish pilot.

(-b) Verify main burner shutdown.

(6) Inspect/clean pilot and main burner.

(-a) Inspect and clean the following:

(-1) igniter system including flame rod, igniter, and wiring/electric devices

(-2) pilot orifice

(-3) main burner

(-4) pilot burner air filter, if applicable

(-5) secondary air filter, if applicable

(-b) Blow out flame arrestor and fire tube.

(7) Restart heater.

(-a) Verify relighter operation including the following:

(-1) battery voltage check

(-2) condition of solar panel

(-b) Light pilot burner.

(-c) Slowly open main burner valve.

(-d) Activate main burner.

(-e) Verify

(-1) burner flame characteristics indicate proper operation (e.g., blue flame, approximately half the distance of the burner tube).

(-2) noise level meets requirements.

(-3) temperature controllers operate correctly.

(-f) Check for leaks.

(8) Return heater to normal operations. Verify

(-a) glycol level is appropriate.

(-b) heater is cycling at required temperature.

(9) Take glycol sample, as required.

(-a) Conduct freeze point test, if applicable.

(-b) Recirculate water bath, if applicable.

(10) Document, as required.

- (b) Potential applicability: G, D
- (c) Difficulty: 4
- (d) Importance: 4
- (e) Interval: 3 yr
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: P&W/O
- (g) Span of control: 1:1

Task 1681 Liquid Knockout (Dehydration) System Inspection, Testing, and Preventive Maintenance

(a) *Task Guidance.* This task includes verification that the liquid knockout system is functioning within specified parameters after installation and prior to or during placement in service. This task also includes actions to keep the system operating safely and efficiently.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment checks, as applicable.

(-a) Verify calibration of equipment.

(-b) Inspect equipment for abnormal conditions (e.g., broken or missing parts).

(-c) Verify equipment against known sources.

(3) Perform walk-around inspection of above-grade liquid knockout system including the following equipment, as applicable:

(-a) pressure differential on scrubbers and/or separators (read gauge, display monitors, or dead weight)

(-b) fluid levels and set points for automatic dump valves

(-c) dump valve, manually activate to ensure operation

(-d) separator and accumulator

(-e) filter separators

(4) Perform preventive maintenance on liquid knockout system including filter replacement, as applicable.

(-a) Remove separator from service.

(-b) Isolate and prepare for filter replacement.

(-c) Replace filter.

(-d) Verify operation of equipment.

(-e) Ensure relief valve is locked/cap sealed in open position.

(-f) Return separator to service.

(5) Document, as required.

- (b) Potential applicability: G, D
- (c) Difficulty: 3
- (d) Importance: 4
- (e) Interval: 3
- (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
- (g) Span of control: 1:3

Task 1691 Glycol Dehydration System Inspection and Testing, Preventive and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the glycol dehydration system is functioning within specified parameters after installation and prior to or during placement in service. This task also includes the repair or replacement, alteration, or refurbishment of the dehydration system and actions to keep the system operating safely and efficiently.

(1) Select task procedure(s) and appropriate equipment.

(2) Perform test equipment checks, as applicable.

(-a) Verify calibration of equipment.

(-b) Inspect equipment for abnormal conditions (e.g., broken or missing parts).

(-c) Verify equipment against known sources.

(3) Perform walk-around inspection and testing of glycol gas dehydration system including the following, as applicable:

(-a) operating parameters and test controls

(-1) glycol process control

(-2) temperature control

(-3) flow control

(-4) level control

(-5) pressure control

(-6) shutdowns

(-b) glycol concentration and pH

(4) Diagnose, troubleshoot, and repair the following glycol gas dehydration system problems, as applicable:

(-a) low pH

(-b) high pH

(-c) low glycol concentration

(-d) high glycol concentration

(-e) incorrect pressure(s) during startup

(-f) incorrect level(s) during startup

(-g) incorrect temperature(s) during startup

(5) Perform maintenance on the following glycol gas dehydration systems, as applicable:

(-a) filter replacement

(-b) lean/rich heat exchanger maintenance

(-1) Remove tube bundle.

(-2) Clean tube bundle.

(-3) Plug leaking tube bundle.

(-c) contactor feed pump replacement

(-d) removal and replacement of reboiler fire tube

(-e) ancillary equipment maintenance (e.g., incinerator, BTEX)

(6) Document, as required.

(b) Potential applicability: G, D

(c) Difficulty: 3

(d) Importance: 4

(e) Interval: 3 yr

(f) Evaluation method

- (1) Initial: P&W/O
- (2) Sub: W/O
- (g) Span of control: 1:3

Task 1701 Mole Sieve Dehydration System Inspection and Testing, Preventive and Corrective Maintenance

(a) *Task Guidance.* This task includes verification that the mole sieve (dry-bed) dehydration system is functioning within specified parameters after installation and prior to or during placement in service. This task also includes the repair or replacement, alteration, or refurbishment of the dehydration system and actions to keep the system operating safely and efficiently.

- (1) Select task procedure(s) and appropriate equipment.
- (2) Perform test equipment checks, as applicable.
 - (-a) Verify calibration of equipment.
 - (-b) Inspect equipment for abnormal conditions (e.g., broken or missing parts).
 - (-c) Verify equipment against known sources.
- (3) Perform walk-around inspection of mole sieve regeneration process including the following, as applicable:
 - (-a) field configuration and correct field-line selection
 - (-b) pressures and temperatures
 - (-1) regeneration heaters
 - (-2) booster compressor

- (-c) heating cycle (open and closed)
 - (-1) regeneration flow rate determination
 - (-2) regeneration flow rate controlling
- (-d) cooling cycle (open and closed)
- (-e) drying/sales cycle
- (4) Diagnose, troubleshoot, and repair the following mole sieve regeneration process, as applicable:
 - (-a) Troubleshoot regeneration compressor.
 - (-b) Test, plug, and replace cooler tubes.
 - (-c) Remove and replace tube bundle.
 - (-d) Troubleshoot regeneration heater.
 - (-e) Correct saturated bed.
 - (-f) Troubleshoot regeneration gas flow (open loop/closed loop).
 - (-g) Troubleshoot restriction or differential.
 - (-h) Replace and dispose of desiccant.
 - (-i) Ensure proper operation of actuating valves.
- (5) Document, as required.
 - (b) Potential applicability: G, D, L
 - (c) Difficulty: 3
 - (d) Importance: 4
 - (e) Interval: 3 yr
 - (f) Evaluation method
 - (1) Initial: P&W/O
 - (2) Sub: W/O
 - (g) Span of control: 1:3

NONMANDATORY APPENDIX B

SUMMARY OF INTEGRATED TASK LIST

Task 0001 Measure Structure-to-Electrolyte Potential

Task Guidance. This task includes using measurement equipment to take a reading of the potential between the structure (pipe, tanks, etc.) being tested and the soil and recording data.

Task 0011 Conduct Close Interval Survey

Task Guidance. This task includes gathering electrical potential readings along the pipeline at specified intervals and recording data.

Task 0021 Measure Soil Resistivity

Task Guidance. This task includes using measurement equipment to measure soil resistivity and recording data.

Task 0031 Inspect and Monitor Galvanic Ground Beds/Anodes

Task Guidance. This task includes inspecting and monitoring the electric potential of galvanic ground beds/anodes.

Task 0041 Installation and Maintenance of Mechanical Electrical Connections

Task Guidance. This task includes making the mechanical connections and repair of tracer wire, test leads, bonds, shunts, etc.

Task 0051 Installation of Exothermic Electrical Connections

Task Guidance. This task includes making exothermic (e.g., thermite, cadweld, and pin-brazing) connections of tracer wire, test leads, bonds, shunts, etc.

Task 0061 Inspect or Test Cathodic Protection Bonds

Task Guidance. This task includes inspecting the physical integrity and testing of cathodic protection bonds.

Task 0071 Inspect or Test Cathodic Protection Electrical Isolation Devices

Task Guidance. This task includes inspecting the physical integrity and testing electrical isolation devices.

Task 0081 Install Cathodic Protection Electrical Isolation Devices

Task Guidance. This task includes the installation of electrical isolation devices.

Task 0091 Troubleshoot Active Cathodic Protection System

Task Guidance. This task applies to operational Cathodic Protection Systems and includes activities to determine why the CP system and components are not functioning and the identification of corrective action.

Task 0101 Inspect Rectifier and Obtain Readings

Task Guidance. This task includes inspecting the rectifier for damage and deterioration and obtaining readings as specified.

Task 0111 Maintain Rectifier

Task Guidance. This task includes verification that the rectifier is functioning within specified parameters, after a rectifier has been hung and AC power connected and prior to or during placing in service. This task also includes actions to repair or replace in-service rectifiers or components.

Task 0121 Collect Sample for Internal Corrosion Monitoring

Task Guidance. This task includes the collection and handling of samples for internal corrosion monitoring and preventing contamination of the sample.

Task 0131 Insert and Remove Coupons/Probes for Internal Corrosion Monitoring

Task Guidance. This task includes inserting and removing coupons/probes for internal corrosion monitoring and preventing contamination or damage of the coupons/probes.

Task 0141 Visual Inspection for Atmospheric Corrosion

Task Guidance. This task includes the inspection of pipe and pipeline components exposed to the atmosphere for the purpose of detecting atmospheric corrosion.

Task 0151 Visual Inspection of Buried Pipe and Components When Exposed

Task Guidance. This task includes the inspection of buried pipe and pipeline components when exposed for the purpose of detecting external corrosion and evaluating coating integrity.

Task 0161 Visual Inspection for Internal Corrosion

Task Guidance. This task includes the inspection of the internal surface of pipe and pipeline components, including tapping coupons, when exposed for the purpose of detecting internal corrosion.

Task 0171 Measure External Corrosion

Task Guidance. This task includes activities to measure and characterize external corrosion, including investigation to determine the extent of corrosion and recording data.

Task 0181 Measure Internal Corrosion

Task Guidance. This task includes activities to measure and characterize internal corrosion, including investigation to determine the extent of corrosion and recording data.

Task 0191 Measure Atmospheric Corrosion

Task Guidance. This task includes activities to measure and characterize atmospheric corrosion, including investigation to determine the extent of corrosion and recording data.

Task 0201 Visual Inspection of Installed Pipe and Components for Mechanical Damage

Task Guidance. This task includes activities associated with the inspection of installed pipe and components for the purpose of detecting mechanical damage (e.g., dents, gouges, cracks).

Task 0211 Measure and Characterize Mechanical Damage on Installed Pipe and Components

Task Guidance. This task includes activities to measure and characterize mechanical damage (e.g., dents, gouges, cracks) on installed pipe and components, including investigation to determine the extent of damage and recording data.

Task 0221 Inspect, Test, and Maintain Sensing Devices

Task Guidance. This task includes verification that the sensing device (e.g., pressure switches; pressure, temperature, and differential transmitters) is functioning within specified parameters, after a sensing device has

been installed and prior to or during placing in service. This task also includes actions to repair or replace sensing devices and adjust set points or output.

Task 0231 Inspect, Test, and Maintain Programmable Logic Controllers (PLC)

Task Guidance. This task includes verification that the PLC is functioning within specified parameters, after a PLC has been installed and prior to or during placing in service. This task also includes actions to repair or replace PLCs and components and adjusting set points or output as specified.

Task 0241 Inspect, Test, and Maintain Liquid Leak Detection Flow Computers

Task Guidance. This task includes verification that the flow computer, when used in a computational pipeline-monitoring leak detection system, is functioning within specified parameters, after a flow computer has been installed and prior to or during placing in service. This task also includes actions to repair or replace flow computers and components and adjusting set points or output as specified.

Task 0251 Inspection and Testing, Corrective and Preventive Maintenance — Overfill Protection Systems

Task Guidance. This task includes verification that the overfill protection system is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the overfill protection system and actions to verify operation and maintain the overfill protection system. This task includes adjusting the set point as specified.

Task 0261 Inspection and Testing, Corrective and Preventive Maintenance — Tank Level Indicator Devices

Task Guidance. This task includes verification that the tank gage is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the tank gage and actions to verify operation and maintain the tank gage.

Task 0271 Prove Flowmeters for Hazardous Liquid Leak Detection

Task Guidance. This task includes data recording and calculations to manually verify (prove) the accuracy of flowmeters for leak detection. This includes activities to bring prover online and to take off-line. Qualification is not required when verification is performed automatically by flow computers or PLCs.

Task 0281 Maintain Flowmeters for Hazardous Liquid Leak Detection

Task Guidance. This task includes verification that the flowmeter (e.g., line integrity meters), when used for leak detection, is functioning within specified parameters, after a flowmeter has been installed and prior to or during placing in service. This task also includes actions to repair or replace flowmeters and components and adjusting output.

Task 0291 Inspect, Test, and Maintain Gravimeters/Densitometers for Hazardous Liquid Leak Detection

Task Guidance. This task includes verification that the gravimeters/densitometers, when used for leak detection, are functioning within specified parameters, after the gravimeters/densitometers have been installed and prior to or during placing in service. This task also includes actions to repair or replace gravimeters/densitometers and components and adjusting output.

Task 0301 Manually Opening and Closing Valves

Task Guidance. This task includes manually opening and closing valves (e.g., pipeline startup and shutdown, flow direction, pigging, tank switching), at the valve site, either manually or using the valve actuator. It also includes valve identification, notifications, and pressure verification. It does not include the operation of valves for

(a) adjusting and monitoring flow or pressure as addressed in Task 0311, Adjust and Monitor Flow or Pressure — Manual Valve Operation

(b) temporary isolation of service lines and service discontinuance as addressed in Task 1201, Temporary Isolation of Service Lines and Service Discontinuance

Task 0311 Adjust and Monitor Flow or Pressure — Manual Valve Operation

Task Guidance. This task includes the adjustment of flow or pressure either manually or using the valve actuator at the valve site. It also includes valve identification, notifications, and pressure verification. It does not include

(a) manually opening and closing valves as addressed in Task 0301, Manually Opening and Closing Valves

(b) temporary isolation of service lines and service discontinuance as addressed in Task 1201, Temporary Isolation of Service Lines and Service Discontinuance

Task 0321 Valve Corrective Maintenance

Task Guidance. This task includes the repair, replacement, alteration, or refurbishment of valves, except valves for the temporary isolation of service lines and service

discontinuance as addressed in Task 1191, Maintenance of Service Valves Upstream of Customer Meter.

Task 0331 Valve — Visual Inspection and Partial Operation

Task Guidance. This task includes visual inspection, partial operation (function test), and lubrication of valves, except valves for the temporary isolation of service lines and service discontinuance as addressed in Task 1191, Maintenance of Service Valves Upstream of Customer Meter.

Task 0341 Valve — Preventive Maintenance

Task Guidance. This task encompasses actions (e.g., lubrication, winterization, packing adjustment) to keep valves operating safely and efficiently, except relief valves as addressed in

(a) Task 0411, Spring-Loaded, Pressure-Limiting, and -Relief Device — Inspection, Testing, Preventive and Corrective Maintenance

(b) Task 0421, Pilot-Operated, Pressure-Limiting, and -Relief Device — Inspection, Testing, Preventive and Corrective Maintenance

(c) Task 0431, Pneumatic-Loaded, Pressure-Limiting, and -Relief Device — Inspection, Testing, Preventive and Corrective Maintenance

Task 0351 Pneumatic Actuator/Operator Inspection and Testing, Preventive and Corrective Maintenance

Task Guidance. This task includes verification that the actuator/operator is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair, replacement, alteration, or refurbishment of the actuator/operator and actions to keep the actuator/operator operating safely and efficiently.

Task 0361 Electric Actuator/Operator Inspection and Testing, Preventive and Corrective Maintenance

Task Guidance. This task includes verification that the actuator/operator is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair, replacement, alteration, or refurbishment of the actuator/operator and actions to keep the actuator/operator operating safely and efficiently.

Task 0371 Hydraulic Actuator/Operator Inspection and Testing, Preventive and Corrective Maintenance

Task Guidance. This task includes verification that the actuator/operator is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair,

replacement, alteration, or refurbishment of the actuator/operator and actions to keep the actuator/operator operating safely and efficiently.

Task 0381 Spring-Loaded, Pressure-Regulating Device — Inspection and Testing, Preventive and Corrective Maintenance

Task Guidance. This task includes verification that the pressure-regulating device is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the pressure-regulating device and actions to keep the pressure-regulating device operating safely and efficiently. This task excludes customer regulation addressed in

(a) Task 1161, Installation of Customer Meters and Regulators: Residential and Small Commercial

(b) Task 1181, Installing and Maintaining Customer Pressure-Regulating, Pressure-Limiting, and -Relief Devices: Large Commercial and Industrial

Task 0391 Pilot-Operated, Pressure-Regulating Device — Inspection, Testing, Preventive and Corrective Maintenance

Task Guidance. This task includes verification that the pressure-regulating device is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the pressure-regulating device and actions to keep the pressure-regulating device operating safely and efficiently. This task excludes customer regulation addressed in

(a) Task 1161, Installation of Customer Meters and Regulators: Residential and Small Commercial

(b) Task 1181, Installing and Maintaining Customer Pressure-Regulating, Pressure-Limiting, and -Relief Devices: Large Commercial and Industrial

Task 0401 Controller-Type, Pressure-Regulating Device — Inspection, Testing, Preventive and Corrective Maintenance

Task Guidance. This task includes verification that the pressure-regulating device is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the pressure-regulating device and actions to keep the pressure-regulating device operating safely and efficiently.

Task 0411 Spring-Loaded, Pressure-Limiting, and -Relief Device — Inspection, Testing, Preventive and Corrective Maintenance

Task Guidance. This task includes verification that the pressure-limiting or -relief device is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of pressure-limiting or -relief device and actions to keep the pressure-limiting or -relief device operating safely and efficiently. This task excludes customer regulation addressed in

(a) Task 1161, Installation of Customer Meters and Regulators: Residential and Small Commercial

(b) Task 1181, Installing and Maintaining Customer Pressure-Regulating, Pressure-Limiting, and -Relief Devices: Large Commercial and Industrial

Task 0421 Pilot-Operated, Pressure-Limiting, and -Relief Device — Inspection, Testing, Preventive and Corrective Maintenance

Task Guidance. This task includes verification that the pressure-limiting or -relief device is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of pressure-limiting or -relief device and actions to keep the pressure-limiting or -relief device operating safely and efficiently. This task excludes customer regulation addressed in

(a) Task 1161, Installation of Customer Meters and Regulators: Residential and Small Commercial

(b) Task 1181, Installing and Maintaining Customer Pressure-Regulating, Pressure-Limiting, and -Relief Devices: Large Commercial and Industrial

Task 0431 Pneumatic-Loaded, Pressure-Limiting, and -Relief Device — Inspection, Testing, Preventive and Corrective Maintenance

Task Guidance. This task includes verification that the pressure-limiting or -relief device is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of pressure-limiting or -relief device and actions to keep the pressure-limiting or -relief device operating safely and efficiently. This task excludes customer regulation addressed in

(a) Task 1161, Installation of Customer Meters and Regulators: Residential and Small Commercial

(b) Task 1181, Installing and Maintaining Customer Pressure-Regulating, Pressure-Limiting, and -Relief Devices: Large Commercial and Industrial

Task 0441 Compressor Startup and Shutdown — Manual

Task Guidance. This task includes manual startup and shutdown of a compressor (e.g., reciprocating, centrifugal, rotary) at the driver control panel.

Task 0451 Pump Startup and Shutdown — Manual

Task Guidance. This task includes manual startup and shutdown of a pump (e.g., reciprocating, centrifugal, rotary, screw) at the driver control panel.

Task 0461 Compressor Preventive Maintenance

Task Guidance. This task encompasses actions (e.g., lubrication, adjustment) to keep compressors operating safely and efficiently. This task does not include maintenance of the compressor driver.

Task 0471 Reciprocating Compressor Inspection, Testing, and Corrective Maintenance

Task Guidance. This task includes verification that a new, replaced, or rebuilt compressor is functioning within specified parameters, prior to or during placing in service. This task includes the repair, alteration, or refurbishment of reciprocating compressors. This task does not include maintenance of the compressor driver.

Task 0481 Centrifugal Compressor Inspection, Testing, and Corrective Maintenance

Task Guidance. This task includes verification that a new, replaced, or rebuilt compressor is functioning within specified parameters, prior to or during placing in service. This task includes the repair, alteration, or refurbishment of centrifugal compressors. This task does not include maintenance of the compressor driver.

Task 0491 Rotary Compressor Inspection, Testing, and Corrective Maintenance

Task Guidance. This task includes verification that a new, replaced, or rebuilt compressor is functioning within specified parameters, prior to or during placement into service. This task includes the repair, alteration, or refurbishment of rotary compressors. This task does not include maintenance of the compressor driver.

Task 0501 Pump Preventive Maintenance

Task Guidance. This task encompasses actions (e.g., lubrication, adjustment) to keep pumps operating safely and

efficiently. This task does not include maintenance of the pump driver.

Task 0511 Centrifugal Pump Inspection, Testing, and Corrective Maintenance

Task Guidance. This task includes verification that a new, replaced, or rebuilt pump is functioning within specified parameters, prior to or during placing in service. This task includes the repair, alteration, or refurbishment of centrifugal pumps. This task does not include maintenance of the pump driver.

Task 0521 Reciprocating Pump Inspection, Testing, and Corrective Maintenance

Task Guidance. This task includes verification that a new, replaced, or rebuilt pump is functioning within specified parameters, prior to or during placing in service. This task includes the repair, alteration, or refurbishment of reciprocating pumps. This task does not include maintenance of the pump driver.

Task 0531 Rotary Pump Inspection, Testing, and Corrective Maintenance

Task Guidance. This task includes verification that a new, replaced, or rebuilt pump is functioning within specified parameters, prior to or during placing in service. This task includes the repair, alteration, or refurbishment of rotary pumps. This task does not include maintenance of the pump driver.

Task 0541 Screw Pump Inspection, Testing, and Corrective Maintenance

Task Guidance. This task includes verification that a new, replaced, or rebuilt pump is functioning within specified parameters, prior to or during placing in service. This task includes the repair, alteration, or refurbishment of screw pumps. This task does not include maintenance of the pump driver.

Task 0551 Explosive Atmosphere Detection and Alarm System Performance Test and Corrective Maintenance

Task Guidance. This task includes verification that the permanently installed explosive atmosphere detection and alarm system is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the performance test and the repair or replacement of fixed explosive atmosphere detection and alarm system.

Task 0561 Pressure Test: Nonliquid Medium — MAOP Less Than 100 psi

Task Guidance. This task includes achieving test pressure and durations and record keeping.

Task 0571 Pressure Test: Nonliquid Medium — MAOP Greater Than or Equal to 100 psi

Task Guidance. This task includes achieving test pressure and durations and record keeping.

Task 0581 Pressure Test: Liquid Medium

Task Guidance. This task includes achieving test pressure and durations and record keeping.

Task 0591 Leak Test at Operating Pressure

Task Guidance. This task includes the detection of leaks at operating pressure either visually (e.g., soap test) or with use of leak detection equipment.

Task 0601 NDT: Radiographic Testing

Task Guidance. This task includes radiographic testing and evaluation of test results. Qualification should be in accordance with ASNT SNT-TC-1A or other acceptable standards or practices.

Task 0611 NDT: Liquid Penetrant Testing

Task Guidance. This task includes liquid (dye) penetrant testing and evaluation of test results. Level II qualification should be in accordance with ASNT SNT-TC-1A or other acceptable standards or practices.

Task 0621 NDT: Magnetic Particle Testing

Task Guidance. This task includes magnetic particle testing and evaluation of test results. Level II qualification should be in accordance with ASNT SNT-TC-1A or other acceptable standards or practices.

Task 0631 NDT: Ultrasonic Testing

Task Guidance. This task includes ultrasonic testing and evaluation of test results. Level II qualification should be in accordance with ASNT SNT-TC-1A or other acceptable standards or practices. This task excludes wall thickness determination with a UT wall thickness device.

Task 0641 Visually Inspect Pipe and Components Prior to Installation

Task Guidance. This task includes the visual inspection of pipe and pipeline components, prior to installation, to identify visually determinable damage and defects.

Task 0651 Routine Visual Inspection of Breakout Tanks

Task Guidance. This task includes the scheduled visual inspection of breakout tanks and tank components to identify visually determinable damage and defects.

Task 0661 Inspection of Breakout Tanks

Task Guidance. This task includes the inspection of in-service or out-of-service breakout tanks and tank components. Qualification should be in accordance with API 653 or other acceptable standards or practices.

Task 0671 Joining of Plastic Pipe: Solvent Cement

Task Guidance. This task includes the assembly and joining of plastic pipe and components using solvent cement and inspection of completed joints.

Task 0681 Joining of Plastic Pipe: Stab Fittings

Task Guidance. This task includes the joining and inspection of plastic pipe with stab fittings and inspection of completed joints.

Task 0691 Joining of Pipe: Nonbottom-Out Compression Couplings

Task Guidance. This task includes the joining of pipe 2 in. and less, with nonbottom-out compression couplings and inspection of completed joints. A nonbottom-out compression coupling is one that requires tightening to a specified torque or number of turns.

Task 0701 Joining of Pipe: Bottom-Out Compression Couplings

Task Guidance. This task includes the joining of pipe 2 in. and less, with bottom-out compression couplings and inspection of completed joints. A bottom-out compression coupling is one that is designed to prevent over-tightening by contact (bottoming out) of the nut with a square shoulder or mating surface.

Task 0711 Joining of Pipe: Compression Couplings

Task Guidance. This task includes the joining of pipe greater than 2 in., with compression couplings and inspection of completed joints.

Task 0721 Joining of Pipe: Threaded Joints

Task Guidance. This task includes the joining of threaded pipe with threaded fittings and the inspection of completed joints. The joining of components with threaded connections is addressed in the component-covered task.

Task 0731 Joining of Pipe: Flange Assembly

Task Guidance. This task includes the assembly of flanges, bolting in sequence, and torquing, as specified.

Task 0741 Joining of Pipe: Brazing or Soldering

Task Guidance. This task includes the joining of copper pipe by brazing or soldering and the inspection of completed joints.

Task 0751 Joining of Plastic Pipe — Butt Heat Fusion: Manual

Task Guidance. This task includes the assembly and joining of plastic pipe by butt heat fusion and inspection of completed joints.

Task 0761 Joining of Plastic Pipe — Butt Heat Fusion: Hydraulic Machine

Task Guidance. This task includes the assembly and joining of plastic pipe by butt heat fusion using a hydraulic machine and inspection of completed joints.

Task 0771 Joining of Plastic Pipe: Sidewall Heat Fusion

Task Guidance. This task includes the assembly and joining of plastic pipe by sidewall heat fusion and inspection of completed joints.

Task 0781 Joining of Plastic Pipe: Electrofusion

Task Guidance. This task includes the assembly and joining of plastic pipe by electrofusion and inspection of completed joints.

Task 0791 Joining of Plastic Pipe: Socket Heat Fusion

Task Guidance. This task includes the assembly and joining of plastic pipe by socket heat fusion and inspection of completed joints.

Task 0801 Welding

Task Guidance. This task includes the assembly and joining of steel pipe by welding, and repair of welds, in accordance with welding procedures. Qualification should be in accordance with API 1104, ASME BPVC Section IX, or other acceptable standards or practices. Visual inspection of welding and welds is in accordance with Task 0811, Visual Inspection of Welding and Welds.

Task 0811 Visual Inspection of Welding and Welds

Task Guidance. This task includes inspection of the welding process (e.g., equipment setup, material fit-up/alignment, handling of welding materials) and inspection of welds to identify visually detectable defects.

Task 0821 Tubing and Fitting Installation: Instrument, Control, and Sampling

Task Guidance. This task includes the preparation, bending, joining, and installation of instrument, control, and sampling line tubing and fittings containing product.

Task 0831 Cast Iron: Caulked Bell and Spigot Joints — Installation and Maintenance of Mechanical Leak Clamp(s)

Task Guidance. This task includes the installation and maintenance of mechanical leak clamps on caulked bell and spigot joints.

Task 0841 Cast Iron Joints — Sealing: Encapsulation

Task Guidance. This task includes the sealing of cast iron joints by encapsulation and inspection of encapsulation.

Task 0851 Internal Sealing: Cast Iron and Ductile Iron

Task Guidance. This task includes the internal sealing of cast iron and ductile iron and inspection of sealant.

Task 0855 Internal Sealing: Cast Iron and Ductile Iron — Anaerobic

Task Guidance. This task includes the internal sealing of cast iron and ductile iron anaerobically and inspection of the plugs.

Task 0861 Installation of Steel Pipe in a Ditch

Task Guidance. After excavation is completed, this task includes the handling, lowering in, and fitting of steel pipe in a ditch to ensure firm support.

Task 0871 Installation of Steel Pipe in a Bore

Task Guidance. After boring is completed, this task includes the handling, pulling in, and inspection of exposed pipe and coating.

Task 0881 Installation of Steel Pipe Plowing/Pull-In

Task Guidance. This task includes the handling, plowing/pull-in of steel pipe, and inspection of exposed pipe and coating.

Task 0891 Field Bending of Steel Pipe

Task Guidance. This task includes the field bending of steel pipe as specified and inspection of completed field bends.

Task 0901 Installation of Plastic Pipe in a Ditch

Task Guidance. After excavation is completed, this task includes the handling, lowering in, and fitting of plastic pipe in a ditch to ensure firm support. The installation of a tracer wire is addressed in Task 0941, Install Tracer Wire.

Task 0911 Installation of Plastic Pipe in a Bore

Task Guidance. After boring is completed, this task includes the handling, pulling in, and inspection of exposed pipe. The installation of a tracer wire is addressed in Task 0941, Install Tracer Wire.

Task 0921 Installation of Plastic Pipe Plowing/Pull-In

Task Guidance. This task includes the handling, plowing/pull-in of plastic pipe, and inspection of exposed pipe. The installation of a tracer wire is addressed in Task 0941, Install Tracer Wire.

Task 0931 Installation of Plastic Pipe by Plowing/Planting

Task Guidance. This task includes the handling, plowing/planting of plastic pipe, and inspection of exposed pipe. The installation of a tracer wire is addressed in Task 0941, Install Tracer Wire.

Task 0935 Relocation of a Pipeline

Task Guidance. This task includes the relocation of a pipeline while protecting it from damage and stress.

Task 0941 Install Tracer Wire

Task Guidance. This task includes the installation of a tracer wire on plastic pipe, including verification of continuity. Electrical connections are addressed in

(a) Task 0041, Installation and Maintenance of Mechanical Electrical Connections

(b) Task 0051, Installation of Exothermic Electrical Connections

Task 0951 Installation of Pipe Above Ground

Task Guidance. This task includes the handling and installation of pipe above ground.

Task 0961 Aboveground Supports and Anchors: Inspection, Preventive and Corrective Maintenance

Task Guidance. This task includes verification that the above-ground supports and anchors are installed in accordance with specifications, prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of above-ground supports and anchors and actions to keep the above-ground supports and anchors functioning as specified.

Task 0971 Installation and Maintenance of Casing Spacers, Vents, and Seals

Task Guidance. This task includes the installation of casing spacers, vents, and seals. This task also includes the evaluation, repair, or replacement of casing vents and seals.

Task 0981 Backfilling

Task Guidance. This task includes visually inspecting backfill material, installation of pipe protective material (e.g., padding, shading, and rock shield), verification of firm support, and placing backfill in lifts or layers as specified.

Task 0991 Coating Application and Repair: Brushed or Rolled

Task Guidance. This task includes the surface preparation and application or repair of coatings using a brush or roller. This task includes painting to inhibit corrosion and internal or external applications of coatings on pipes, tanks, etc.

Task 1001 Coating Application and Repair: Sprayed

Task Guidance. This task includes the surface preparation and application or repair of coatings using a sprayer. This task includes painting to inhibit corrosion and internal or external applications of coatings on pipes, tanks, etc.

Task 1011 External Coating Application and Repair: Wrapped

Task Guidance. This task includes the surface preparation and application or repair of coatings using a wrap.

Task 1031 Install or Repair Internal Liner

Task Guidance. This task includes the surface preparation, installation, repair, and inspection of an internal liner.

Task 1041 Install Mechanical Clamps and Sleeves: Bolted

Task Guidance. This task includes the preparation, installation, and inspection of bolted mechanical clamps and sleeves.

Task 1051 Fit-Up of Weld-Type Repair Sleeve

Task Guidance. This task includes the preparation and fit-up of weld-type repair sleeves. Welding the repair sleeve is covered in Task 0801, Welding.

Task 1061 Install Composite Sleeves

Task Guidance. This task includes the preparation and installation of composite sleeves.

Task 1071 Repair of Steel Pipe by Grinding

Task Guidance. This task includes the verification of minimum wall thickness requirements and removal of defects by grinding.

Task 1081 Tapping a Pipeline (Tap Diameter 2 in. and Less)

Task Guidance. This task includes performing tapping, including the installation of the isolation valve and tapping equipment, and removal of isolation valve, as specified. Installation of fittings is addressed in

(a) Task 0801, Welding

(b) Task 1041, Install Mechanical Clamps and Sleeves: Bolted

Task 1091 Tapping a Pipeline (Tap Diameter Greater Than 2 in.)

Task Guidance. This task includes performing tapping, including the installation of the isolation valve and tapping equipment, and removal of isolation valve, as specified. Installation of fittings is addressed in

- (a) Task 0801, Welding
- (b) Task 1041, Install Mechanical Clamps and Sleeves: Bolted

Task 1101 Tapping a Pipeline With a Built-In Cutter

Task Guidance. This task includes tapping a pipe with an installed fitting that contains a built-in cutter. Installation of fittings is addressed in

- (a) Task 0771, Joining of Plastic Pipe: Sidewall Heat Fusion
- (b) Task 0781, Joining of Plastic Pipe: Electrofusion
- (c) Task 0801, Welding
- (d) Task 1041, Install Mechanical Clamps and Sleeves: Bolted

Task 1111 Tapping Cast and Ductile Iron Pipe and Low-Pressure Steel Pipe

Task Guidance. This task includes tapping a pipe with or without an installed fitting. Installation of fittings, as specified, is addressed in Task 1041, Install Mechanical Clamps and Sleeves: Bolted.

Task 1121 Bagging and Stopping Low-Pressure Pipe

Task Guidance. This task includes the insertion and removal of a bag on low-pressure pipe. It also includes pressure verification.

Task 1131 Stopper (Stoppie) Pipe

Task Guidance. This task includes the insertion and removal of a stopper (stoppie). It also includes pressure verification.

Task 1141 Squeeze Off Plastic Pipe

Task Guidance. This task includes the squeeze off of plastic pipe. This also includes the selection, installation, and removal of squeeze-off tools.

Task 1151 Squeeze Off Steel Pipe

Task Guidance. This task includes the squeeze off of steel pipe. This also includes the selection, installation, and removal of squeeze-off tools.

Task 1161 Installation of Customer Meters and Regulators: Residential and Small Commercial

Task Guidance. This task includes locating and hanging/setting the meter. Attaching a meter bracket does not require qualification as long as a qualified individual completes the installation in accordance with the steps in this task. Proving the integrity of customer piping and lighting customer utilization equipment is not included.

The removal and replacement of a meter is a job made up of at least this task and Task 1201, Temporary Isolation of Service Lines and Service Discontinuance. As such, a covered task has not been identified for the removal and replacement of residential and small commercial meters and regulators.

Task 1171 Installing Customer Meters: Large Commercial and Industrial

Task Guidance. This task includes locating and hanging/setting the meter. Attaching a meter bracket/support does not require qualification as long as a qualified individual completes the installation in accordance with the steps in this task. Proving the integrity of customer piping and lighting customer utilization equipment is not included.

The removal and replacement of a meter is a job made up of at least this task and Task 1201, Temporary Isolation of Service Lines and Service Discontinuance. As such, a covered task has not been identified for the removal and replacement of large commercial and industrial meters and regulators.

Task 1181 Installing and Maintaining Customer Pressure-Regulating, Pressure-Limiting, and -Relief Devices: Large Commercial and Industrial

Task Guidance. This task includes installing and maintaining pressure-regulating, pressure-limiting, and -relief devices. It also includes locating vent and installation of vent piping.

Task 1191 Maintenance of Service Valves Upstream of Customer Meter

Task Guidance. This task includes removing, replacing, and maintaining service valves upstream of customer meter.

Task 1201 Temporary Isolation of Service Lines and Service Discontinuance

Task Guidance. This task includes closing and locking service valves upstream of the customer meter or installation of a mechanical device or fitting to prevent the flow of gas.

Task 1211 Odorization: Periodic Sampling

Task Guidance. This task includes the periodic sampling of gas to verify concentration of odorant by use of instrumentation.

Task 1221 Odorization: Odorizer Inspection, Testing, Preventive and Corrective Maintenance

Task Guidance. This task includes verification that the odorizer is functioning within specified parameters, after installation or replacement and prior to or during placing in service. This task includes the repair, replacement, alteration, or refurbishment of the odorizer and actions to keep the odorizer operating safely and efficiently.

Task 1231 Inside Gas Leak Investigation

Task Guidance. This task includes emergency response for reported or discovered leaks of operator lines inside a building. It includes initiating precautionary actions and determining if the source of the leak is from the operators' facility. Determining the location of leaks on customer piping, repairing and proving the integrity of customer piping, and lighting customer-utilized equipment is not included.

Task 1241 Outside Gas Leak Investigation

Task Guidance. This task includes emergency response to reported or discovered outside leaks. It includes initiating precautionary actions, determining if the source of the leak is from the operators' facility and, for leaks on the operators' pipeline, determining leak spread and grading the leak. Determining the location of leaks on customer piping or another operator's pipeline is not included.

Task 1251 Hazardous Liquid Leak Investigation

Task Guidance. This task includes the investigation of reported or discovered leaks. This also includes initiation of precautionary actions ("make safe").

Task 1261 Walking Gas Leakage Survey

Task Guidance. This task includes conducting a walking gas leak survey utilizing gas detection survey equipment, documentation, and reporting an emergency condition.

Task 1271 Mobile Gas Leakage Survey

Task Guidance. This task includes conducting a mobile (other than walking) gas leakage survey utilizing leak-detection survey equipment (e.g., flame ionization, optical methane, laser), documentation, and reporting an emergency condition.

Task 1285 Inspect Water Crossing

Task Guidance. This task includes using visual inspection by divers and/or instrumented detection equipment (sonar, probing, etc.) to inspect underwater pipeline

facilities and crossing conditions. Locating underwater pipelines is addressed in Task 1481, Diving: Temporary Marking of Underwater Pipelines.

Task 1291 Locate Underground Pipelines

Task Guidance. This task includes locating underground pipelines utilizing maps, records, and locating equipment. It also includes placing temporary markers or markings.

Task 1301 Install and Maintain Pipeline Markers

Task Guidance. This task includes determining the location of, placing, and maintaining permanent pipeline markers.

Task 1311 Inspect Pipeline Surface Conditions: Patrol Right-of-Way or Easement

Task Guidance. This task includes performing right-of-way or easement patrol (e.g., walking, flying, or driving) to visually identify signs of leaks, encroachments, conditions of the right-of-way, or any other signs of potential impact to pipeline safety or integrity. Includes reporting an emergency condition.

Task 1321 Damage Prevention During Excavation Activities by or on Behalf of the Operator

Task Guidance. This task includes ensuring the performance of damage prevention activities during excavation activities (e.g., verifying underground pipelines are marked, providing required notifications, use of spotter/swamper to guide equipment operator, probing, hand digging, pot holing to verify location of bore-head).

Task 1331 Damage Prevention Inspection During Third-Party Excavation or Encroachment Activities as Determined Necessary by Operator

Task Guidance. When third-party excavation or encroachment activities occur, this task includes inspection of those activities (e.g., verifying underground pipelines are marked, providing required notifications, use of spotter/swamper to guide equipment operator, probing, hand digging, pot holing to verify location of bore-head).

When an operator inspects third-party excavations or encroachment activities, this task includes the inspection of those activities and actions to protect the operators' facilities, such as work stoppage, and requiring proper support for operators' pipeline facility.

Task 1341 Provide or Ensure Adequate Pipeline Support During Operator-Initiated Excavation Activities

Task Guidance. This task includes the actions necessary to provide or ensure adequate pipeline support during excavation activities (e.g., installing bridging, bracing).

Task 1351 Vault Inspection and Maintenance

Task Guidance. This task applies to the inspection and maintenance of vaults housing pressure-regulating and -limiting equipment, having a volumetric internal content of 200 ft³ or more. It includes inspection of ventilating equipment, vault cover, sufficient drainage, and structural integrity. Investigation to identify product leakage is addressed in

- (a) Task 1231, Inside Gas Leak Investigation
- (b) Task 1241, Outside Gas Leak Investigation
- (c) Task 1251, Hazardous Liquid Leak Investigation

Task 1361 Station Emergency Shutdown System: Inspection, Testing, and Corrective Maintenance

Task Guidance. This task includes verification that the station emergency shutdown system is functioning within specified parameters, after installation and prior to or during placing in service. This task also includes the repair or replacement, alteration, or refurbishment of the station emergency shutdown system and actions to verify operation and maintain the station emergency shutdown system.

Task 1371 Operate Gas Pipeline: System Control Center Operations

Task Guidance. This task includes the remote operation of a gas pipeline (e.g., monitoring operating parameters, notifications, remotely adjusting and maintaining pressure, remotely starting and stopping compressors).

Task 1381 Operate Gas Pipeline: Local Facility Remote-Control Operations

Task Guidance. This task includes the local facility remote-control operations of a gas pipeline (e.g., monitoring operating parameters, notifications, remotely adjusting and maintaining pressure, remotely starting and stopping compressors).

Task 1391 Operate Liquids Pipeline: System Control Center Operations

Task Guidance. This task includes the remote operation of a hazardous liquids pipeline (e.g., monitoring operating parameters, notifications, remotely adjusting and maintaining pressure and flow, remotely starting and stopping pumps, monitoring for pipeline leaks).

Task 1401 Operate Liquids Pipeline: Local Facility Remote-Control Operations

Task Guidance. This task includes the local facility remote operation of a hazardous liquids pipeline (e.g., monitoring operating parameters, notifications, remotely adjusting and maintaining pressure and flow, remotely starting and stopping pumps, monitoring for pipeline leaks).

Task 1411 Indirect Inspection Techniques

Task Guidance. This task includes indirect inspection [e.g., alternating current voltage gradient, close interval survey (Task 0011), direct current voltage gradient, soil resistivity (Task 0021)].

Task 1431 Diving: Measure Structure-to-Electrolyte Potential

Task Guidance. This task includes using measurement equipment to take a reading of the potential between the underwater structure and electrolyte (fresh or salt water) and record data. Pipeline locating is addressed separately in Task 1481, Diving: Temporary Marking of Underwater Pipelines.

Task 1461 Diving: Measure and Describe Corrosion and Mechanical Damage — Buried or Submerged Pipeline

Task Guidance. This task includes activities to measure and characterize corrosion or mechanical damage on buried or submerged pipelines. It includes the investigation to determine the extent of corrosion and recording data.

Task 1471 Diving: Install Galvanic Anodes on Submerged Pipelines

Task Guidance. This task includes the installation of galvanic anodes on submerged pipelines. It does not include:

- Task 0801, Welding
- Task 1431, Diving: Measure Structure-to-Electrolyte Potential

Task 1481 Diving: Temporary Marking of Underwater Pipelines

Task Guidance. This task includes locating buried underwater pipelines utilizing probes or water jets, etc. It also includes placing temporary markers (e.g., sonar reflectors, buoys).

Task 1491 Diving: Movement of Active Underwater Pipeline

Task Guidance. This task includes movement of active underwater pipeline (e.g., installation of slings, water jetting).

Task 1501 Diving: Install, Replace, or Repair Support Structures on Existing Underwater Pipelines

Task Guidance. This task includes installing, replacing, and repairing support structures on existing underwater pipelines.

Task 1511 Diving: Perform Underwater Flange Assembly and Disassembly

Task Guidance. This task includes the assembly of flanges, disassembly of flanges, bolting in sequence, and torquing, as specified.

Task 1521 Diving: Install Pipe-End Connectors

Task Guidance. This task includes the installation of pipe-end connectors (e.g., mechanical gripping, cold forged) on underwater pipelines.

Task 1531 Diving: Install Mechanical Clamps or Sleeves

Task Guidance. This task includes the installation of mechanical clamps or sleeves on underwater pipelines.

Task 1541 Diving: Perform an Underwater Mechanical Tap

Task Guidance. This task includes performing tapping, including the installation of the isolation valve and tapping equipment.

Task 1551 Diving: Stopper (Stopp) Pipe

Task Guidance. This task includes the insertion and removal of a stopper (stopp). It also includes pressure verification. Hot tapping is covered in Task 1541, Diving: Perform an Underwater Mechanical Tap.

Task 1631 Launching and/or Receiving Internal Devices (Pigs) With a Temporary Launcher and/or Receiver for Lines Out of Service

Task Guidance. This task consists of inserting or removing internal devices (pigs) on pipeline systems not in service. The installation of the temporary launchers and receivers are covered under Task 0731, Joining of Pipe: Flange Assembly, or Task 0801, Welding.

Task 1641 Launching or Receiving Internal Devices (Pigs) Using Traps

Task Guidance. This task consists of inserting pipeline barrels, relieving pressure, inserting or removing internal devices, pressurizing barrel, and launching/receiving internal devices. These devices may include, but are not limited to, inspection, cleaning, batching, or plugging. Manually opening and closing valves is addressed in Task 0301.

Task 1651 Purge — Flammable or Inert Gas

Task Guidance. This task includes actions to be taken to safely purge pipeline facilities using natural gas, inert gas, or air. Other tasks that may be performed during purging include operating valves, adjusting or monitoring flow or pressure, or operating gas pipelines addressed in

- Task 0301, Manually Opening and Closing Valves
- Task 0311, Adjust and Monitor Flow or Pressure — Manual Valve Operation
- Task 1201, Temporary Isolation of Service Lines and Service Discontinuance
- Task 1381, Operate Gas Pipeline: Local Facility Remote-Control Operations (if performed)

Task 1661 Purge: Hazardous Liquids

Task Guidance. This task includes actions to be taken to safely purge or drain down hazardous liquids pipeline facilities. Other tasks that may be performed during purging or drain down include operating valves, adjusting or monitoring flow or pressure, or operating liquids pipelines addressed in

- Task 0301, Manually Opening and Closing Valves
- Task 0311, Adjust and Monitor Flow or Pressure — Manual Valve Operation
- Task 1391, Operate Liquids Pipeline: Systems Control Center Operations (if performed)

Task 1671 Pipeline Heater — Inspection and Preventive Maintenance

Task Guidance. This task includes verification that the pipeline heater is functioning within specified parameters. This task also includes actions to keep the pipeline heater operating safely and efficiently. Inspection of pressure-regulating and -relief devices is addressed in

- Task 0381, Spring-Loaded, Pressure-Regulating Device — Inspection and Testing, Preventive and Corrective Maintenance
- Task 0411, Spring-Loaded, Pressure-Limiting, and -Relief Device: Device — Inspection, Testing, Preventive and Corrective Maintenance

Task 1681 Liquid Knockout (Dehydration) System Inspection, Testing, and Preventive Maintenance

Task Guidance. This task includes verification that the liquid knockout system is functioning within specified parameters after installation and prior to or during placement in service. This task also includes actions to keep the system operating safely and efficiently.

Task 1691 Glycol Dehydration System Inspection and Testing, Preventive and Corrective Maintenance

Task Guidance. This task includes verification that the glycol dehydration system is functioning within specified parameters after installation and prior to or during placement in service. This task also includes the repair or replacement and alteration or refurbishment of the dehydration system, and actions to keep the system operating safely and efficiently.

Task 1701 Mole Sieve Dehydration System Inspection and Testing, Preventive and Corrective Maintenance

Task Guidance. This task includes verification that the mole sieve (dry-bed) dehydration system is functioning within specified parameters after installation and

prior to or during placement in service. This task also includes the repair or replacement and alteration or refurbishment of the dehydration system, and actions to keep the system operating safely and efficiently.

ASMENORMDOC.COM : Click to view the full PDF of ASME B31Q 2016

NONMANDATORY APPENDIX C TASK LIST DEVELOPMENT PROCESS

The development of the task list in Nonmandatory Appendix A was a comprehensive process. Various sectors of the pipeline industry were considered: hazardous liquids, gas transmission, gas distribution, large and small operators, contractors, and service provid-

ers. The task list is also designed to support the benefits of portable evaluations. Table C-1 describes the process utilized to arrive at the covered tasks in Nonmandatory Appendix A.

Table C-1 Task List Development Process

	Reviewers/Participants	Action/Focus	Results
1	Subject Matter Experts representing hazardous liquids, gas transmission, and gas distribution pipelines. Expertise represented: corrosion, mechanical, electrical, operations, and construction/maintenance.	Develop fault trees. Identify covered tasks from the fault trees, and perform initial quality control review.	Fault trees and initial covered task list developed.
2	B31Q Team 3	QA/QC review	Updated covered task list.
3	A larger SME team with same experience as above (a few members overlap). Pipeline contractors and diving/underwater experience also represented.	Review covered task list and initial development of task steps.	Updated covered task list and initial identification of task steps.
4	B31Q Team 6	Develop task steps.	Final task steps identified and questions raised about possible combination, elimination, or revision of some covered tasks.
5	Teams of SMEs for subject areas facilitated by B31Q Teams 4 and 6.	Revise covered task list, perform DI analysis for subsequent qualification intervals, and determine appropriate, minimum evaluation methods for each task.	Updated covered task list. Subsequent qualification intervals developed. Methods identified for initial qualification and subsequent qualification. Spans of control developed.
6	B31Q Review	QA/QC, including soliciting SME input when needed.	Finalized task list.

NONMANDATORY APPENDIX D

EXAMPLE OF EVALUATION CRITERIA

Table D-1 is an example of evaluation criteria for a task, Measure Structure-to-Electrolyte Potential, Task 0001. This example was created by taking an existing evaluation for the task and listing the criteria as they correspond to the steps for portability. Listing criteria according to the steps is not necessary, but for portable evaluation providers, it may help show how the steps are covered by the evaluation. Using the same method for initial and subsequent qualification is always an option. When initial qualification requires performance along with written or oral evaluation, but use of only written or oral testing is justified for subsequent

qualification, those criteria evaluated by performance can be measured with written or oral questions for subsequent qualification. For example, Step 2 criteria require the individual to “perform routine maintenance.” Rather than performing the maintenance, for subsequent qualification, the individual could be questioned on the steps he or she would perform, how the step or steps might change dependent on the situation, why each step is needed, etc. It is important that the same criteria are covered in both initial and subsequent qualification, even if the method is allowed to be different.

Table D-1 Task 0001, Measure Structure-to-Electrolyte Potential

Step	Evaluation Criteria
1. Identify structure-to-electrolyte potential measurement requirements.	Identify specifications or procedures that contain measurement requirements, and explain the specification or procedure requirements, including safety and environmental items.
2. Perform test equipment check.	Identify equipment to be used, verify equipment functions within specified parameters and tolerances, initiate corrective action when equipment is outside allowable tolerances and/or requires repair, and perform routine maintenance.
3. Identify and locate correct test point.	Describe correct placement of test equipment, e.g., location over structure, etc., or place test equipment (half-cells and test leads) in accordance with requirements.
4. Measure and ensure accuracy of structure-to-electrolyte potential.	Obtain and record measurements, describe items that may affect measurement accuracy, e.g.: polarity of structure-to-electrolyte measurements, IR considerations when taking measurements, methods for minimizing contact resistance, procedures related to measuring pipe-to-water potentials, where applicable, defective test leads or station, at least four conditions that may result in questionable measurements, current drain, such as rebar/concrete and station grounding systems, on structure-to-electrolyte potential, and pipe-coating condition.
5. Recognize and react to abnormal operating conditions (AOCs).	Describe AOC(s) that may be encountered while performing the task. Describe the reaction to AOC(s): initiating remedial action or reporting for analysis of remedial actions required.
6. If required, complete documentation.	Identify or describe documentation requirements, and complete or describe the completion and submittal of documentation.

NONMANDATORY APPENDIX E ABNORMAL OPERATING CONDITIONS (AOCs)

The following is a list of AOCs that may occur on a pipeline:

- (a) unplanned escape of product from a pipeline
- (b) fire or explosion
- (c) unplanned pressure deviation (e.g., increase, decrease, high, low, absent)
- (d) unplanned flow-rate deviation (e.g., high flow, low flow, no flow)
- (e) pipeline damage (e.g., excavation damage, lightning strikes, tornado, flood, earthquake)
- (f) activation of a safety device(s) other than during planned testing (e.g., pressure relief, emergency shutdown, high-pressure shutdowns, case pressure shutdowns, high-temperature shutdowns)
- (g) unplanned status change (e.g., unit startup, unit shutdown, valve open, valve close, without being directed to do so)
- (h) interruption or failure of communications, control system, or power
- (i) inadequate odorization or reports of gas odor

ASMENORMDOC.COM : Click to view the full PDF of ASME B31Q-2016

NONMANDATORY APPENDIX F EVALUATION METHOD SELECTION

F-1 GENERAL

The tasks included in Nonmandatory Appendix A were reviewed by SMEs to determine the minimum appropriate evaluation method(s) for each task. The following is similar to the process used in order to help explain the result or provide guidance in the event this process is used by others.

The process to determine evaluation methods may be performed with the same group of SMEs that analyzed the Difficulty and Importance of the tasks. A description of SME selection and representation is in para. 5.3.1 and Nonmandatory Appendix G.

The process includes the following steps:

- (a) introduction of the reason for the discussion (identify appropriate evaluation methods for each task)
- (b) review of definition and examples of KSAs
- (c) review of the appropriate methods for KSAs
- (d) consensus on appropriate method (one task at a time)
- (e) review of final product

F-2 INTRODUCTION: THE REASON FOR SETTING AN APPROPRIATE EVALUATION METHOD

Careful selection of evaluation methods makes the evaluation best reflect the individual's KSAs to perform the task. While each evaluation method may measure a variety of KSAs, each method tends to measure one type or another better. The intent of this exercise is to determine the minimum method(s) that would best evaluate the KSAs required for task performance.

F-3 DEFINITION AND EXAMPLES OF KSAs

Table F-3-1 may be reviewed with the SMEs to help them understand KSAs. Because physical ability is evaluated while skills are evaluated, the definition and examples of ability were reviewed, but the main focus was on the definitions of knowledge and skills.

F-4 APPROPRIATE METHODS FOR KSAs

Table F-4-1 may be reviewed with SMEs to help them see the relationship between the KSAs required by a task and the appropriate evaluation method. The information specified in paras. F-4.1 and F-4.2 was discussed to explain the table.

F-4.1 Written Evaluations

Written evaluations mainly measure knowledge, as indicated by the filled circle under Knowledge in Table F-4-1. They also measure reading ability, some writing ability, some mental abilities including reasoning ability (narrowing down to the right answer), test-taking skills, and many other factors.

F-4.2 Oral Interview Evaluations

Oral evaluations mainly measure knowledge, as indicated by the filled circle under Knowledge in Table F-4-1. They also measure communication skills and some general mental abilities.

F-4.3 Performance Evaluations

Performance evaluations mainly measure skill and physical abilities, as indicated by the filled circle under Skill and Ability in Table F-4-1. Knowledge is also measured, particularly the application of knowledge, but the extent knowledge is measured depends on the extent to which the context affects performance. Tasks that require the use of different equipment, application of different steps, or where different conditions are created or encountered based on the situation may require that additional knowledge be evaluated by another evaluation method.

F-5 CONSENSUS ON MINIMUM APPROPRIATE EVALUATION METHOD

Each task was discussed in turn, and the results were documented for each task. "P" was used to indicate performance, "O" was used to indicate oral, "W" was used to indicate written, "/" was used to indicate an "or," and "&" was used to indicate an "and." Where the result is W/O, either a written or oral method should be used to qualify individuals for the task. Where the result is W/O & P, a performance evaluation should be used and accompanied by either a written or an oral evaluation.

Questions such as the following may be used to help SMEs think about each task and determine whether mainly knowledge or knowledge and skill were involved: